

```
In [3]:  
import libraryF1dataNotebook as libraryDataF1  
import pandas as pd
```

FORMULA 1 MSC CRUISES GRAN PREMIO DEL MADE IN ITALY E DELL'EMILIA-ROMAGNA 2024

The Emilia Romagna Grand Prix (Italian: Gran Premio dell'Emilia-Romagna) is a Formula One motor racing event held at the Autodromo Internazionale Enzo e Dino Ferrari, often referred to as "Imola" after the town where it is located.[1] The event takes the name "Emilia-Romagna" from the Italian region where the circuit is located. The venue has previously hosted the Italian Grand Prix in 1980, and the San Marino Grand Prix from 1981 to 2006.

Source: Wikipedia

Obtain session information

```
In [4]:  
libraryDataF1.obtain_information('sessions', year=2024, country_acronym='ITA')
```

```
Out[4]:  
session_key session_name date_start date_end gmt_offset  
0 9508 Practice 1 2024-05-17T11:30:00+00:00 2024-05-17T12:30:00+00:00 02:00:00  
1 9509 Practice 2 2024-05-17T15:00:00+00:00 2024-05-17T16:00:00+00:00 02:00:00  
2 9510 Practice 3 2024-05-18T10:30:00+00:00 2024-05-18T11:30:00+00:00 02:00:00  
3 9511 Qualifying 2024-05-18T14:00:00+00:00 2024-05-18T15:00:00+00:00 02:00:00  
4 9515 Race 2024-05-19T13:00:00+00:00 2024-05-19T15:00:00+00:00 02:00:00
```

Free Practice 1

Obtain setup

```
In [5]:  
practice = libraryDataF1.obtain_information('laps', session_key=9508)  
stintInformation = libraryDataF1.obtain_information('stints', session_key=9508)  
drivers = libraryDataF1.obtain_information('drivers', session_key=9508)
```

```
In [6]:  
stintsDataFrame = libraryDataF1.stint_configuration(drivers, stintInformation)  
jointables2 = pd.merge(practice, stintsDataFrame, on=['lap_number', 'driver_number'])  
jointables2
```

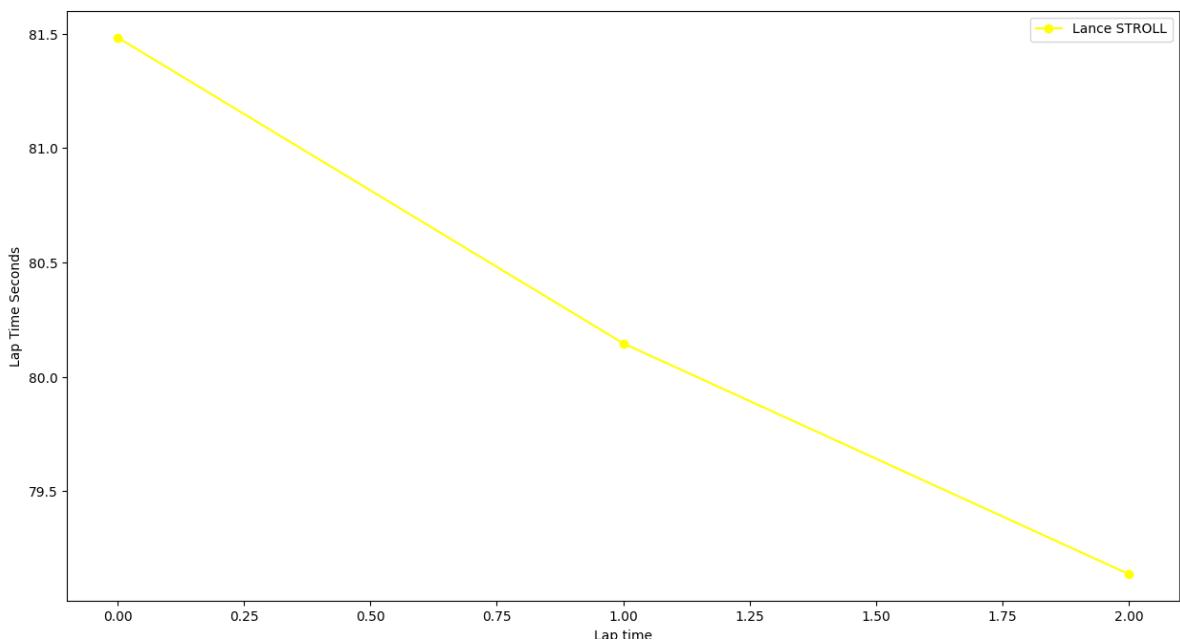
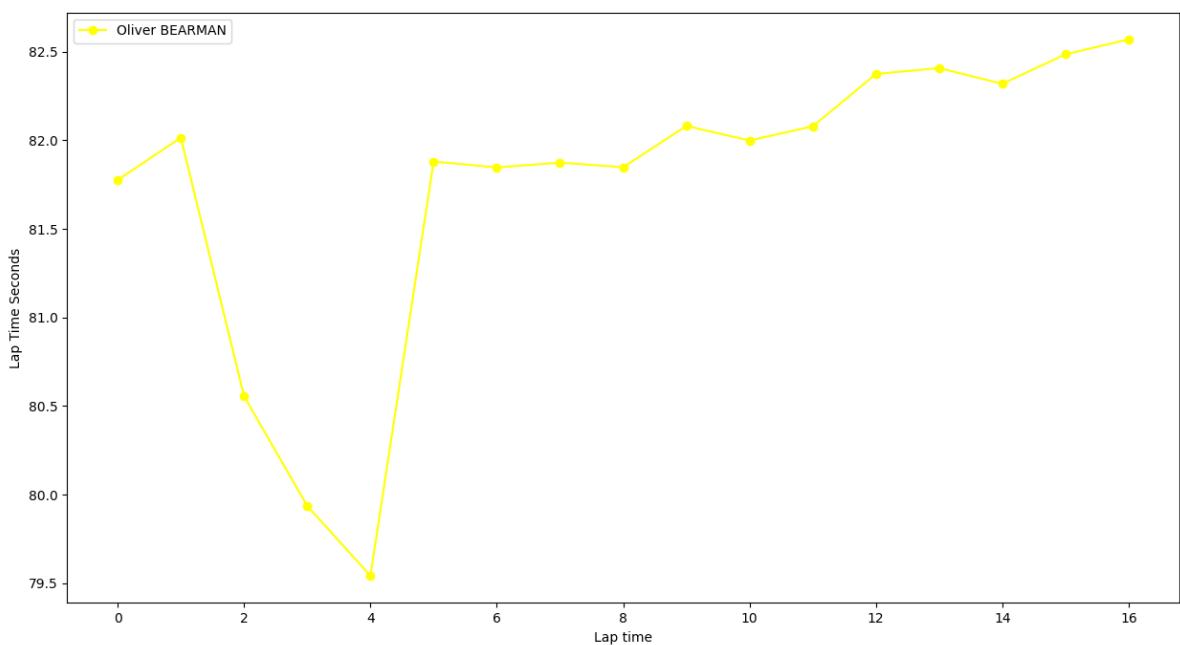
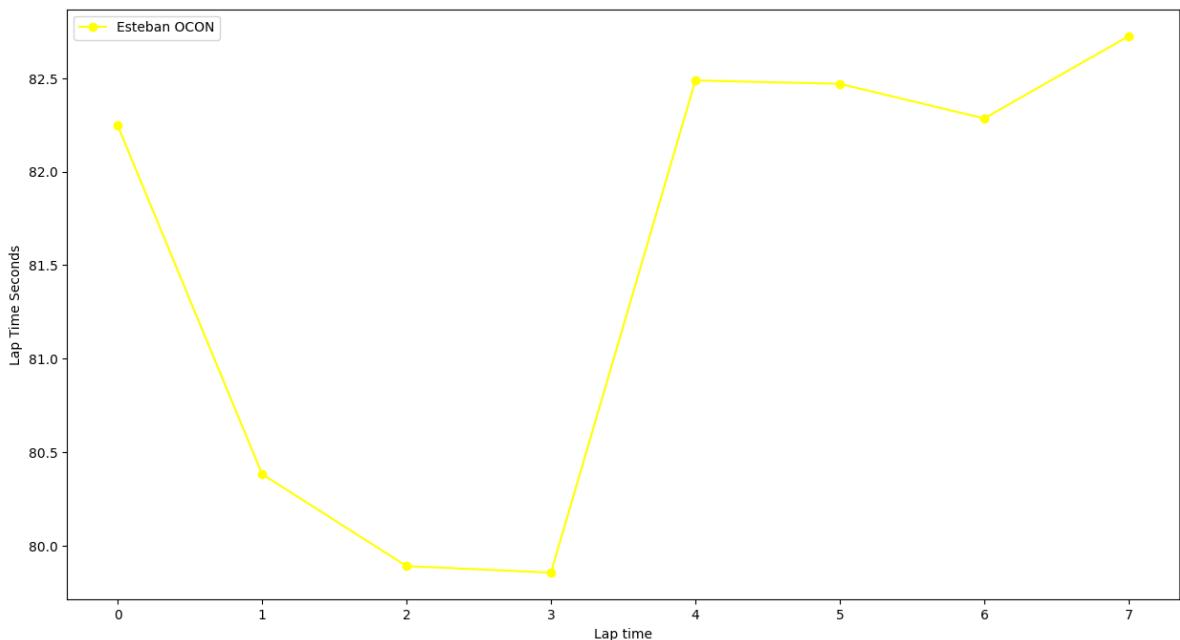
```
Out[6]:  
meeting_key session_key driver_number i1_speed i2_speed st_speed  
0 1235 9508 14 204.0 244.0 249.0 2024-05-17T11:30:  
1 1235 9508 2 192.0 199.0 262.0 2024-05-17T11:30:
```

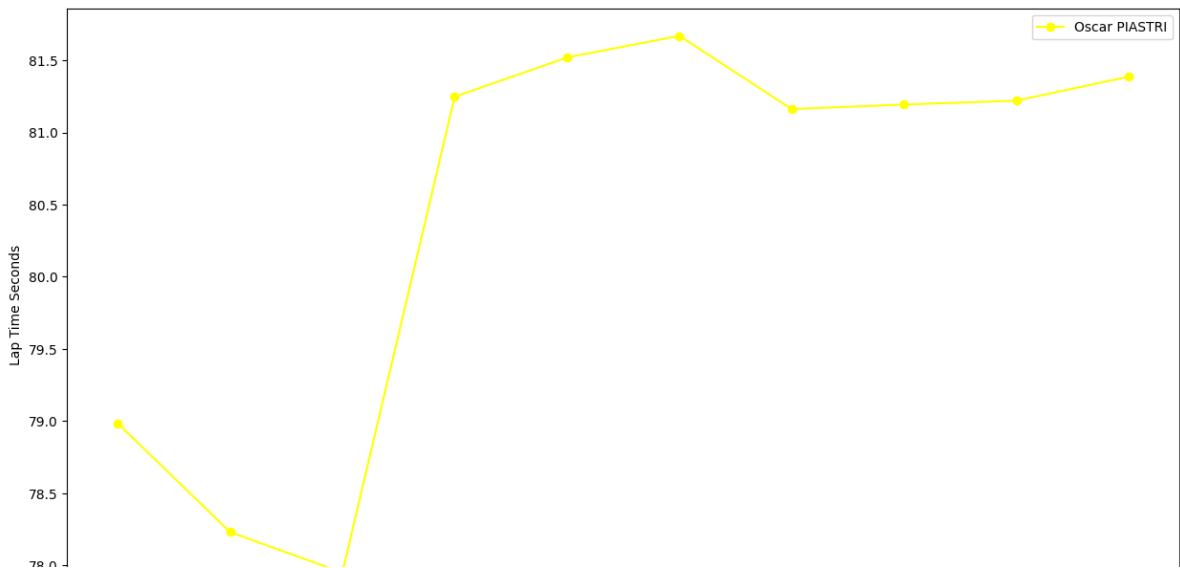
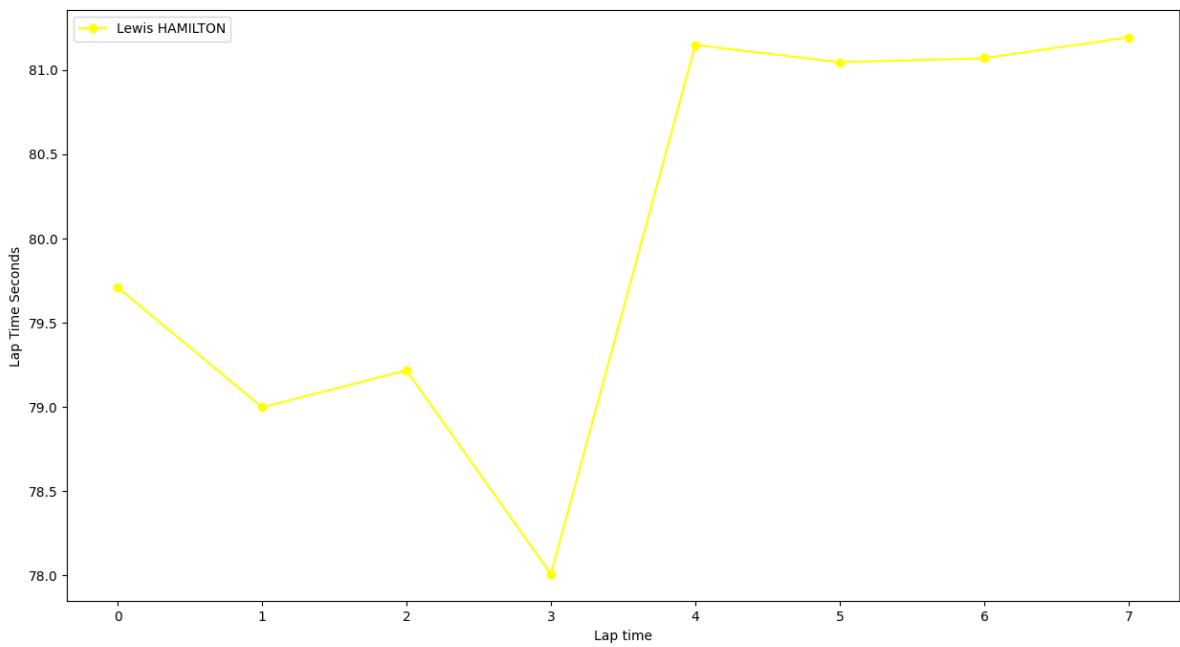
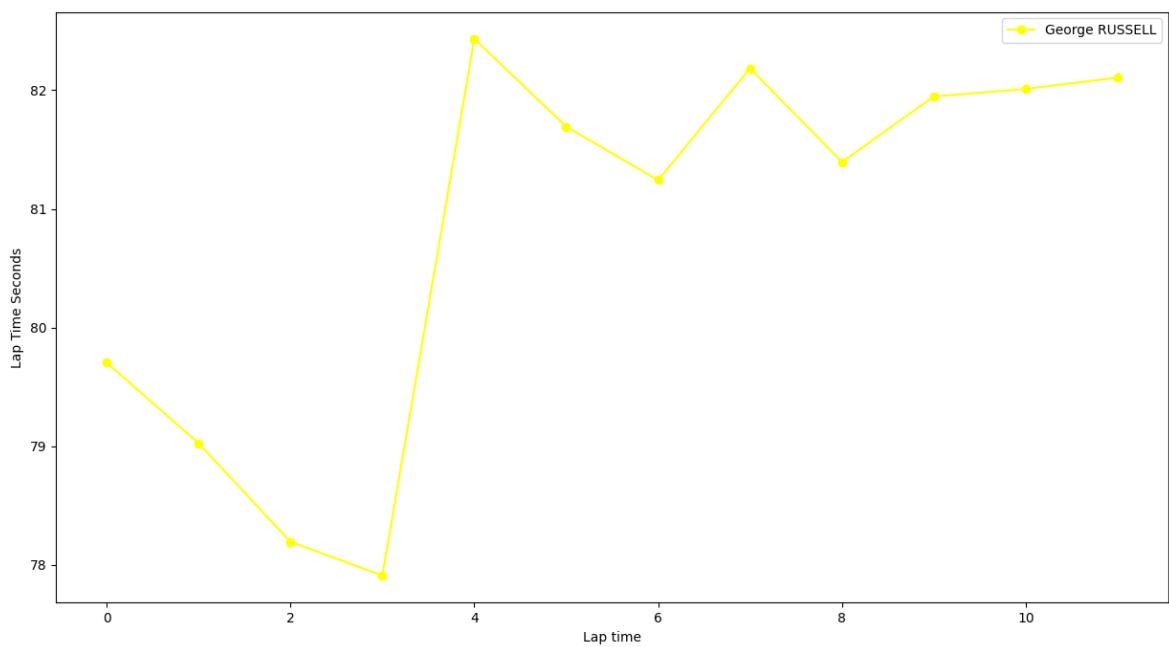
	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
2	1235	9508	23	194.0	199.0	247.0	2024-05-17T11:30:
3	1235	9508	31	182.0	230.0	245.0	2024-05-17T11:30:
4	1235	9508	24	188.0	229.0	208.0	2024-05-17T11:30:
...
458	1235	9508	81	216.0	222.0	232.0	2024-05-17T12:32:
459	1235	9508	11	191.0	228.0	232.0	2024-05-17T12:32:
460	1235	9508	3	195.0	159.0	260.0	2024-05-17T12:33:
461	1235	9508	27	189.0	208.0	237.0	2024-05-17T12:33:
462	1235	9508	16	150.0	169.0	207.0	2024-05-17T12:33:

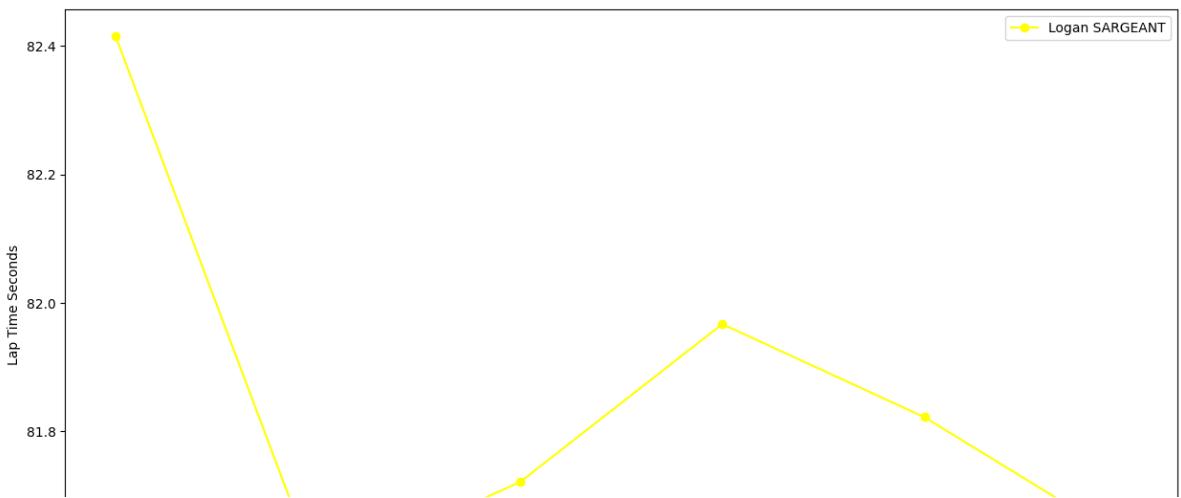
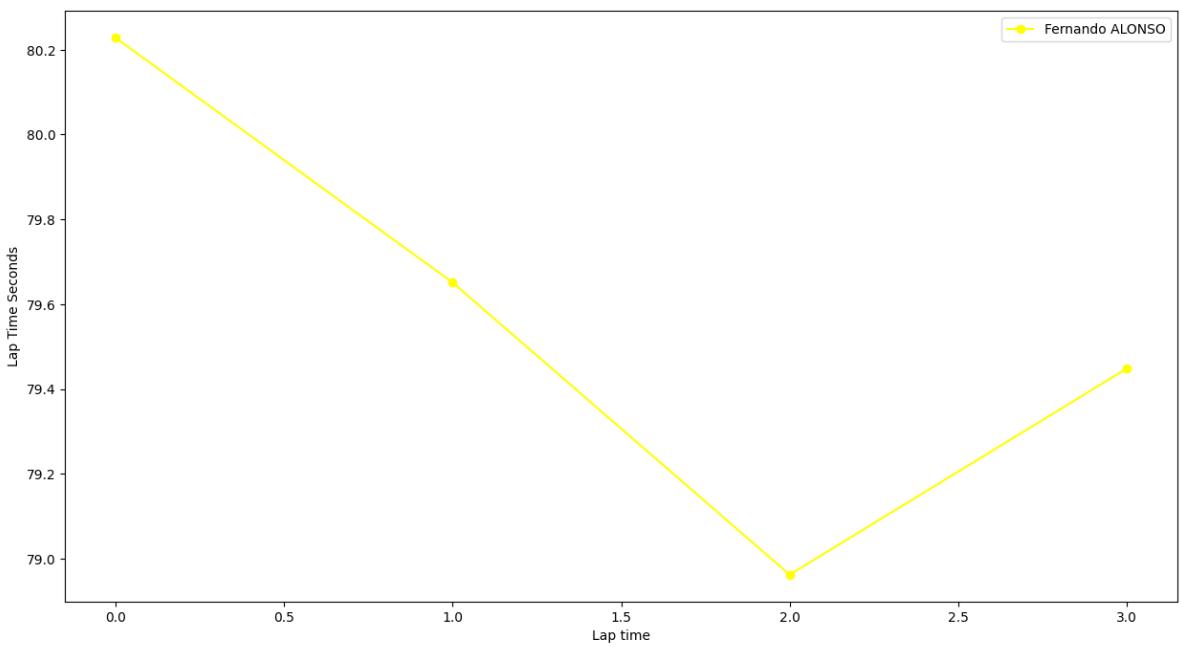
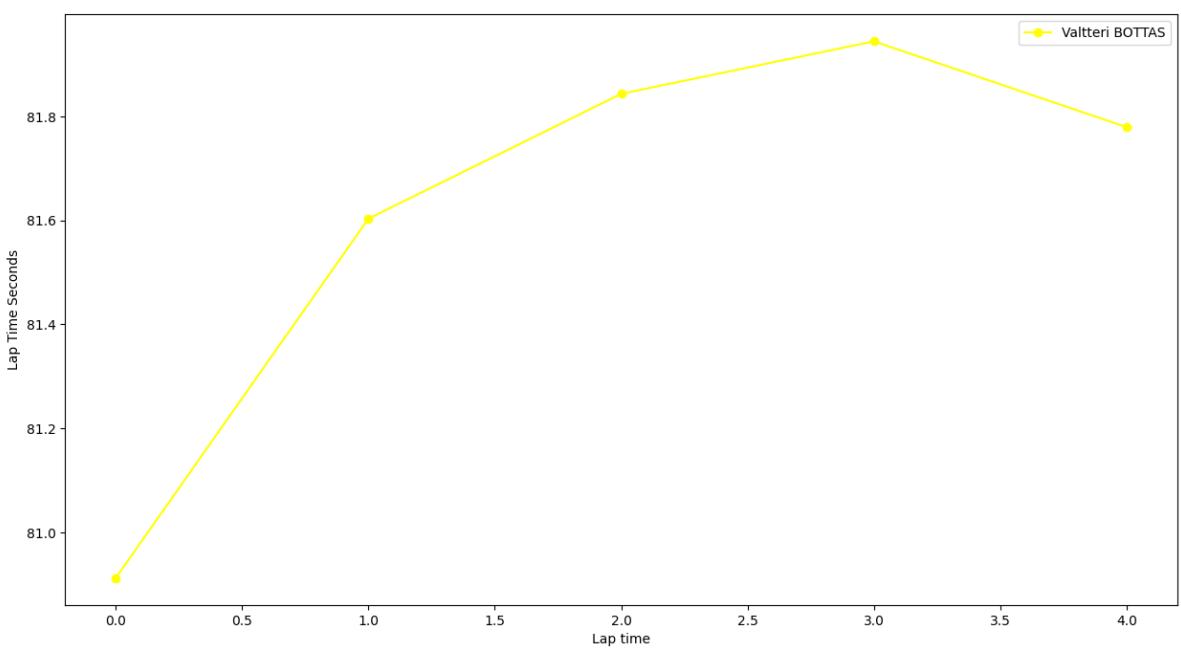
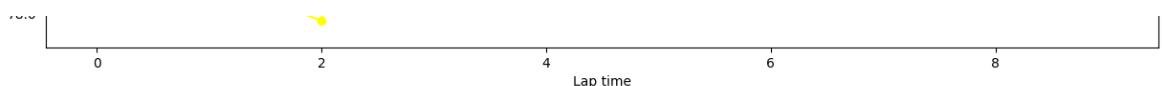
See race pace by means of the charts

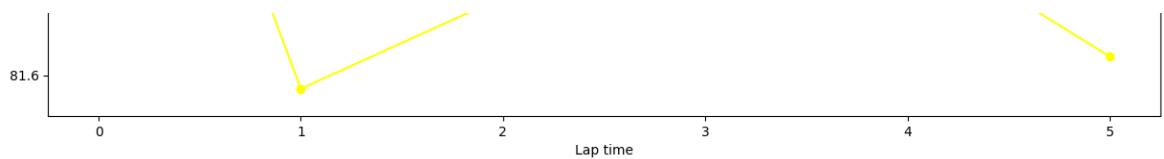
Medium tyres

```
In [7]: libraryDataF1.obtain_data_tyres(jointables2,"MEDIUM",83)
```



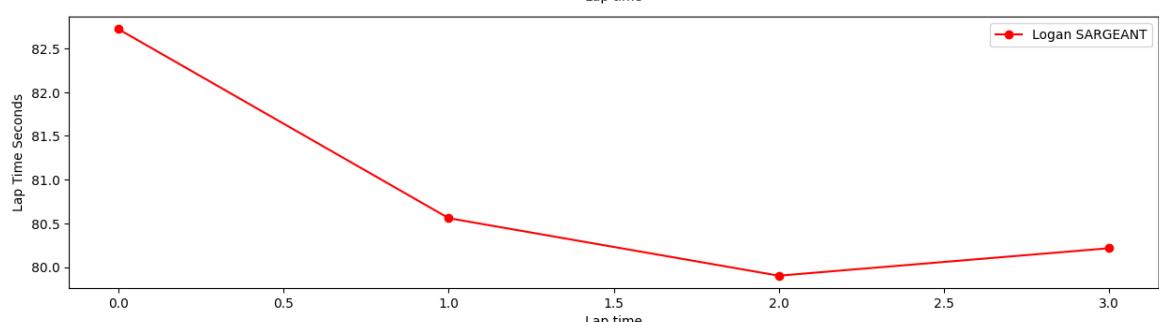
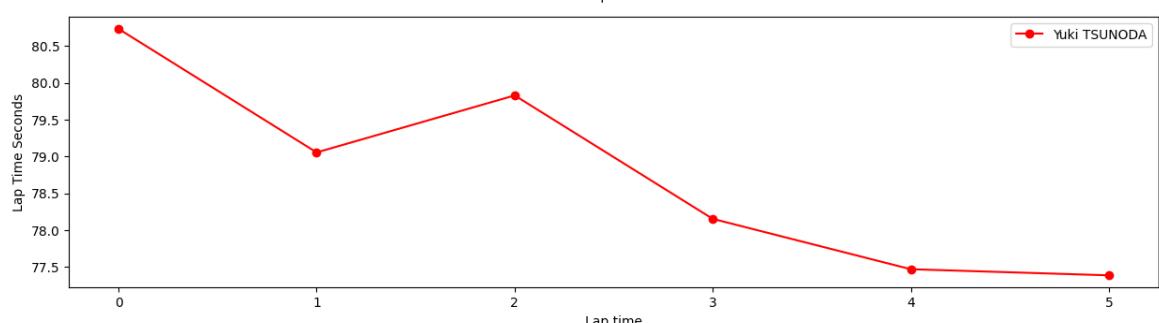
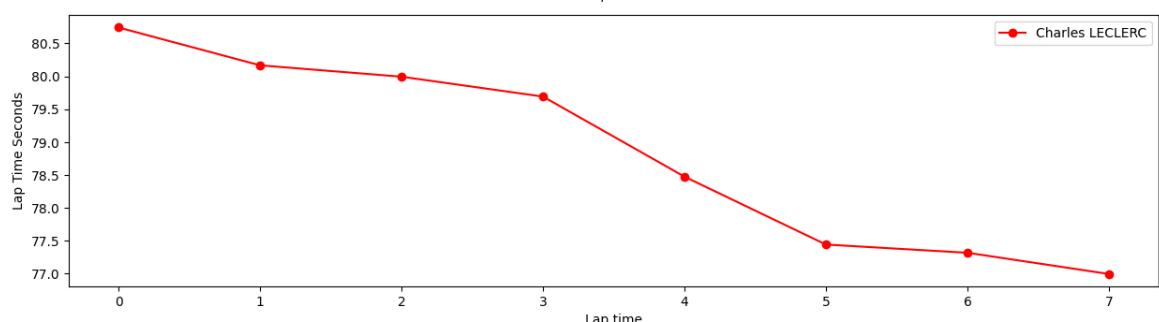
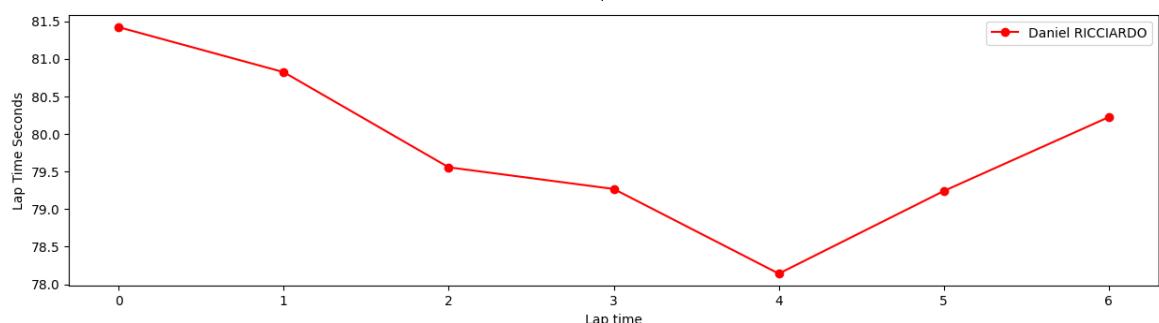
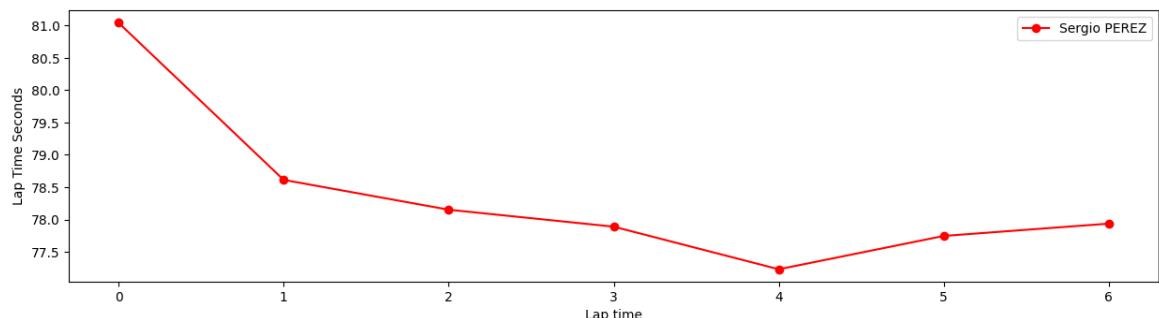
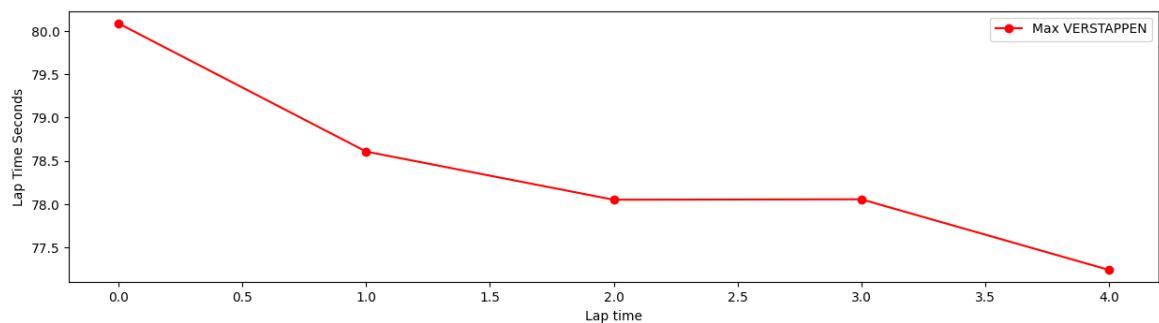


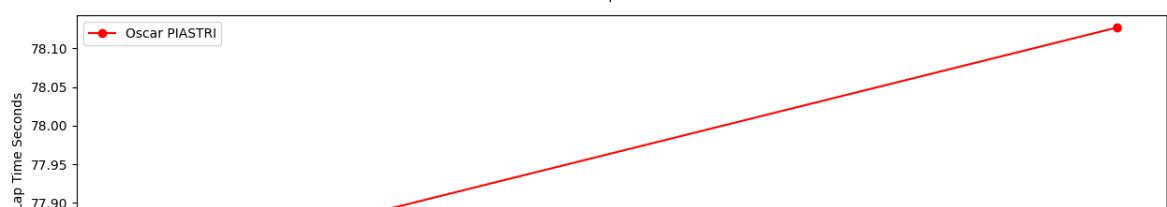
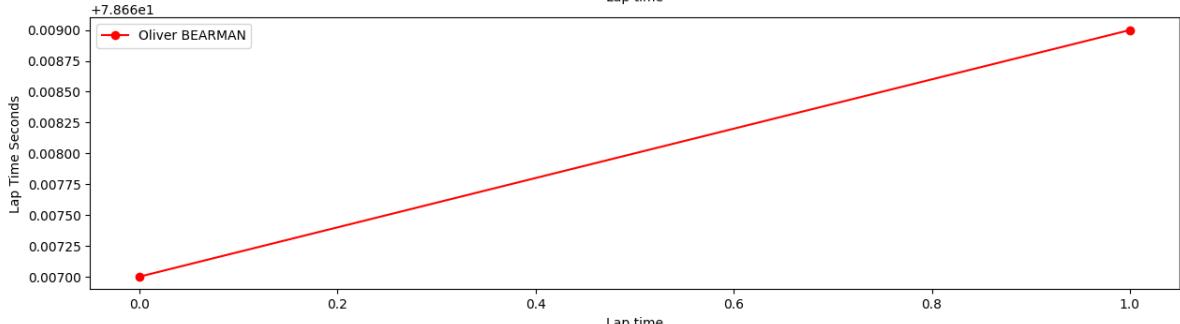
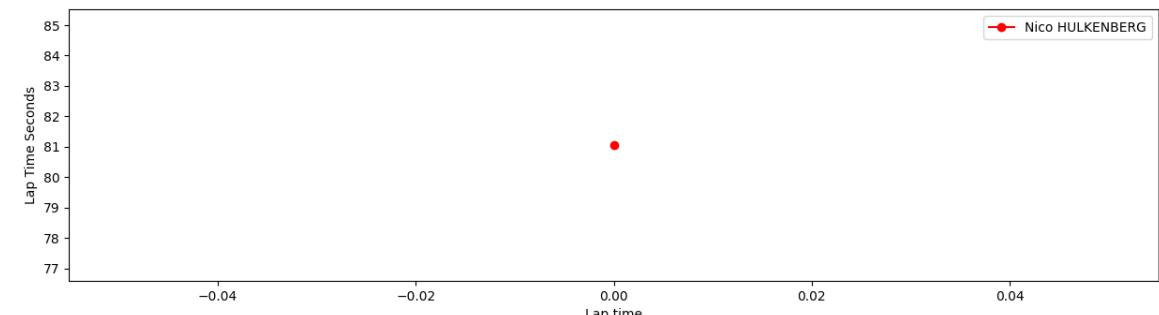
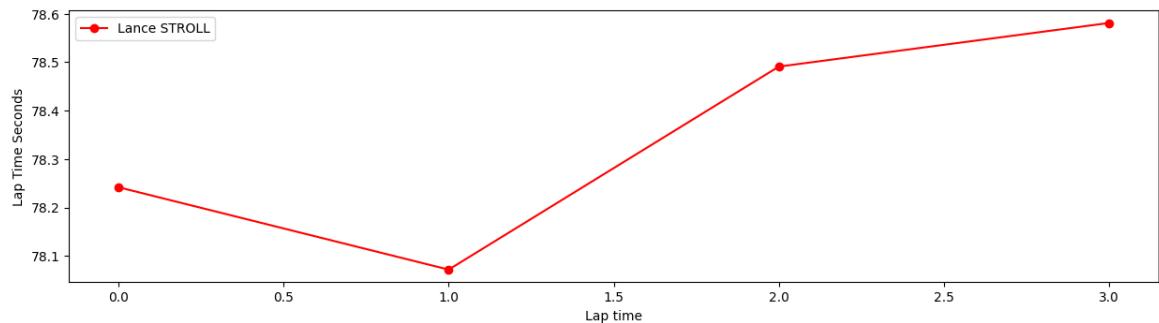
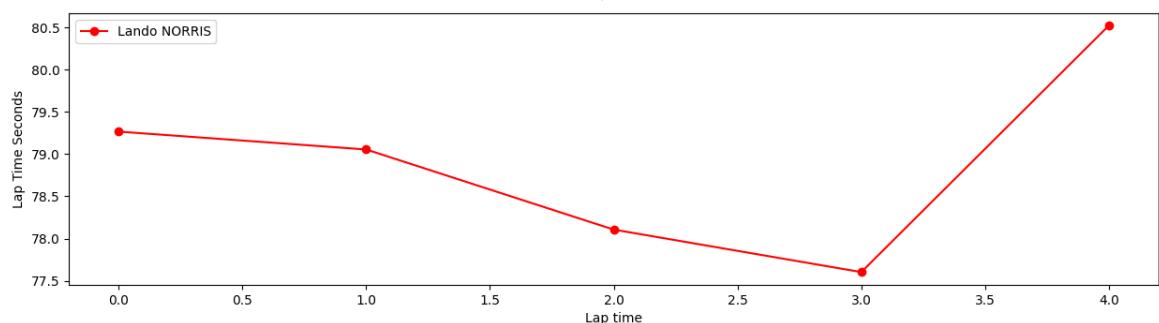
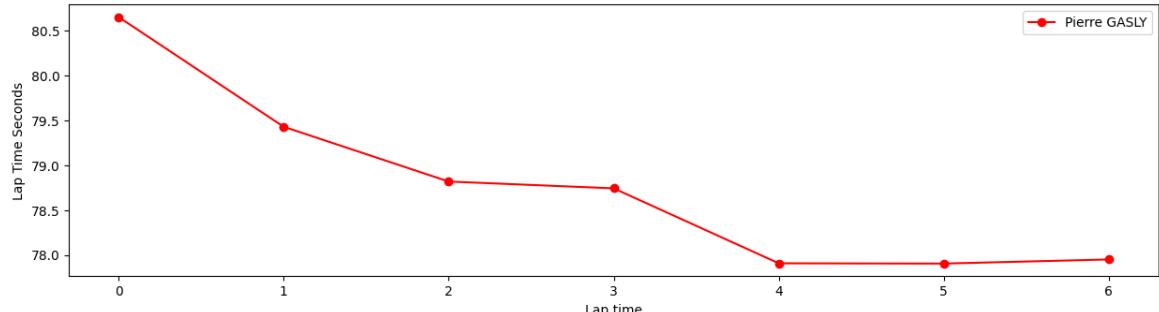
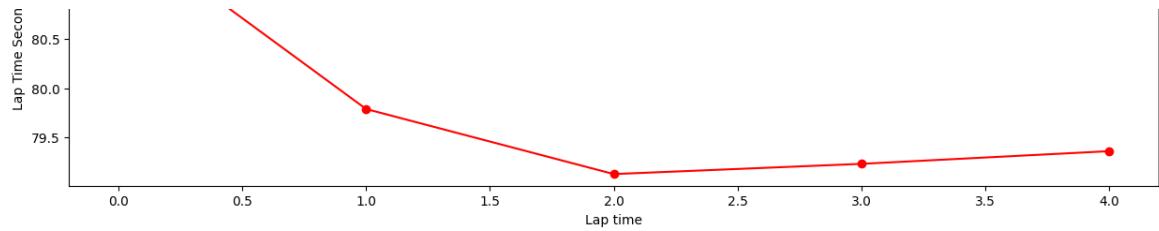


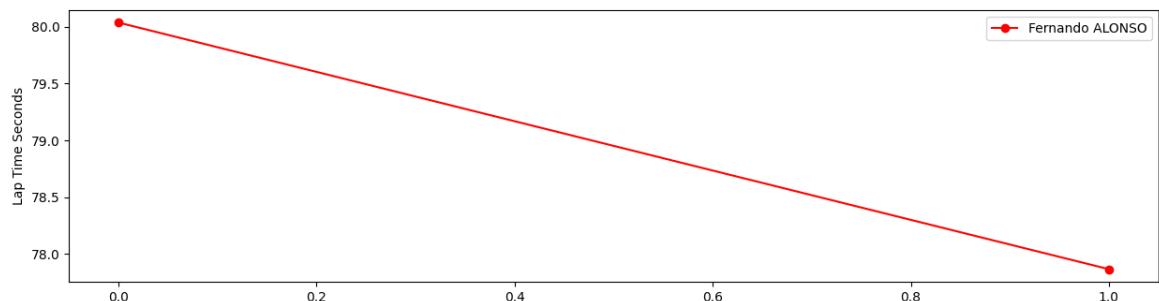
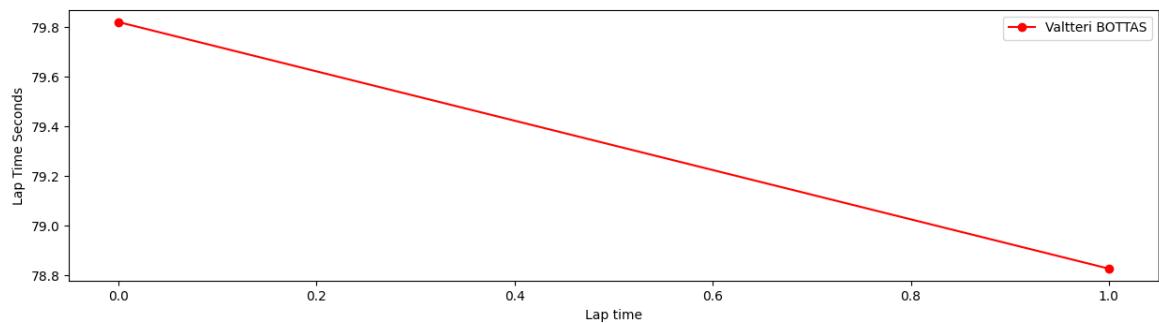
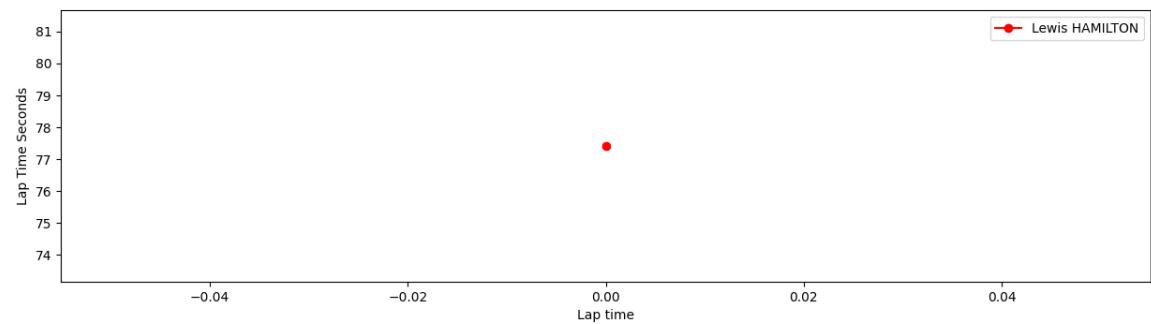
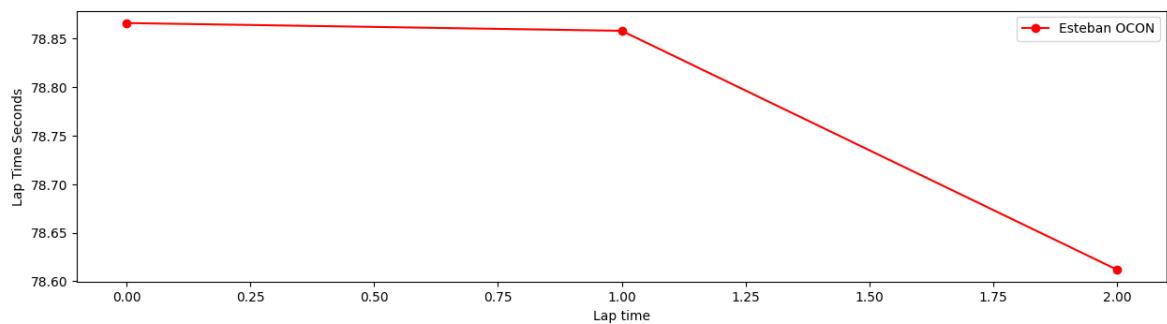
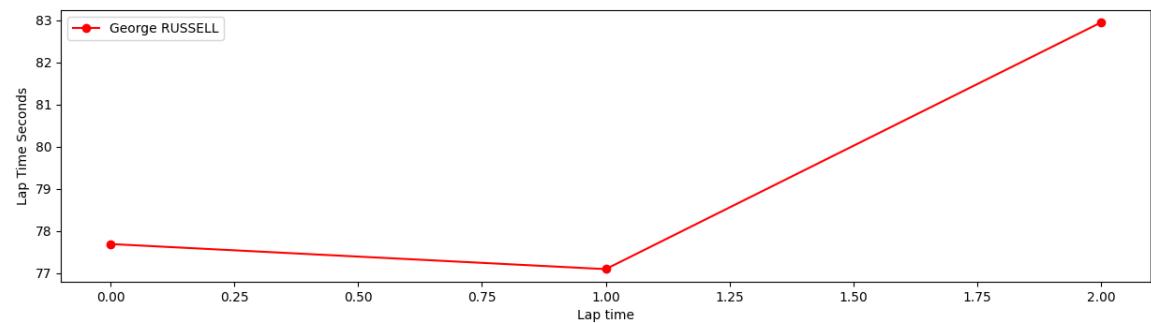
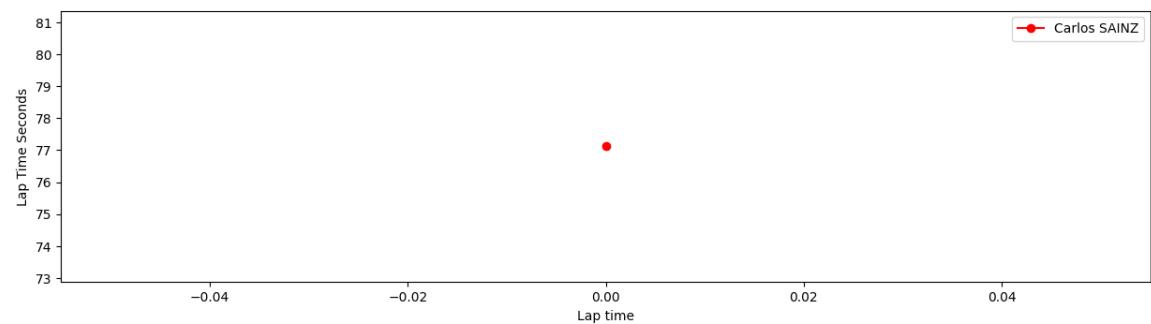
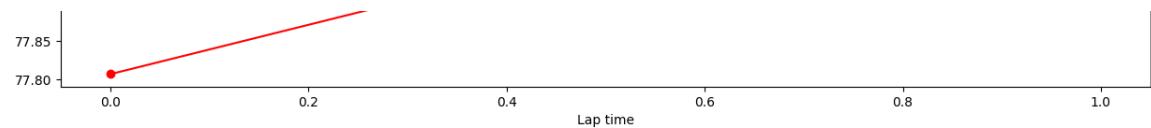


Soft tyres

```
In [8]: libraryDataF1.obtain_data_tyres(jointables2,"SOFT",83)
```



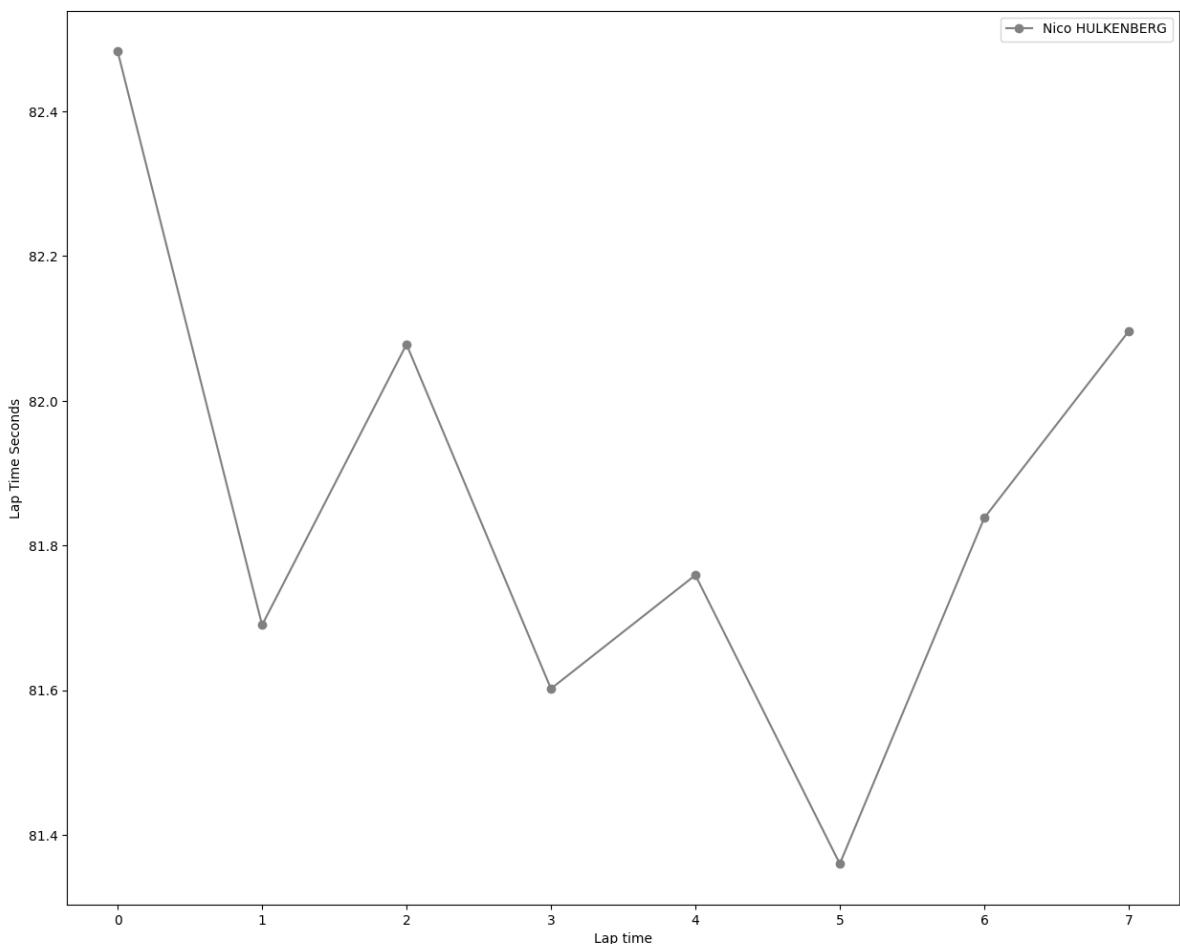
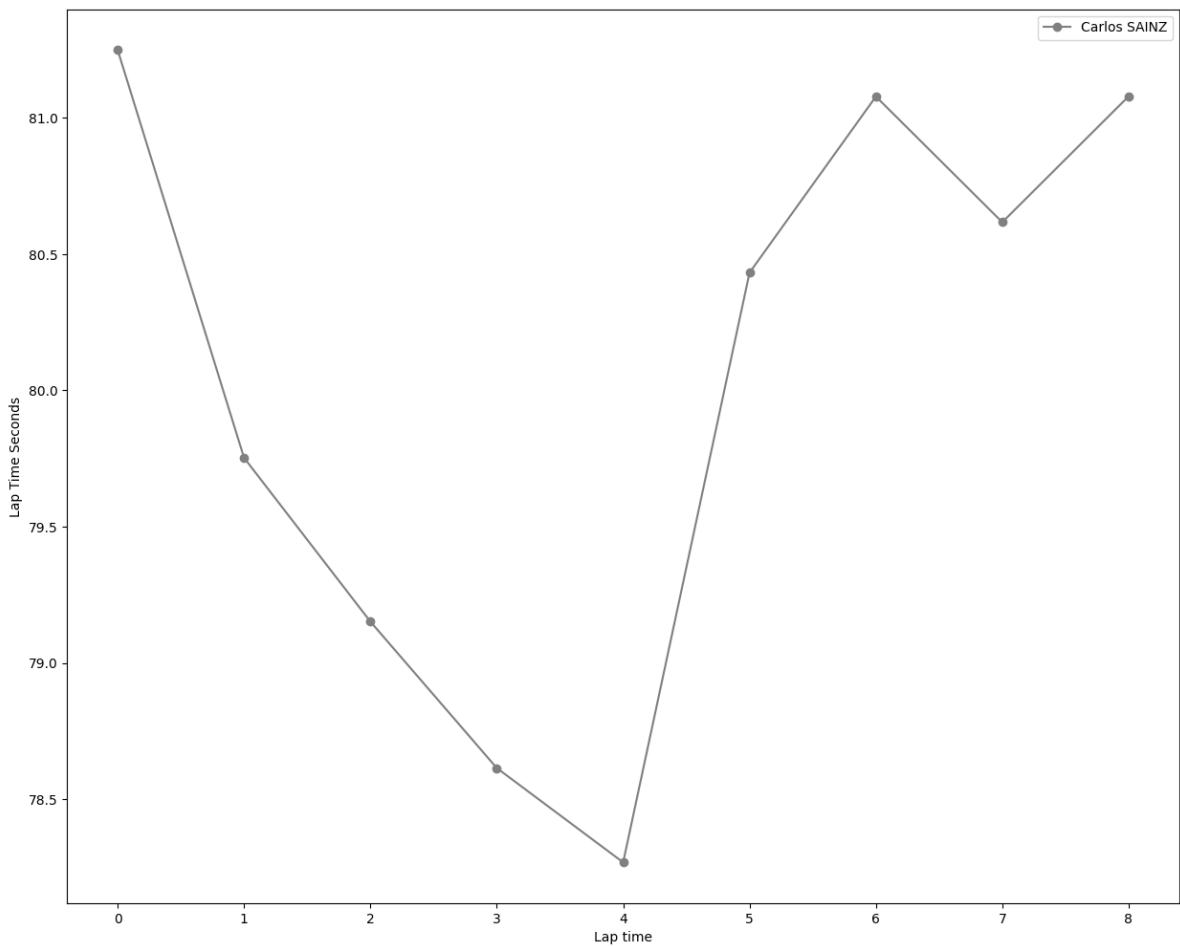


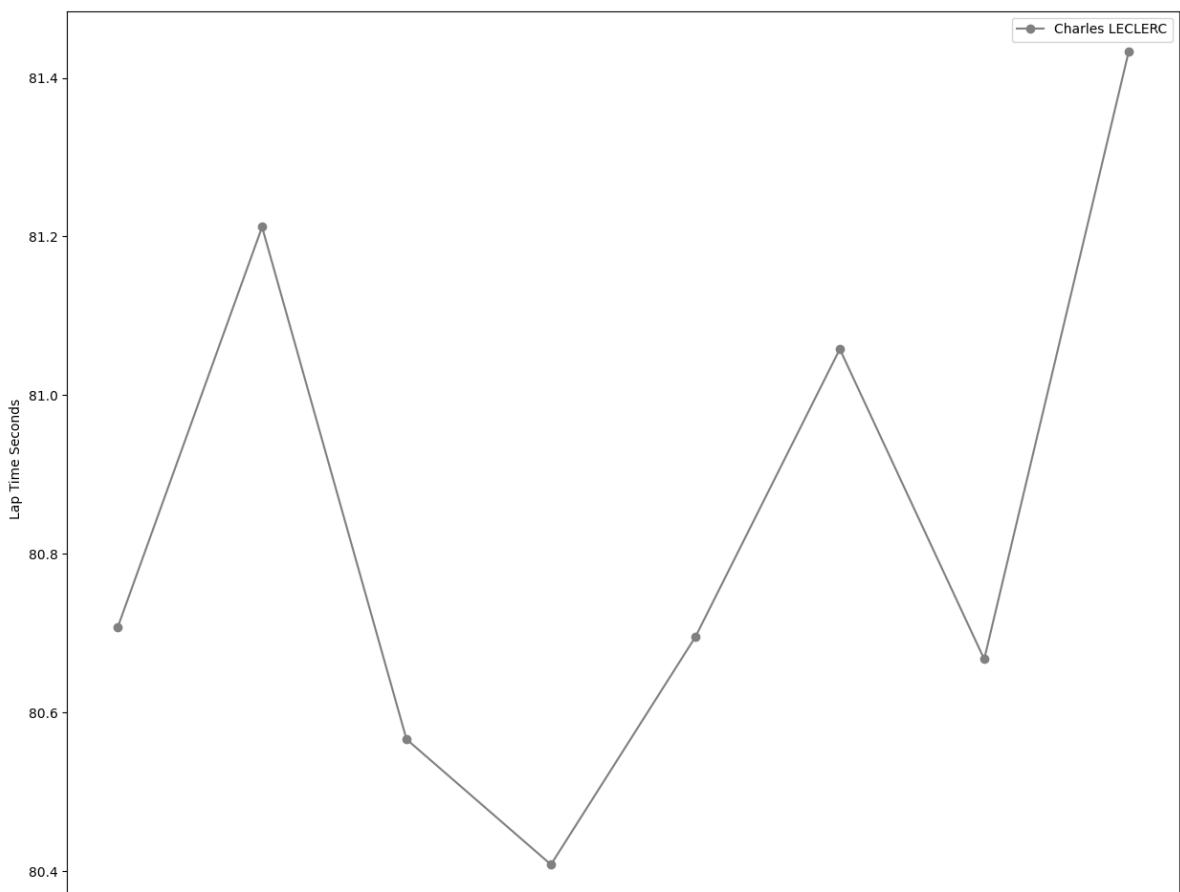
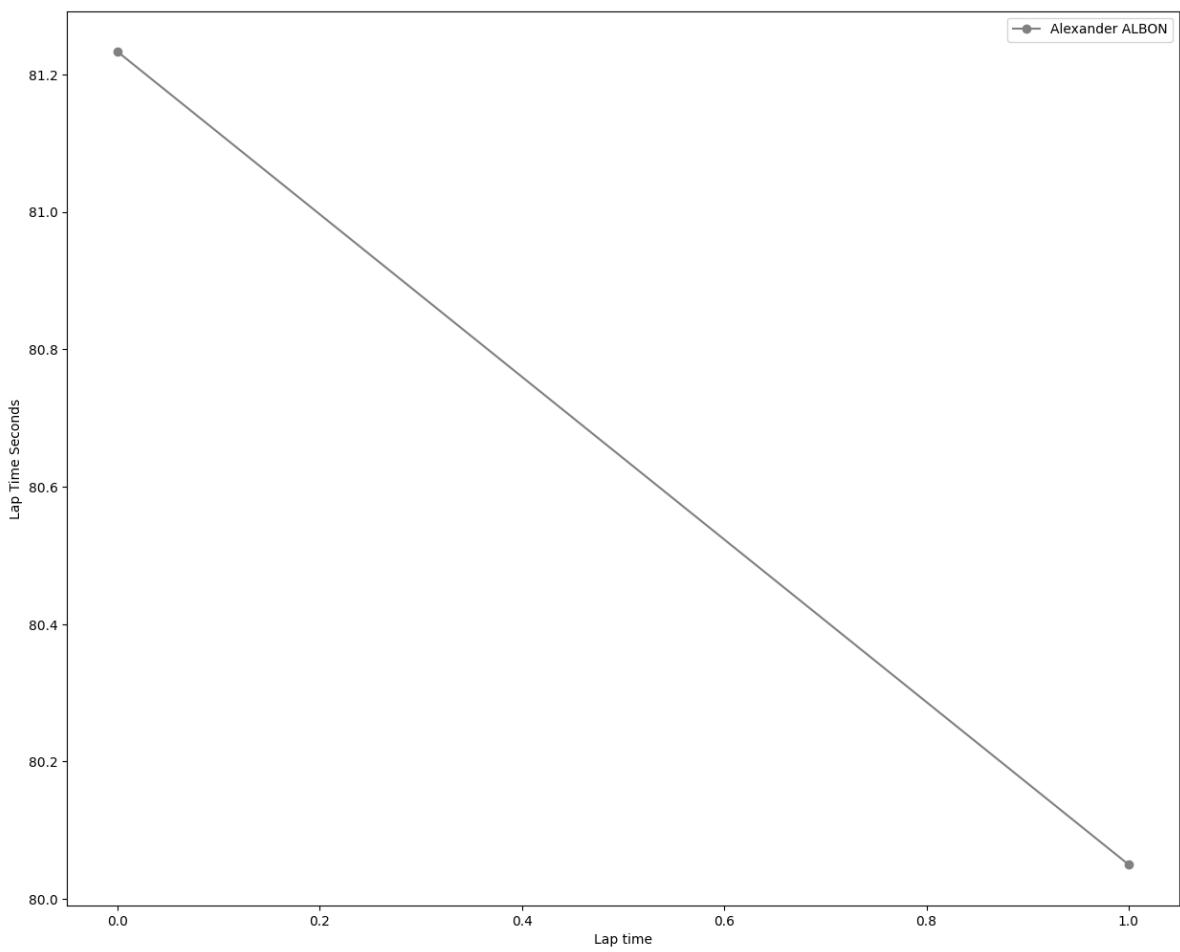


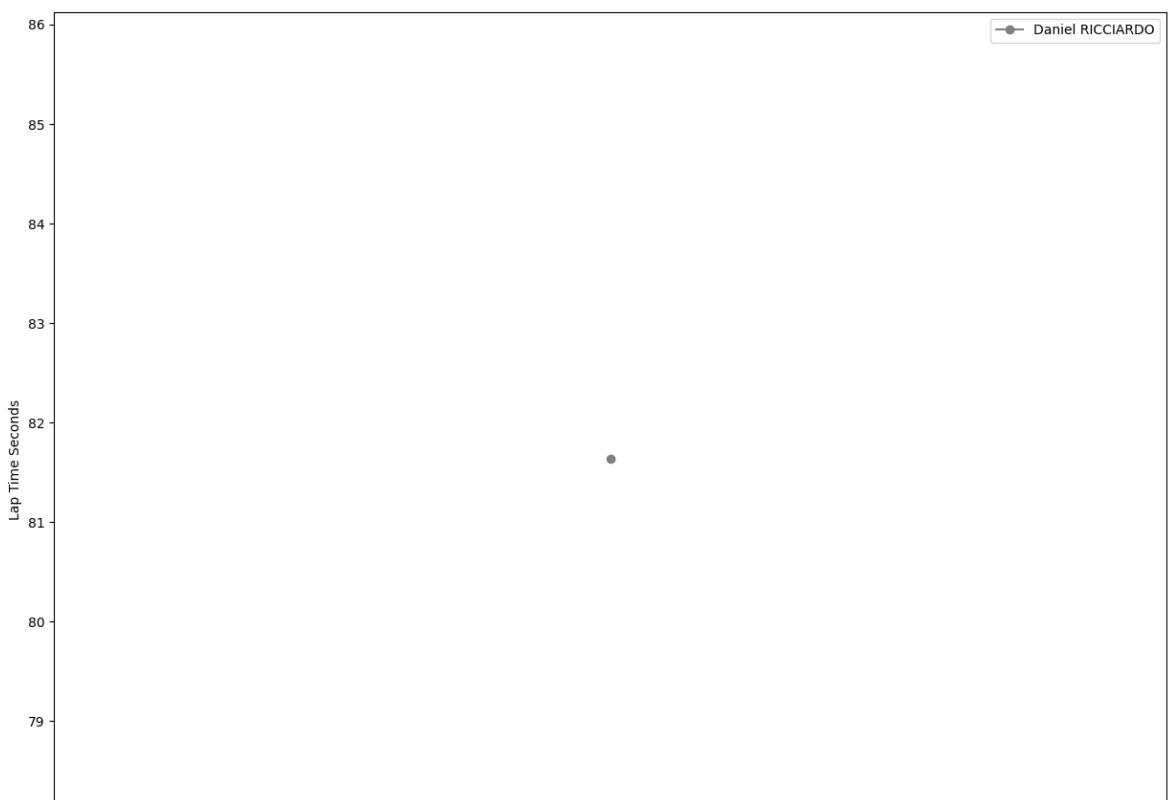
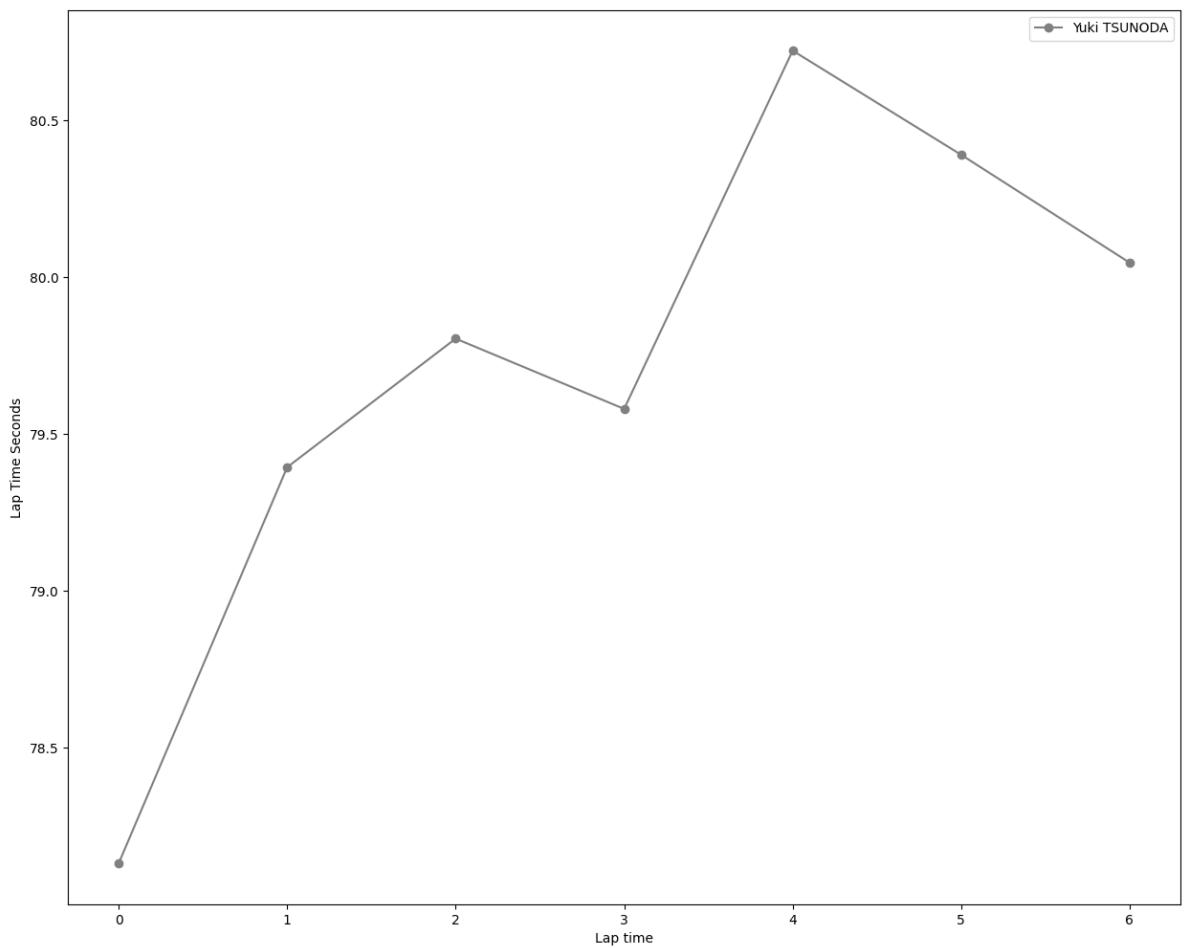
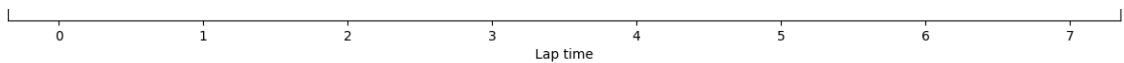
Hard tyres

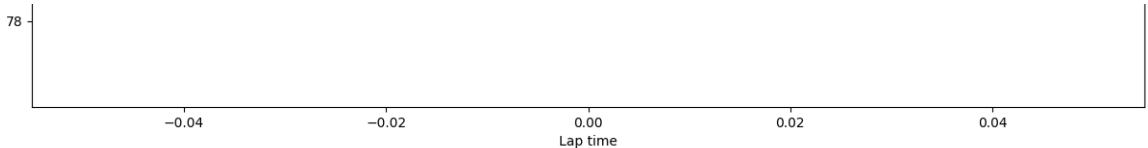
In [9]:

```
libraryDataF1.obtain_data_tyres(jointables2, "HARD", 83)
```



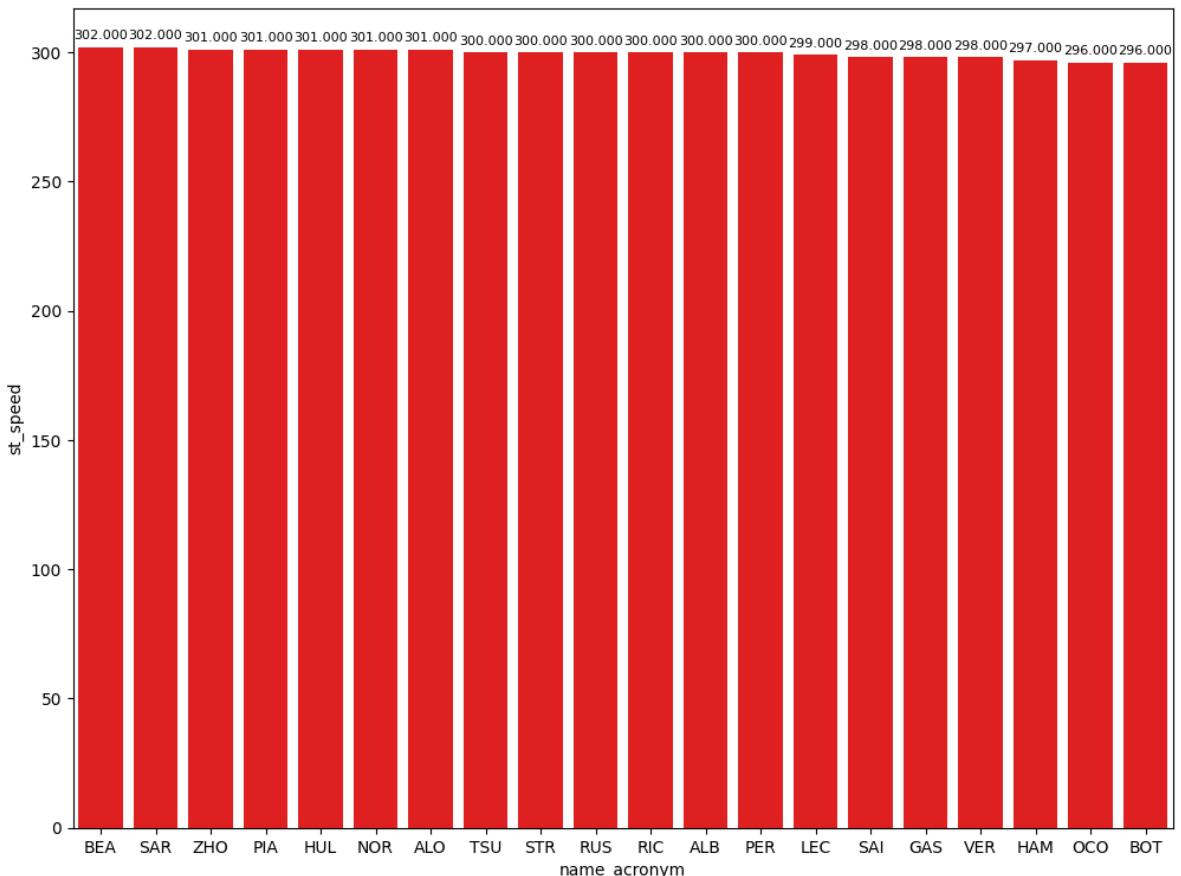




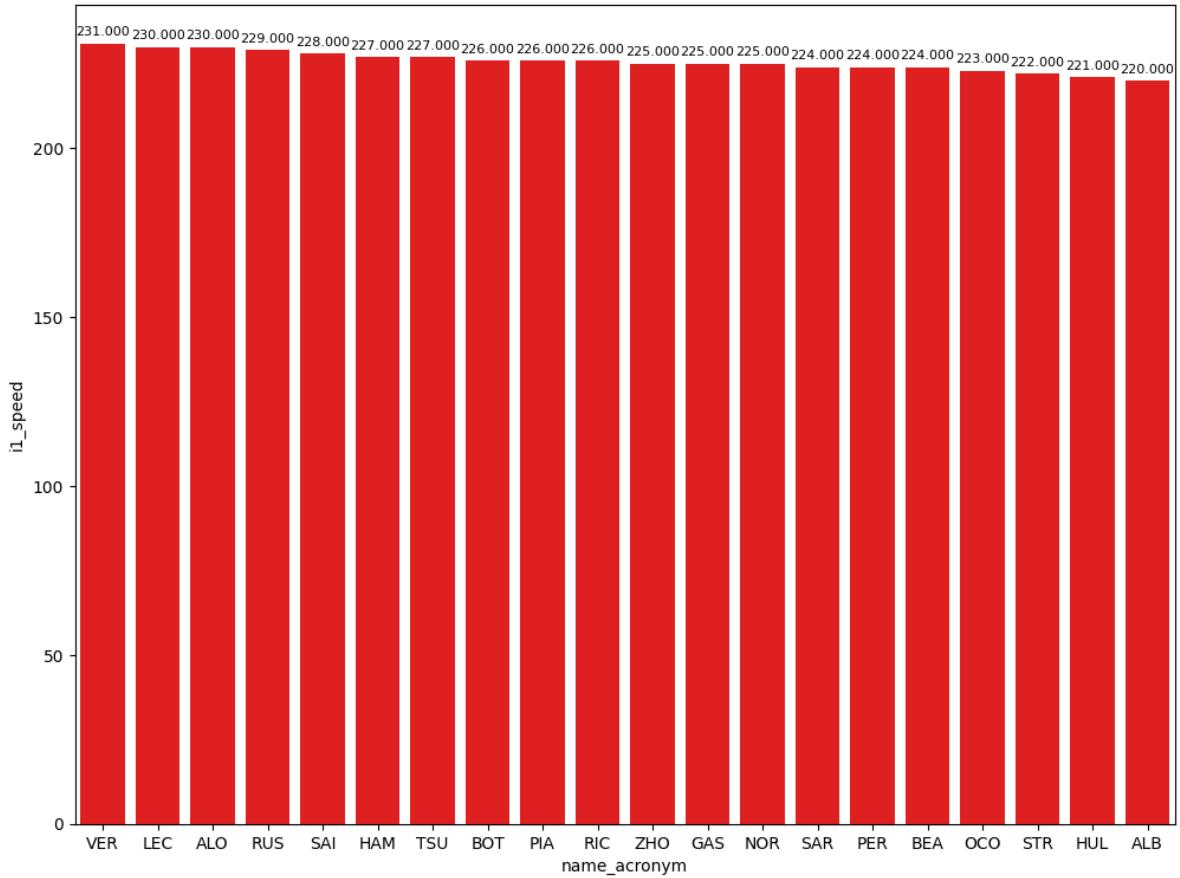


Speed trap

```
In [10]: top_speed = jointables2.loc[jointables2.groupby(['name_acronym'])['st_speed'].max()]
libraryDataF1.obtainchart("name_acronym","st_speed",top_speed)
```

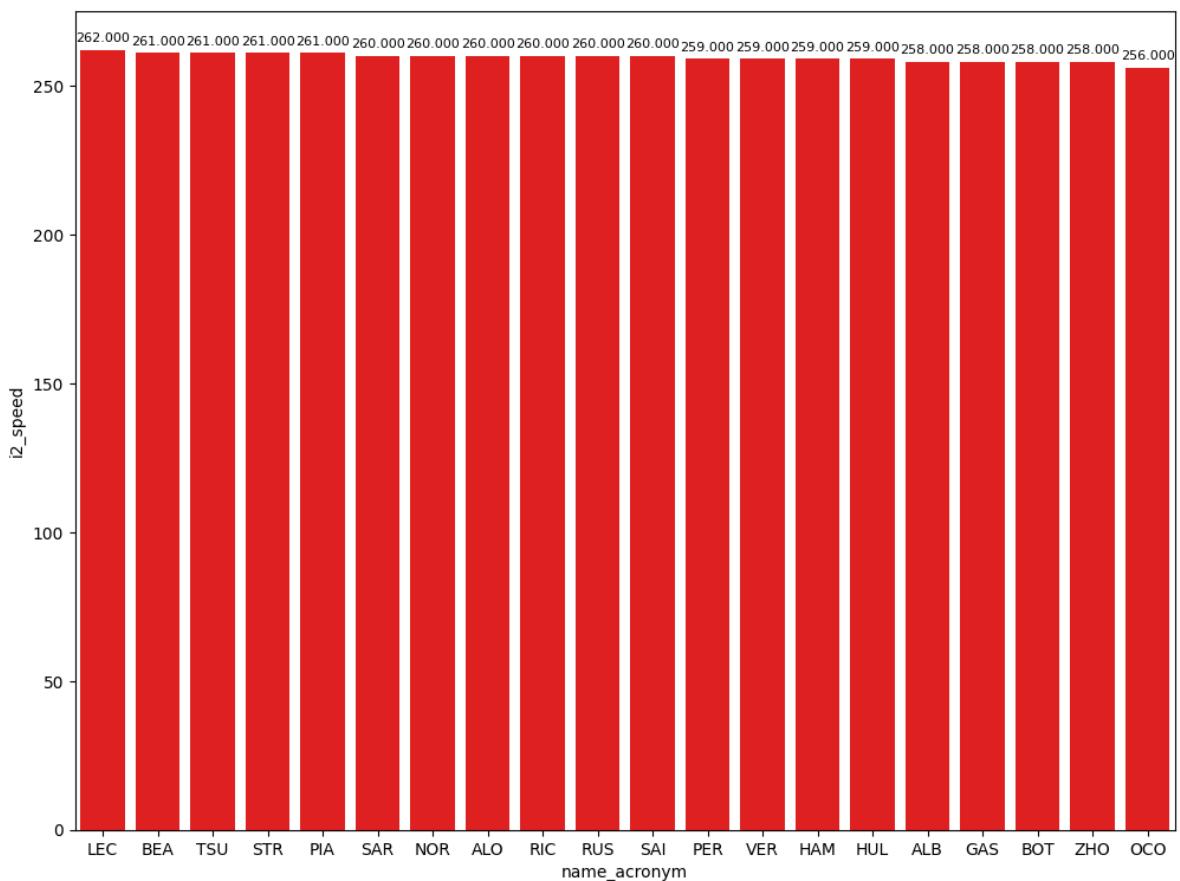


```
In [11]: top_speed = jointables2.loc[jointables2.groupby(['name_acronym'])['i1_speed'].max()]
libraryDataF1.obtainchart("name_acronym","i1_speed",top_speed)
```



In [12]:

```
top_speed = jointables2.loc[jointables2.groupby(['name_acronym'])['i2_speed'].max()]
libraryDataF1.obtainchart("name_acronym","i2_speed",top_speed)
```



Fastest lap per compound

In this section, I will show the best lap with the different compounds of the session.

```
In [13]: compoundsPace = jointables2.loc[jointables2.groupby(['compound'])['lap_duration'].min()]
compoundsPace[['full_name', 'compound', 'duration_sector_1', 'duration_sector_2', 'duration_sector_3', 'lap_duration']]
```

```
Out[13]:    full_name  compound  duration_sector_1  duration_sector_2  duration_sector_3  lap_duration
303      Yuki TSUNODA        HARD       24.658        27.051        26.421      78.13
119      George RUSSELL      MEDIUM      24.752        26.886        26.271      77.90
248      Charles LECLERC      SOFT        24.451        26.553        25.986      76.99
```

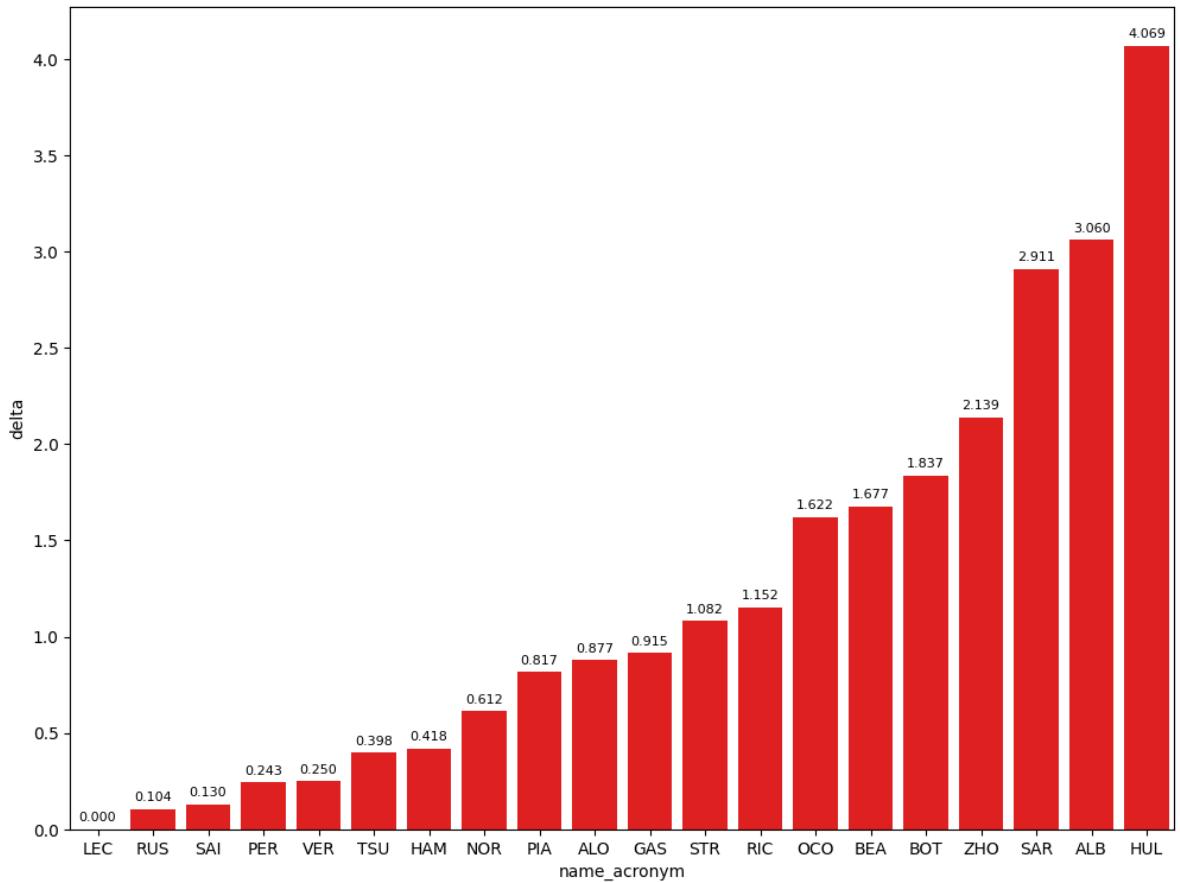
Deltas

In this section we can see the deltas of the fastest lap of each driver compared with the fastest lap of the session

```
In [14]: practiceCleaned = jointables2.query("lap_duration >1")
drivers_list = list(practiceCleaned['driver_number'].unique())
newdataset = pd.DataFrame()
for driver in drivers_list:
    newdataset = libraryDataF1.obtain_fastest_lap(driver, practiceCleaned, newdataset)

arr= libraryDataF1.obtain_deltas(newdataset)
newdataset.insert(3,'delta',arr)
```

```
In [15]: dt = newdataset.sort_values(ascending=True, by='delta')
libraryDataF1.obtainchart("name_acronym","delta",dt)
```



Track dominance

In this section, best sector are taken of each sector to see the car's performance in each sector. Also, each sector will be commented.

Sector 1: In this sector we can see that Verstappen was so dominant with a 3 tenths of difference with Oscar Piastri that was the second fastest. Also, Checo was fast in this sector taking the P4 in the table with 4 tenths of disadvantage compared to Max. So that, Red Bull ,at least in one lap, could be dominant in the qualyfing. If we don't take into account Verstappen, the gap between Piastri and Norris is less than two tenths hence this sector will be disputed among their drivers.

Sector 2: Unlike last sector, Red Bull (and specially Verstappen) suffered a lot having big troubles in Variante Alta where he lost a lot of good laps. As we can see in the sector 2 table, Ferrari was the best team in this sector being Charles Leclerc who leaded the table in this session.

Sector 3: As sector 1, Verstappen was the fastest in this sector but the gap is less than first sector being two differences among Verstappen and Tsunoda.

In [16]:

```
sectorPace = jointables2.loc[jointables2.groupby(['driver_number'])['duration'].min()]
sectorPace[['duration_sector_1','full_name','compound','lap_duration','lap_number']]
```

Out[16]:

	duration_sector_1	full_name	compound	lap_duration	lap_number
414	24.063	Max VERSTAPPEN	SOFT	108.764	21
196	24.355	Oscar PIASTRI	SOFT	77.807	12
197	24.408	Carlos SAINZ	SOFT	77.120	13
285	24.418	Sergio PEREZ	SOFT	77.233	14

	duration_sector_1	full_name	compound	lap_duration	lap_number
194	24.421	Yuki TSUNODA	SOFT	77.471	13
248	24.451	Charles LECLERC	SOFT	76.990	16
250	24.468	Lewis HAMILTON	SOFT	116.134	15
311	24.474	Fernando ALONSO	SOFT	80.035	14
228	24.479	George RUSSELL	SOFT	77.094	14
399	24.552	Lando NORRIS	SOFT	77.602	14
239	24.663	Daniel RICCIARDO	SOFT	78.142	16
201	24.690	Lance STROLL	SOFT	78.072	11
296	24.704	Pierre GASLY	SOFT	77.908	13
173	24.832	Oliver BEARMAN	SOFT	78.667	12
264	24.872	Valtteri BOTTAS	SOFT	78.827	14
267	24.905	Logan SARGEANT	SOFT	88.600	13
344	24.955	ZHOU Guanyu	SOFT	79.233	12
242	25.037	Esteban OCON	SOFT	78.858	15
149	25.058	Alexander ALBON	HARD	NaN	8
264	25.550	Nico HULKENBERG	HARD	81.260	16

In [17]:

```
sectorPace = jointables2.loc[jointables2.groupby(['driver_number'])['duration_sector_1'].mean()]
sectorPace[['duration_sector_2','full_name','compound','lap_duration','lap_number']]
```

Out[17]:

	duration_sector_2	full_name	compound	lap_duration	lap_number
248	26.553	Charles LECLERC	SOFT	76.990	16
228	26.649	George RUSSELL	SOFT	77.094	14
197	26.651	Carlos SAINZ	SOFT	77.120	13
196	26.683	Oscar PIASTRI	SOFT	77.807	12
194	26.686	Yuki TSUNODA	SOFT	77.471	13
285	26.738	Sergio PEREZ	SOFT	77.233	14
311	26.757	Fernando ALONSO	SOFT	80.035	14
202	26.818	Lewis HAMILTON	SOFT	77.408	12
336	26.830	Max VERSTAPPEN	SOFT	104.933	18
399	26.875	Lando NORRIS	SOFT	77.602	14
191	26.886	Daniel RICCIARDO	SOFT	89.063	13
296	26.922	Pierre GASLY	SOFT	77.908	13
201	26.949	Lance STROLL	SOFT	78.072	11
266	27.176	Esteban OCON	SOFT	78.612	18
221	27.180	Oliver BEARMAN	SOFT	78.669	15
244	27.245	Logan SARGEANT	SOFT	80.215	10
264	27.361	Valtteri BOTTAS	SOFT	78.827	14
402	27.441	ZHOU Guanyu	SOFT	79.362	15
198	27.730	Nico HULKENBERG	SOFT	86.556	10

	duration_sector_2	full_name	compound	lap_duration	lap_number
In [18]:	sectorPace = jointables2.loc[jointables2.groupby(['driver_number'])['duration_sector_2'].mean().reset_index().sort_values('duration_sector_2', ascending=False).head(10)].groupby(['duration_sector_3','full_name','compound','lap_duration','lap_number']).mean().reset_index()				
Out[18]:	duration_sector_3	full_name	compound	lap_duration	lap_number
284	25.942	Max VERSTAPPEN	SOFT	77.240	15
172	25.960	Charles LECLERC	SOFT	77.438	11
228	25.966	George RUSSELL	SOFT	77.094	14
197	26.061	Carlos SAINZ	SOFT	77.120	13
285	26.077	Sergio PEREZ	SOFT	77.233	14
202	26.117	Lewis HAMILTON	SOFT	77.408	12
241	26.120	Yuki TSUNODA	SOFT	77.388	16
351	26.167	Pierre GASLY	SOFT	77.905	16
399	26.175	Lando NORRIS	SOFT	77.602	14
141	26.263	Oscar PIASTRI	MEDIUM	77.951	9
266	26.317	Esteban OCON	SOFT	78.612	18
170	26.372	Lance STROLL	SOFT	78.242	9
348	26.387	Fernando ALONSO	SOFT	77.867	16
293	26.405	ZHOU Guanyu	SOFT	79.129	9
239	26.450	Daniel RICCIARDO	SOFT	78.142	16
221	26.471	Oliver BEARMAN	SOFT	78.669	15
227	26.556	Valtteri BOTTAS	SOFT	79.820	10
150	26.780	Logan SARGEANT	SOFT	79.901	7
122	26.857	Alexander ALBON	HARD	80.050	6
171	27.226	Nico HULKENBERG	SOFT	81.059	8

Mean pace with the different compound used on the session

	lap_duration	
	compound	
In [19]:	race_pace = pd.DataFrame(jointables2.query("is_pit_out_lap == False and lap_number > 10").groupby(['compound']).mean().reset_index())	
Out[19]:	SOFT	79.117104
	HARD	80.792919
	MEDIUM	81.200756

Long runs

In [20]:

```
MINIMUN_SECONDS = 80
MAXIMUM_SECONDS = 83
```

Red Bull Racing

In [21]:

```
stintInformation.query('driver_number == 1 or driver_number == 11')
```

Out[21]:

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
1	1235	9508	1	1.0	1	0	MEDIUM	
2	1235	9508	2	1.0	1	0	MEDIUM	
8	1235	9508	1	11.0	1	0	MEDIUM	
29	1235	9508	3	1.0	1	14	SOFT	
31	1235	9508	2	11.0	1	16	SOFT	
59	1235	9508	4	1.0	15	17	SOFT	
63	1235	9508	3	11.0	17	24	SOFT	
66	1235	9508	5	1.0	18	22	SOFT	

In [22]:

```
libraryDataF1.getinfolongruns(jointables2,1,'Red Bull Racing',MINIMUN_SECONDS)
```

Out[22]:

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2
29	Max VERSTAPPEN	SOFT	2024-05-17T11:33:00.636000+00:00		2	25.14

In [23]:

```
libraryDataF1.getinfolongruns(jointables2,11,'Red Bull Racing',MINIMUN_SECONDS)
```

Out[23]:

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2
30	Sergio PEREZ	SOFT	2024-05-17T11:33:06.030000+00:00		2	26.088

Ferrari

In [24]:

```
stintInformation.query('driver_number == 16 or driver_number == 55')
```

Out[24]:

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
10	1235	9508	1	16.0	1	0	MEDIUM	
27	1235	9508	1	55.0	1	12	HARD	
32	1235	9508	2	16.0	1	18	SOFT	
56	1235	9508	2	55.0	13	15	SOFT	
61	1235	9508	3	55.0	16	17	SOFT	
68	1235	9508	4	55.0	18	26	HARD	
72	1235	9508	3	16.0	19	31	HARD	

```
In [25]: libraryDataF1.getinfolongruns(jointables2,16,'Ferrari',MINIMUN_SECONDS,MAX)
```

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3	duration_lap	duration_lap_plus
32	Charles LECLERC	SOFT	2024-05-17T11:33:16.880000+00:00			2		26.152	
45	Charles LECLERC	SOFT	2024-05-17T11:34:37.390000+00:00			3		25.815	
291	Charles LECLERC	HARD	2024-05-17T12:17:44.868000+00:00			19		25.710	
300	Charles LECLERC	HARD	2024-05-17T12:19:05.592000+00:00			20		26.109	
315	Charles LECLERC	HARD	2024-05-17T12:20:26.817000+00:00			21		25.782	
347	Charles LECLERC	HARD	2024-05-17T12:23:13.393000+00:00			23		25.536	
364	Charles LECLERC	HARD	2024-05-17T12:24:34.817000+00:00			24		25.673	
395	Charles LECLERC	HARD	2024-05-17T12:27:17.804000+00:00			26		25.366	
409	Charles LECLERC	HARD	2024-05-17T12:28:38.799000+00:00			27		25.418	
428	Charles LECLERC	HARD	2024-05-17T12:29:59.539000+00:00			28		25.692	

```
In [26]: libraryDataF1.getinfolongruns(jointables2,55,'Ferrari',MINIMUN_SECONDS,MAX)
```

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3	duration_lap	duration_lap_plus
26	Carlos SAINZ	HARD	2024-05-17T11:32:34.981000+00:00			2		26.369	
349	Carlos SAINZ	HARD	2024-05-17T12:23:24.939000+00:00			19		25.328	
367	Carlos SAINZ	HARD	2024-05-17T12:24:45.385000+00:00			20		25.775	
382	Carlos SAINZ	HARD	2024-05-17T12:26:06.378000+00:00			21		25.555	
397	Carlos SAINZ	HARD	2024-05-17T12:27:27.029000+00:00			22		25.686	

Mercedes

```
In [27]: stintInformation.query('driver_number == 44 or driver_number == 63')
```

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
22	1235	9508	1	44.0	1	8	MEDIUM	
25	1235	9508	1	63.0	1	10	MEDIUM	
43	1235	9508	2	44.0	9	11	MEDIUM	
49	1235	9508	2	63.0	11	17	SOFT	

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
53	1235	9508	3	44.0	12	18	SOFT	
69	1235	9508	3	63.0	18	29	MEDIUM	
71	1235	9508	4	44.0	19	25	MEDIUM	

In [28]: `stintInformation.query('driver_number == 63 or driver_number == 44')`

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
22	1235	9508	1	44.0	1	8	MEDIUM	
25	1235	9508	1	63.0	1	10	MEDIUM	
43	1235	9508	2	44.0	9	11	MEDIUM	
49	1235	9508	2	63.0	11	17	SOFT	
53	1235	9508	3	44.0	12	18	SOFT	
69	1235	9508	3	63.0	18	29	MEDIUM	
71	1235	9508	4	44.0	19	25	MEDIUM	
77	1235	9508	5	44.0	26	28	MEDIUM	

In [29]: `libraryDataF1.getinfolongruns(jointables2,44,'Mercedes',MINIMUM_SECONDS,MAXIMUM_SECONDS)`

	full_name	compound	date_start	lap_number	duration_sector_1	duration_lap	duration_lap_percent
326	Lewis HAMILTON	MEDIUM	2024-05-17T12:21:25.919000+00:00	20		25.691	
342	Lewis HAMILTON	MEDIUM	2024-05-17T12:22:47.038000+00:00	21		25.744	
358	Lewis HAMILTON	MEDIUM	2024-05-17T12:24:08.258000+00:00	22		25.677	
375	Lewis HAMILTON	MEDIUM	2024-05-17T12:25:29.094000+00:00	23		25.755	

In [30]: `libraryDataF1.getinfolongruns(jointables2,63,'Mercedes',MINIMUM_SECONDS,MAXIMUM_SECONDS)`

	full_name	compound	date_start	lap_number	duration_sector_1	duration_lap	duration_lap_percent
255	George RUSSELL	SOFT	2024-05-17T12:07:42.469000+00:00	16		24.541	
294	George RUSSELL	MEDIUM	2024-05-17T12:17:57.939000+00:00	18		26.394	
302	George RUSSELL	MEDIUM	2024-05-17T12:19:20.310000+00:00	19		26.080	
319	George RUSSELL	MEDIUM	2024-05-17T12:20:41.978000+00:00	20		25.906	
333	George RUSSELL	MEDIUM	2024-05-17T12:22:03.260000+00:00	21		25.925	
368	George RUSSELL	MEDIUM	2024-05-17T12:24:50.428000+00:00	23		25.790	

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
383	George RUSSELL	MEDIUM	2024-05-17T12:26:11.722000+00:00		24		25.939	
398	George RUISSONI	MEDIUM	2024-05-17T12:27:33.658000+00:00		25		26.036	

McLaren

```
In [31]: stintInformation.query('driver_number == 81 or driver_number == 4')
```

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
5	1235	9508	1	4.0	1	0	MEDIUM	
18	1235	9508	1	81.0	1	3	MEDIUM	
19	1235	9508	2	4.0	1	4	SOFT	
37	1235	9508	2	81.0	4	8	MEDIUM	
39	1235	9508	3	4.0	5	5	SOFT	
40	1235	9508	4	4.0	6	10	SOFT	
44	1235	9508	3	81.0	9	11	MEDIUM	
47	1235	9508	5	4.0	11	11	SOFT	
51	1235	9508	4	81.0	12	16	SOFT	
52	1235	9508	6	4.0	12	18	SOFT	
64	1235	9508	5	81.0	17	26	MEDIUM	

```
In [32]: libraryDataF1.getinfolongruns(jointables2,4,'McLaren',MINIMUM_SECONDS,MAXIMUM_SECONDS)
```

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
416	Lando NORRIS	SOFT	2024-05-17T12:28:57.955000+00:00		15		25.006	

```
In [33]: libraryDataF1.getinfolongruns(jointables2,81,'McLaren',MINIMUN_SECONDS,MAX)
```

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3	duration_lap	duration_total
328	Oscar PIASTRI	MEDIUM		2024-05-17T12:21:37.074000+00:00					17	25.834
343	Oscar PIASTRI	MEDIUM		2024-05-17T12:22:58.329000+00:00					18	25.674
361	Oscar PIASTRI	MEDIUM		2024-05-17T12:24:19.767000+00:00					19	25.717
378	Oscar PIASTRI	MEDIUM		2024-05-17T12:25:41.443000+00:00					20	25.766
393	Oscar PIASTRI	MEDIUM		2024-05-17T12:27:02.578000+00:00					21	25.687
406	Oscar PIASTRI	MEDIUM		2024-05-17T12:28:23.759000+00:00					22	25.776
425	Oscar PIASTRI	MEDIUM		2024-05-17T12:29:44.948000+00:00					23	25.655

Aston Martin

```
In [34]: stintInformation.query('driver_number == 18 or driver_number == 14')
```

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
9	1235	9508	1	14.0	1	0	MEDIUM	
21	1235	9508	1	18.0	1	8	MEDIUM	
28	1235	9508	2	14.0	1	13	MEDIUM	
45	1235	9508	2	18.0	9	13	SOFT	
57	1235	9508	3	14.0	14	18	SOFT	
58	1235	9508	3	18.0	14	20	SOFT	
70	1235	9508	4	14.0	19	19	SOFT	
74	1235	9508	4	18.0	21	23	SOFT	

```
In [35]: libraryDataF1.getinfolongruns(jointables2,14,'Aston Martin',MINIMUN_SECONDS,MAX)
```

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3	duration_lap	duration_total
168	Fernando ALONSO	MEDIUM		2024-05-17T11:56:41.142000+00:00					5	25.264
311	Fernando ALONSO	SOFT		2024-05-17T12:20:11.494000+00:00					14	24.474

```
In [36]: libraryDataF1.getinfolongruns(jointables2,18,'Aston Martin',MINIMUN_SECONDS,MAX)
```

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3	duration_lap	duration_total
28	Lance STROLL	MEDIUM		2024-05-17T11:32:53.399000+00:00					2	26.207

```
full_name compound date_start lap_number duration_sector_1 du
Lapno
```

RB

```
In [37]: stintInformation.query('driver_number == 3 or driver_number == 22')
```

```
Out[37]:
```

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
4	1235	9508	1	3.0	1	0	MEDIUM	
11	1235	9508	1	22.0	1	0	MEDIUM	
12	1235	9508	2	22.0	1	0	MEDIUM	
33	1235	9508	3	22.0	1	19	SOFT	
36	1235	9508	2	3.0	1	23	SOFT	
73	1235	9508	4	22.0	20	30	HARD	
76	1235	9508	3	3.0	24	27	HARD	

```
In [38]: libraryDataF1.getinfolongruns(jointables2,3,'RB',MINIMUM_SECONDS,MAXIMUM_SECONDS)
```

```
Out[38]:
```

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2
31	Daniel RICCIARDO	SOFT	2024-05-17T11:33:09.899000+00:00	2	26.047	
44	Daniel RICCIARDO	SOFT	2024-05-17T11:34:31.117000+00:00	3	25.862	
372	Daniel RICCIARDO	SOFT	2024-05-17T12:25:15.691000+00:00	21	25.554	
426	Daniel RICCIARDO	HARD	2024-05-17T12:29:51.967000+00:00	24	26.051	

```
In [39]: libraryDataF1.getinfolongruns(jointables2,22,'RB',MINIMUM_SECONDS,MAXIMUM_SECONDS)
```

```
Out[39]:
```

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2
35	Yuki TSUNODA	SOFT	2024-05-17T11:33:30.665000+00:00	2	25.820	
386	Yuki TSUNODA	HARD	2024-05-17T12:26:25.943000+00:00	25	25.150	
401	Yuki TSUNODA	HARD	2024-05-17T12:27:46.610000+00:00	26	25.459	
419	Yuki TSUNODA	HARD	2024-05-17T12:29:08.098000+00:00	27	25.391	

Haas

```
In [40]: libraryDataF1.getinfolongruns(jointables2,50,'Haas F1 Team',MINIMUM_SECONDS,MAXIMUM_SECONDS)
```

```
Out[40]:
```

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
--	-----------	----------	------------	------------	-------------------	-------------------	-------------------

```
In [41]: libraryDataF1.getinfolongruns(jointables2,27,'Haas F1 Team',MINIMUN_SECONDS,MAXIMUM_SECONDS)
```

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
49	Nico HULKENBERG	HARD	2024-05-17T11:35:11.833000+00:00		4	26.429	25.888	25.870
171	Nico HULKENBERG	SOFT	2024-05-17T11:57:00.611000+00:00		8	25.916	25.888	25.870
330	Nico HULKENBERG	HARD	2024-05-17T12:21:45.292000+00:00		12	26.119	25.888	25.870
345	Nico HULKENBERG	HARD	2024-05-17T12:23:06.900000+00:00		13	25.800	25.888	25.870
363	Nico HULKENBERG	HARD	2024-05-17T12:24:28.940000+00:00		14	25.888	25.888	25.870
379	Nico HULKENBERG	HARD	2024-05-17T12:25:50.610000+00:00		15	25.870	25.888	25.870
394	Nico HULKENBERG	HARD	2024-05-17T12:27:12.353000+00:00		16	25.559	25.888	25.870
408	Nico HULKENBERG	HARD	2024-05-17T12:28:33.663000+00:00		17	25.841	25.888	25.870
427	Nico HULKENBERG	HARD	2024-05-17T12:29:55.596000+00:00		18	25.901	25.888	25.870

Alpine

```
In [42]: stintInformation.query('driver_number == 31 or driver_number == 10')
```

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
6	1235	9508	1	10.0	1	0	MEDIUM	SOFT
7	1235	9508	2	10.0	1	0	MEDIUM	SOFT
24	1235	9508	1	31.0	1	10	MEDIUM	SOFT
35	1235	9508	3	10.0	1	22	SOFT	MEDIUM
48	1235	9508	2	31.0	11	11	MEDIUM	SOFT
54	1235	9508	3	31.0	12	20	SOFT	MEDIUM
75	1235	9508	4	31.0	21	30	MEDIUM	SOFT

```
In [43]: libraryDataF1.getinfolongruns(jointables2,31,'Alpine',MINIMUN_SECONDS,MAXIMUM_SECONDS)
```

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
21	Esteban OCON	MEDIUM	2024-05-17T11:32:09.114000+00:00		2	26.246	25.677	25.677
52	Esteban OCON	MEDIUM	2024-05-17T11:35:22.424000+00:00		4	25.677	26.152	26.246
340	Esteban OCON	MEDIUM	2024-05-17T12:22:33.541000+00:00		22	26.152	26.251	26.246
373	Esteban OCON	MEDIUM	2024-05-17T12:25:19.036000+00:00		24	26.251	26.246	26.152

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2
389	Esteban OCON	MEDIUM	2024-05-17T12:26:41.442000+00:00		25		26.036
- - -							

In [44]: `libraryDataF1.getinfolongruns(jointables2, 10, 'Alpine', MINIMUM_SECONDS, MAXIMUM_SECONDS)`

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2
143	Pierre GASLY	SOFT	2024-05-17T11:46:40.364000+00:00		3		25.933

Williams

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
3	1235	9508	1	2.0	1	0	MEDIUM	
13	1235	9508	1	23.0	1	0	MEDIUM	
14	1235	9508	2	23.0	1	0	MEDIUM	
23	1235	9508	3	23.0	1	9	HARD	
30	1235	9508	2	2.0	1	14	SOFT	
60	1235	9508	3	2.0	15	23	MEDIUM	

In [46]: `libraryDataF1.getinfolongruns(jointables2, 23, 'Williams', MINIMUM_SECONDS, MAXIMUM_SECONDS)`

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2
97	Alexander ALBON	HARD	2024-05-17T11:41:03.876000+00:00		4		25.794
122	Alexander ALBON	HARD	2024-05-17T11:44:17.178000+00:00		6		25.380

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2
101	Logan SARGEANT	SOFT	2024-05-17T11:41:25.386000+00:00		3		26.602
126	Logan SARGEANT	SOFT	2024-05-17T11:44:41.039000+00:00		5		25.717
244	Logan SARGEANT	SOFT	2024-05-17T12:05:57.483000+00:00		10		24.923
334	Logan SARGEANT	MEDIUM	2024-05-17T12:22:13.364000+00:00		15		26.593
352	Logan SARGEANT	MEDIUM	2024-05-17T12:23:35.720000+00:00		16		26.056
370	Logan SARGEANT	MEDIUM	2024-05-17T12:24:57.278000+00:00		17		26.014

	full_name	compound		date_start	lap_number	duration_sector_1	
385	Logan SARGEANT	MEDIUM	2024-05-17T12:26:19.050000+00:00		18		25.962
400	Logan SARGEANT	MEDIUM	2024-05-17T12:27:41.044000+00:00		19		25.917

Kick Sauber

In [48]: `stintInformation.query('driver_number == 24 or driver_number == 77')`

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
15	1235	9508	1	24.0	1	0	MEDIUM	
16	1235	9508	2	24.0	1	0	MEDIUM	
17	1235	9508	1	77.0	1	3	MEDIUM	
34	1235	9508	3	24.0	1	19	SOFT	
38	1235	9508	2	77.0	4	9	MEDIUM	
46	1235	9508	3	77.0	10	16	SOFT	
62	1235	9508	4	77.0	17	17	SOFT	
67	1235	9508	5	77.0	18	24	MEDIUM	

In [49]: `libraryDataF1.getinfolongruns(jointables2, 24, 'Kick Sauber', MINIMUM_SECONDS)`

	full_name	compound		date_start	lap_number	duration_sector_1	duration_lap
140	ZHOU Guanyu	SOFT	2024-05-17T11:46:11.434000+00:00		4		26.286

In [50]: `libraryDataF1.getinfolongruns(jointables2, 77, 'Kick Sauber', MINIMUM_SECONDS)`

	full_name	compound		date_start	lap_number	duration_sector_1	duration_lap
113	Valtteri BOTTAS	MEDIUM	2024-05-17T11:42:45.317000+00:00		4		26.362
365	Valtteri BOTTAS	MEDIUM	2024-05-17T12:24:36.996000+00:00		18		26.227
381	Valtteri BOTTAS	MEDIUM	2024-05-17T12:25:58.660000+00:00		19		26.010
396	Valtteri BOTTAS	MEDIUM	2024-05-17T12:27:20.487000+00:00		20		25.927
411	Valtteri BOTTAS	MEDIUM	2024-05-17T12:28:42.510000+00:00		21		26.138

Free Practice 2

Obtain setup

```
In [51]: practice = libraryDataF1.obtain_information('laps', session_key=9509)
stintInformation = libraryDataF1.obtain_information('stints', session_key=9509)
drivers = libraryDataF1.obtain_information('drivers', session_key=9509)
```

```
In [52]: drivers
```

	session_key	meeting_key	broadcast_name	country_code	first_name	full_name	
0	9509	1235	M VERSTAPPEN	NED	Max	Max VERSTAPPEN	https://
1	9509	1235	L SARGEANT	USA	Logan	Logan SARGEANT	https://
2	9509	1235	D RICCIARDO	AUS	Daniel	Daniel RICCIARDO	https://
3	9509	1235	L NORRIS	GBR	Lando	Lando NORRIS	https://
4	9509	1235	P GASLY	FRA	Pierre	Pierre GASLY	https://
5	9509	1235	S PEREZ	MEX	Sergio	Sergio PEREZ	https://
6	9509	1235	F ALONSO	ESP	Fernando	Fernando ALONSO	https://
7	9509	1235	C LECLERC	MON	Charles	Charles LECLERC	https://
8	9509	1235	L STROLL	CAN	Lance	Lance STROLL	https://
9	9509	1235	K MAGNUSEN	DEN	Kevin	Kevin MAGNUSEN	https://
10	9509	1235	Y TSUNODA	JPN	Yuki	Yuki TSUNODA	https://
11	9509	1235	A ALBON	THA	Alexander	Alexander ALBON	https://
12	9509	1235	G ZHOU	CHN	Guanyu	ZHOU Guanyu	https://
13	9509	1235	N HULKENBERG	GER	Nico	Nico HULKENBERG	https://
14	9509	1235	E OCON	FRA	Esteban	Esteban OCON	https://
15	9509	1235	L HAMILTON	GBR	Lewis	Lewis HAMILTON	https://
16	9509	1235	C SAINZ	ESP	Carlos	Carlos SAINZ	https://
17	9509	1235	G RUSSELL	GBR	George	George RUSSELL	https://
18	9509	1235	V BOTTAS	FIN	Valtteri	Valtteri BOTTAS	https://
19	9509	1235	O PIASTRI	AUS	Oscar	Oscar PIASTRI	https://

```
In [53]: stintsDataFrame = libraryDataF1.stint_configuration(drivers,stintInformation)
jointables2 = pd.merge(practice,stintsDataFrame, on=['lap_number','driver_number'])
jointables2
```

```
Out[53]:
```

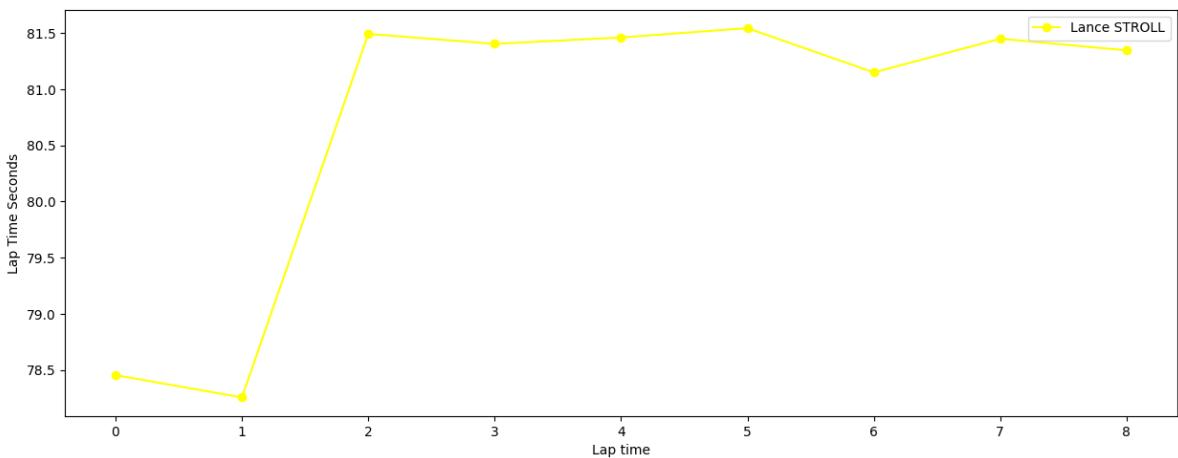
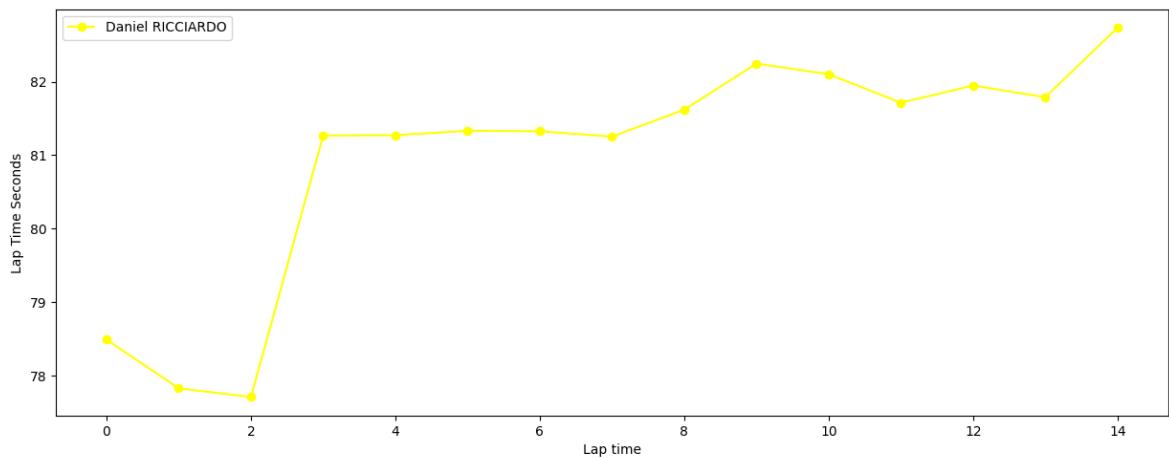
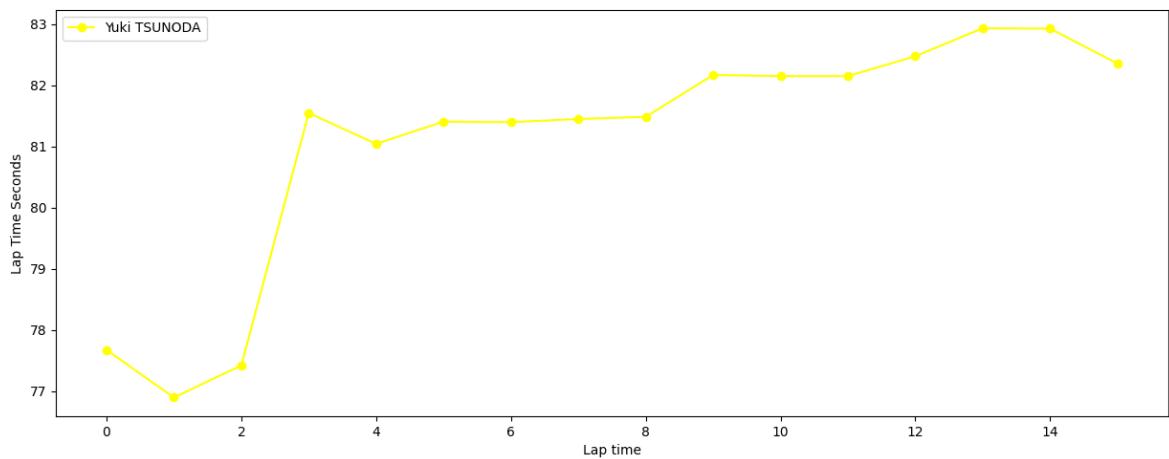
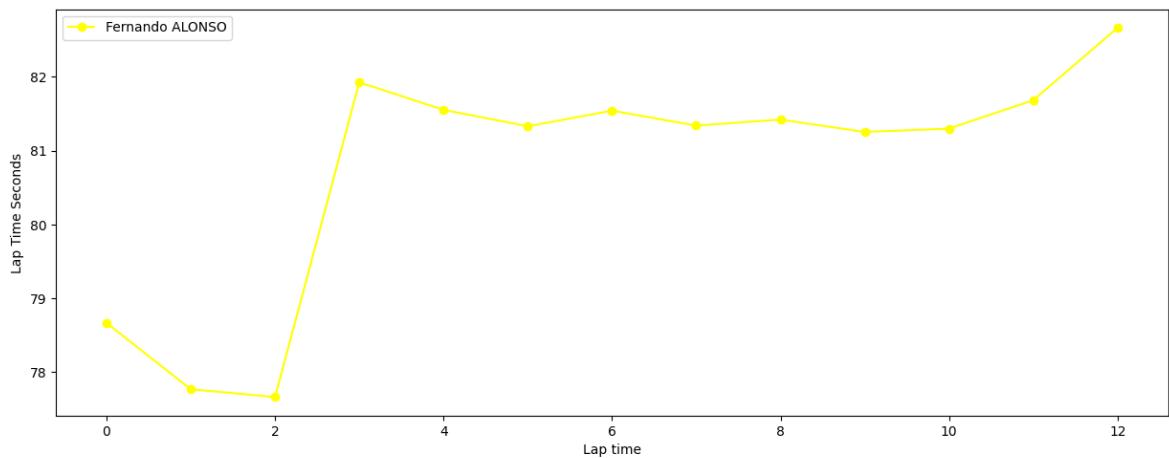
	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
0	1235	9509	31	198.0	236	257	2024-05-17T15:00:
1	1235	9509	63	209.0	237	280	2024-05-17T15:00:
2	1235	9509	27	201.0	243	266	2024-05-17T15:00:
3	1235	9509	20	189.0	234	268	2024-05-17T15:00:
4	1235	9509	14	205.0	215	278	2024-05-17T15:00:
...
566	1235	9509	31	210.0	250	284	2024-05-17T16:03:
567	1235	9509	3	160.0	128	239	2024-05-17T16:03:
568	1235	9509	44	214.0	235	266	2024-05-17T16:03:
569	1235	9509	27	179.0	179	246	2024-05-17T16:03:
570	1235	9509	1	195.0	193	219	2024-05-17T16:03:

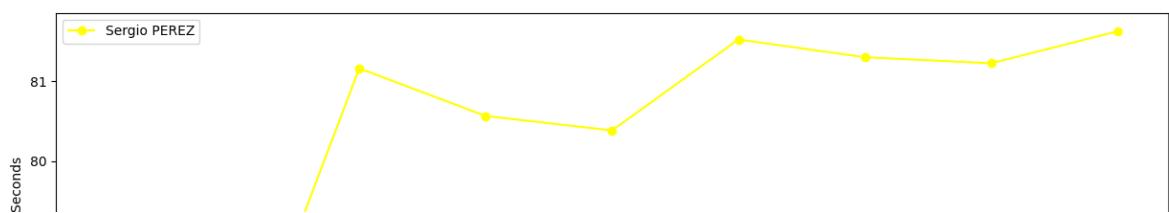
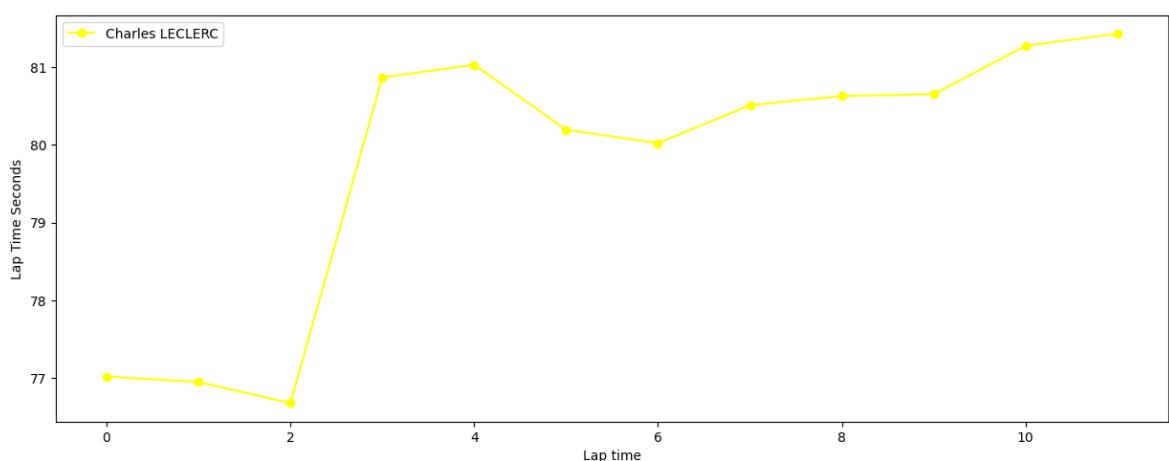
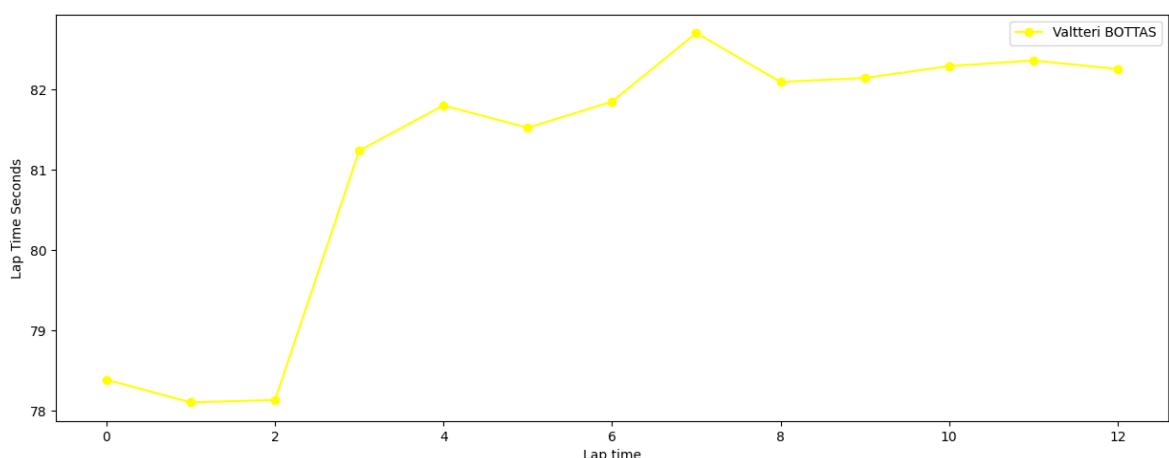
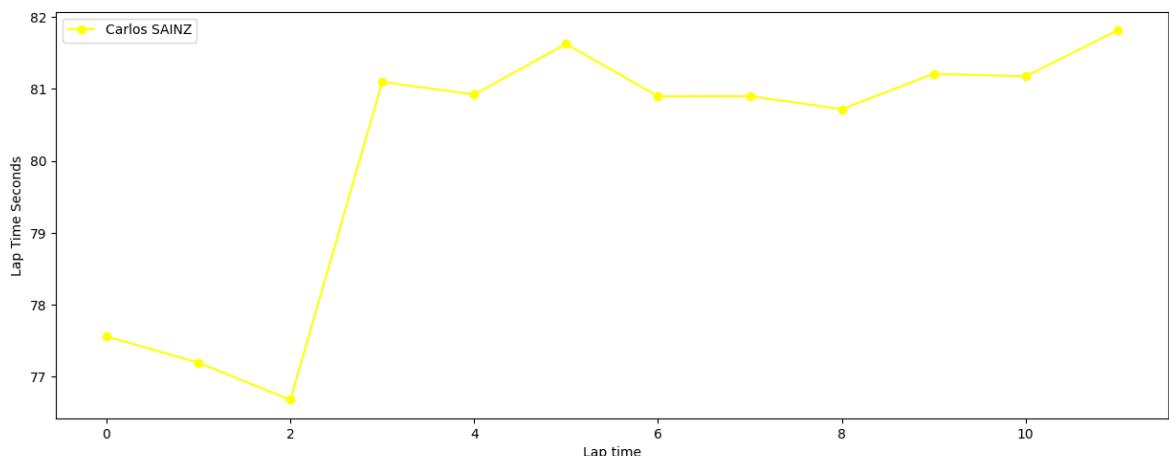
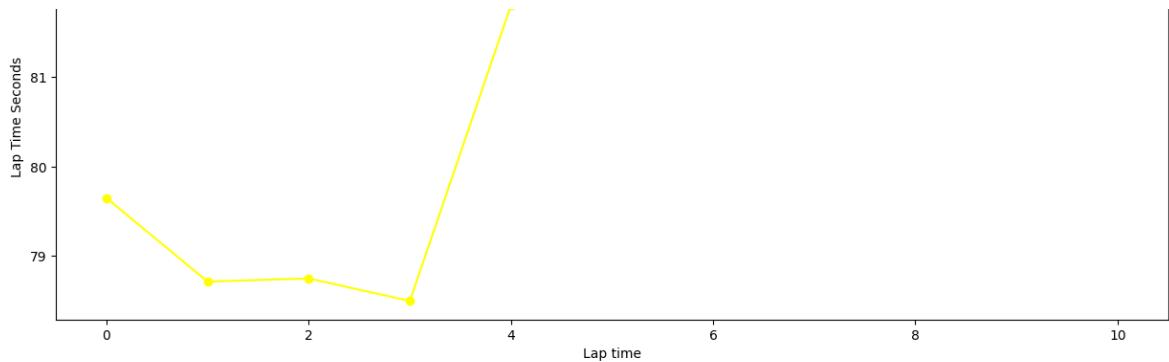
571 rows × 20 columns

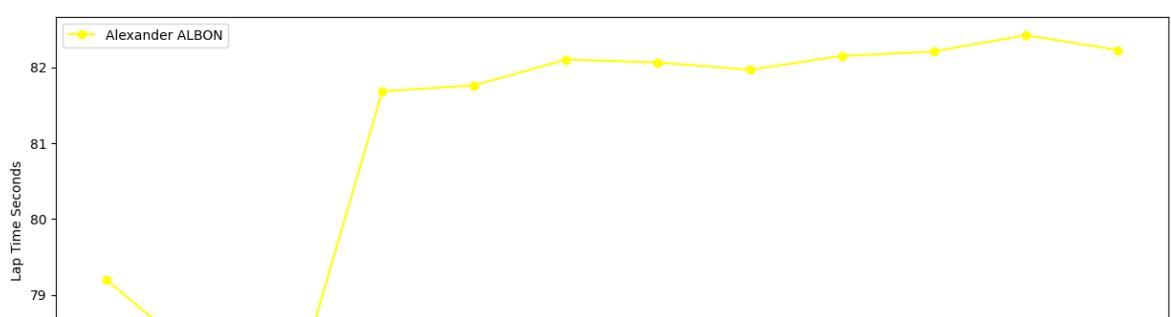
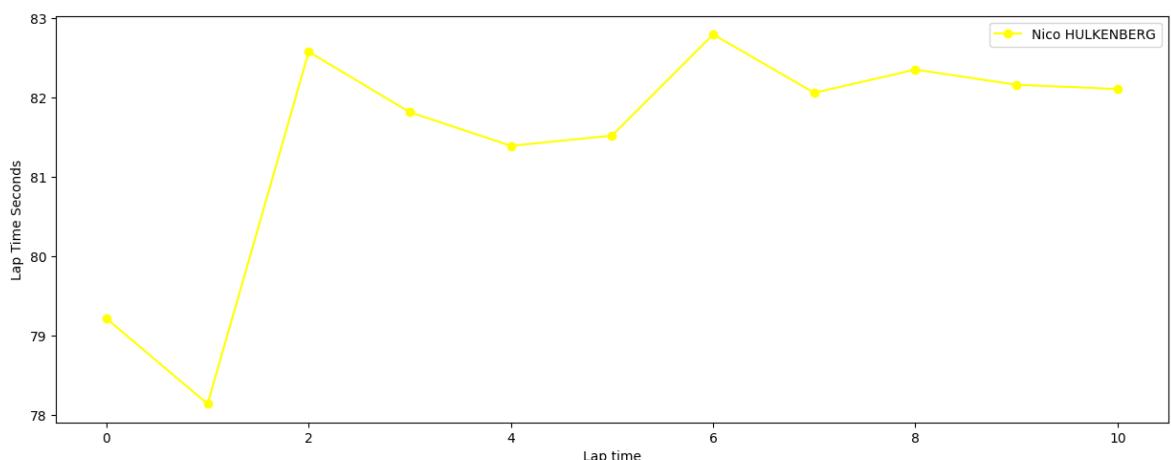
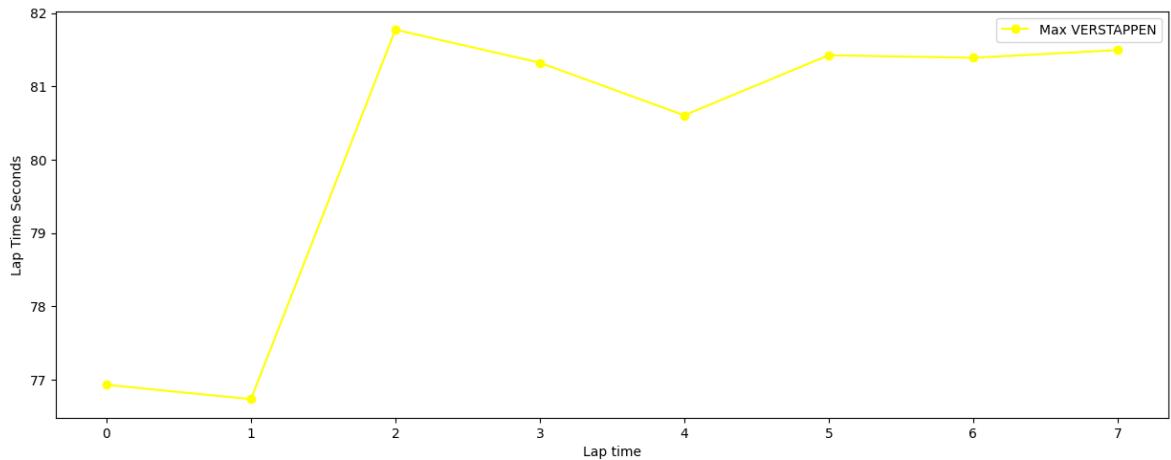
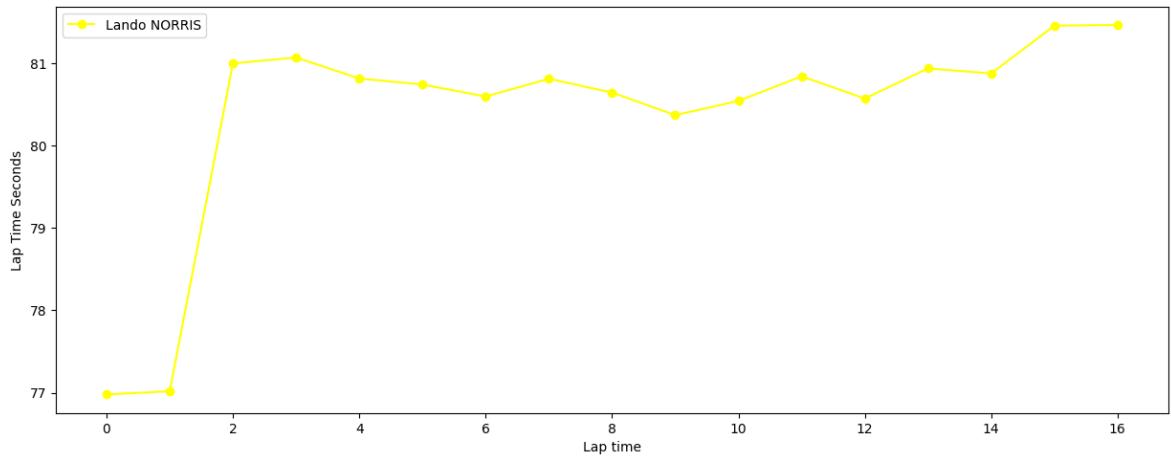
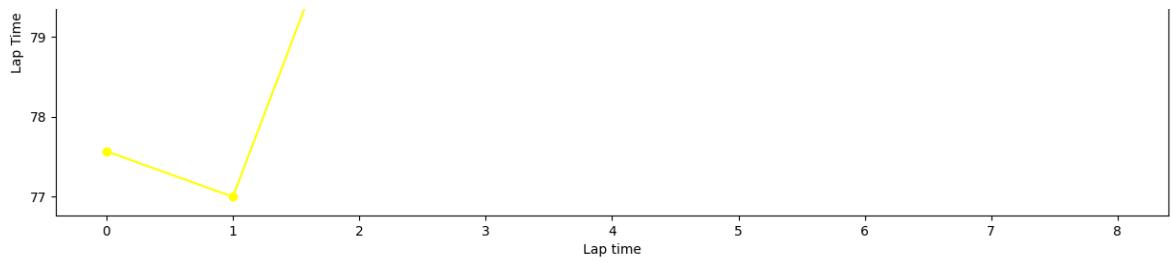
See race pace by means of the charts

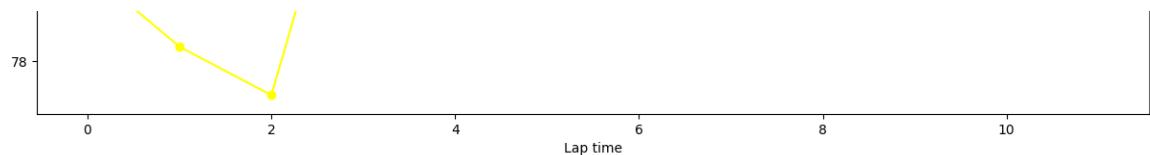
Medium tyres

```
In [54]: libraryDataF1.obtain_data_tyres(jointables2,"MEDIUM",83)
```



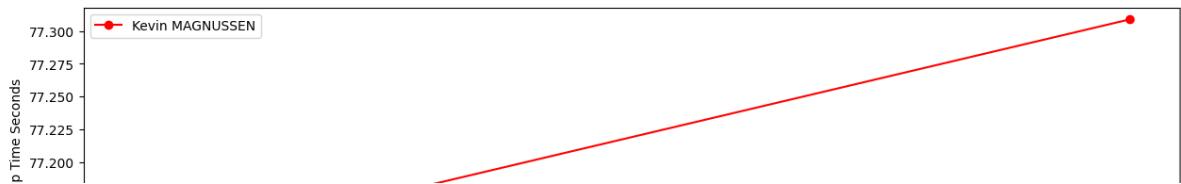
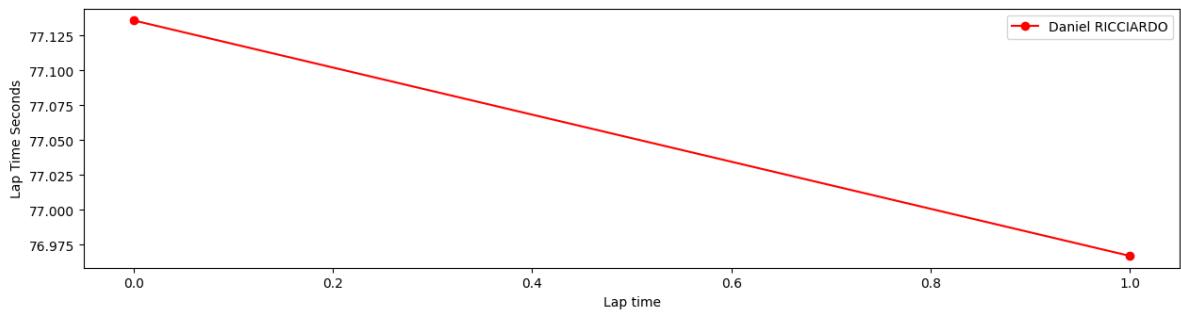
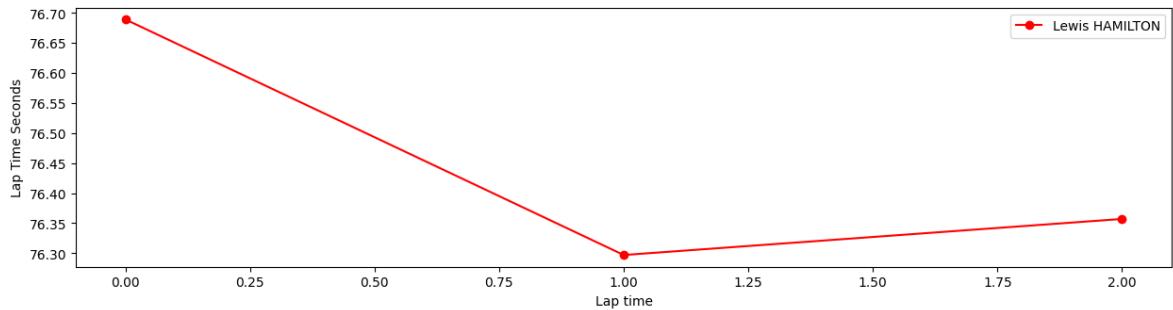
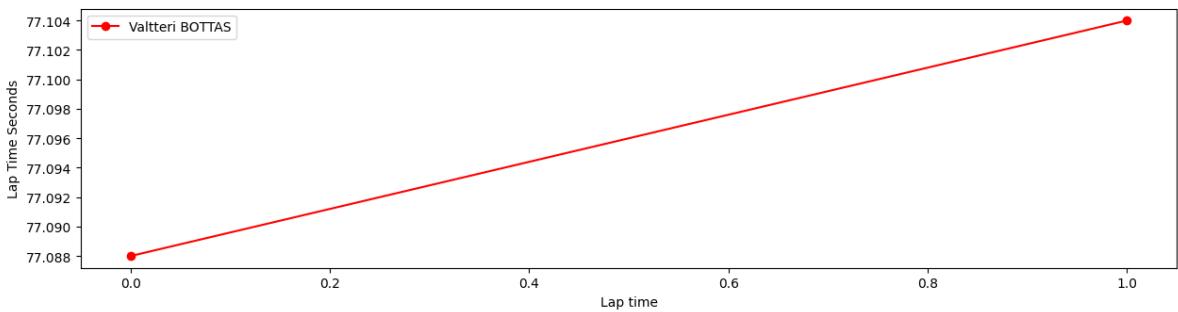
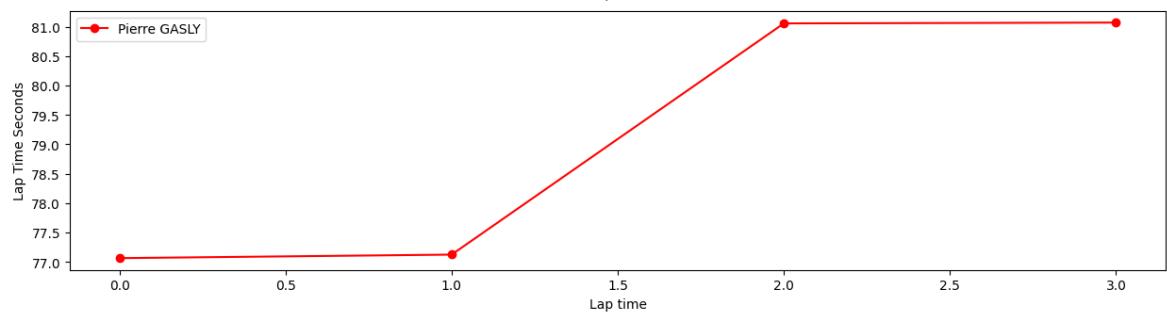
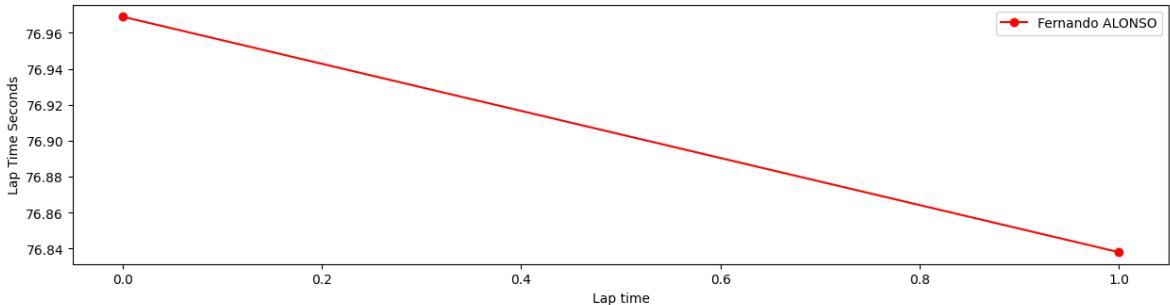
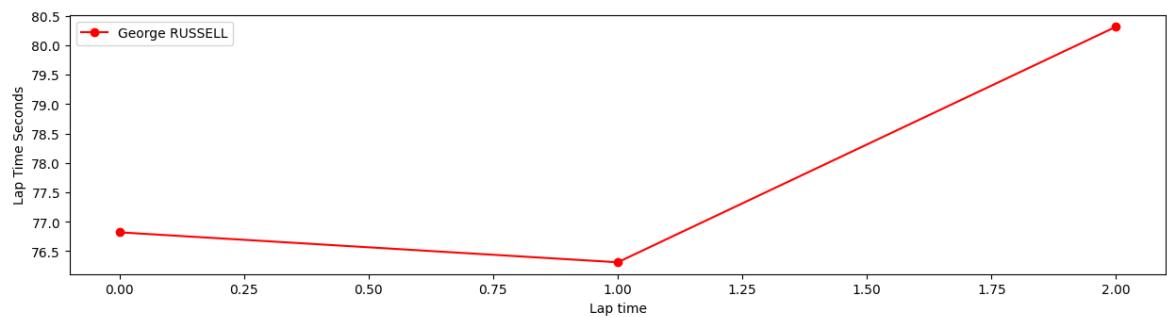


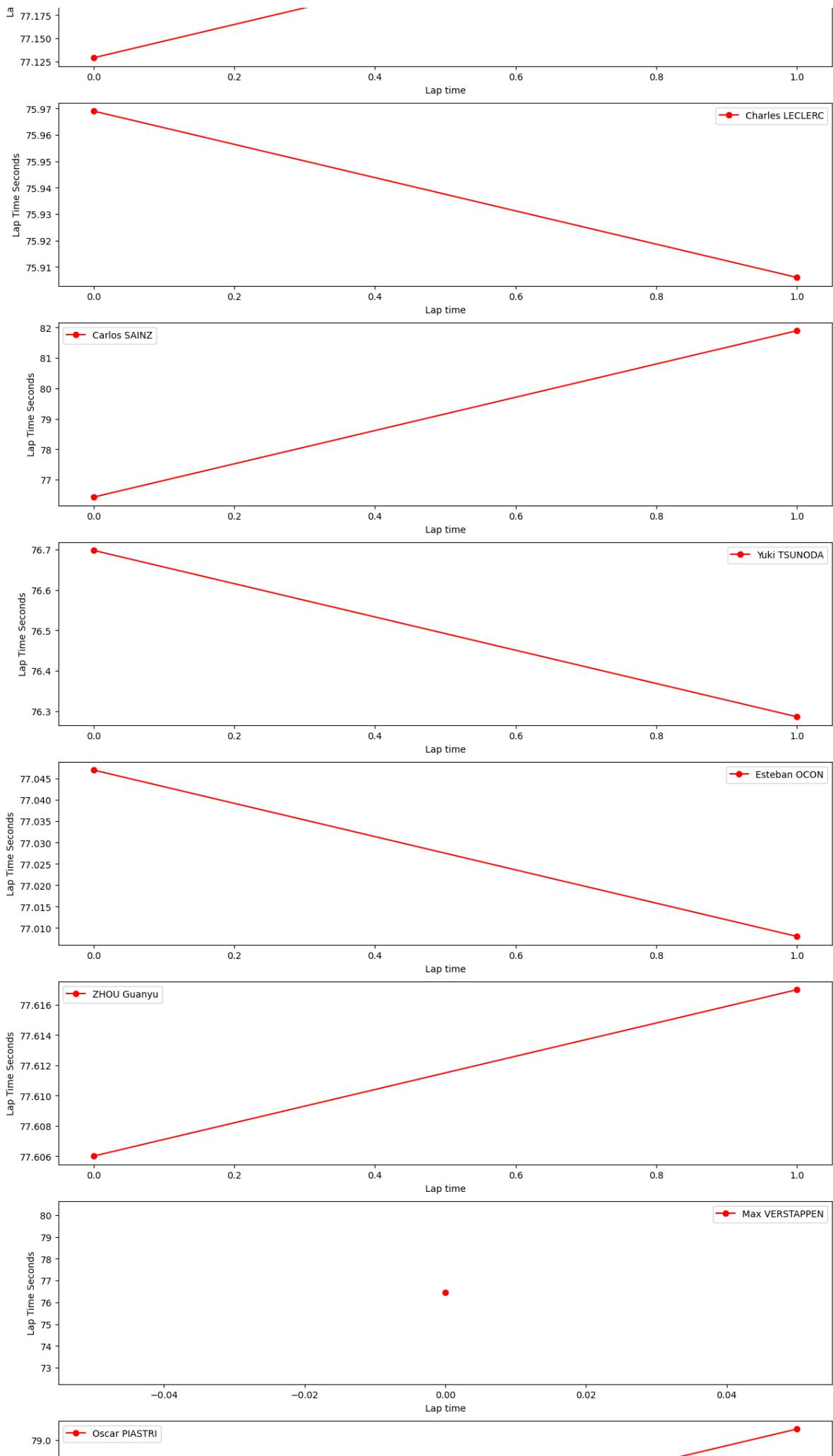


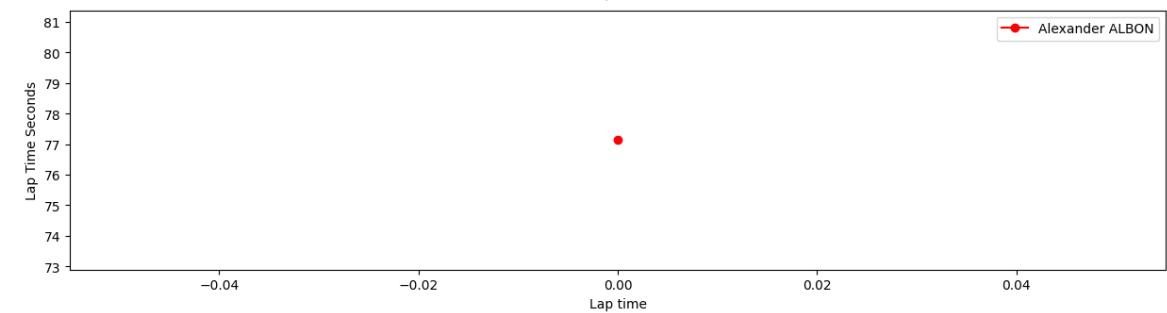
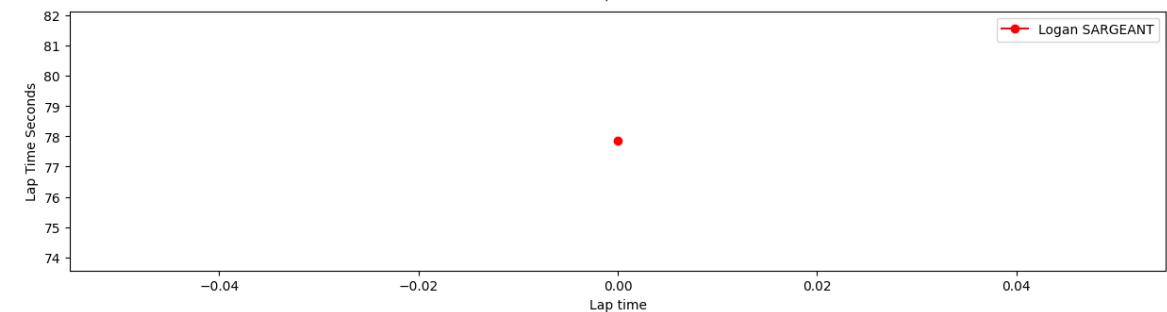
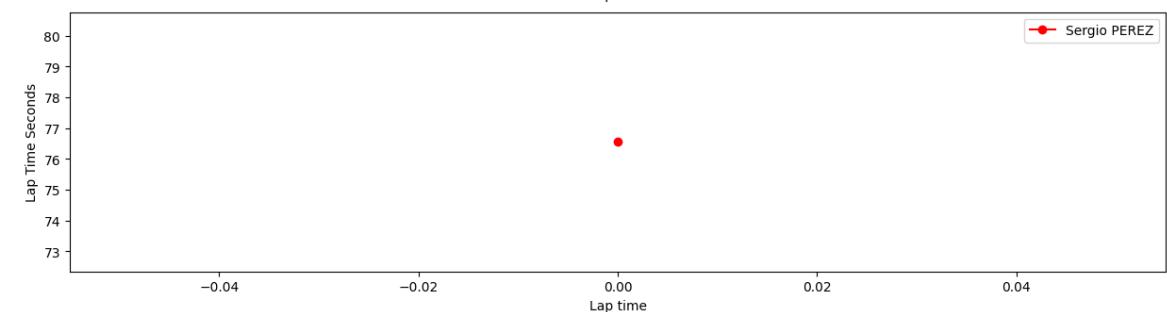
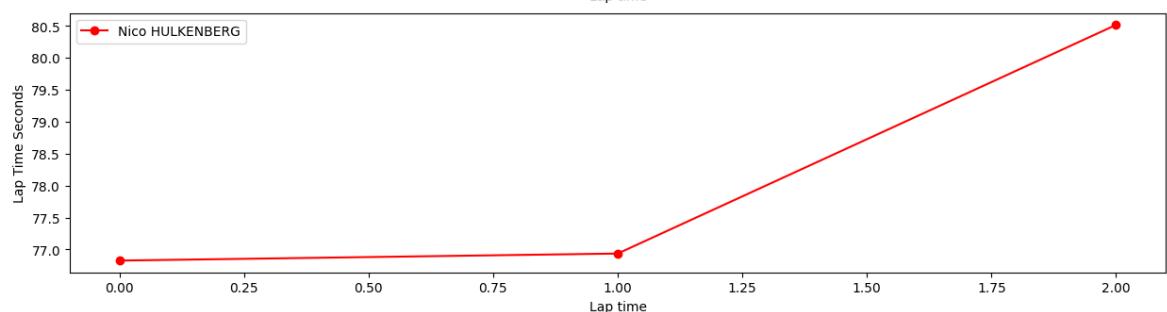
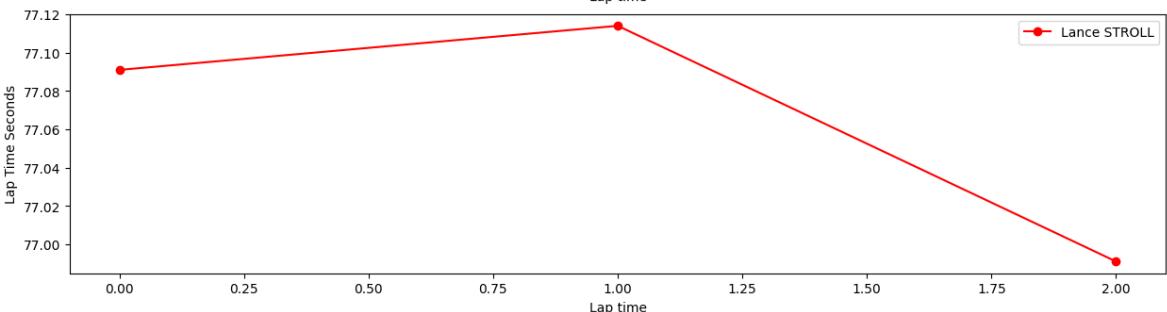
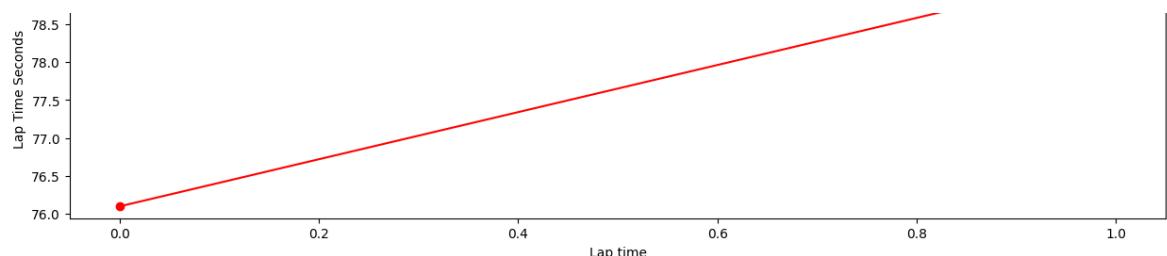


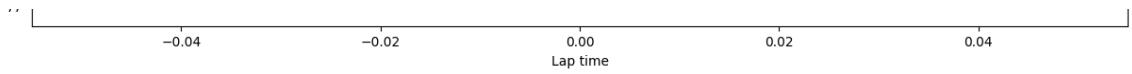
Soft tyres

```
In [55]: libraryDataF1.obtain_data_tyres(jointables2,"SOFT",83)
```





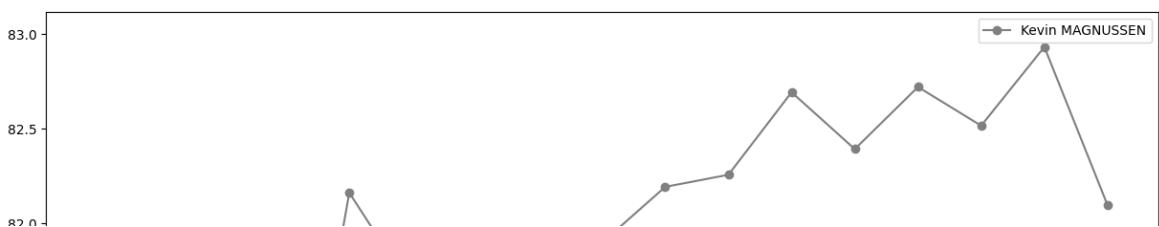
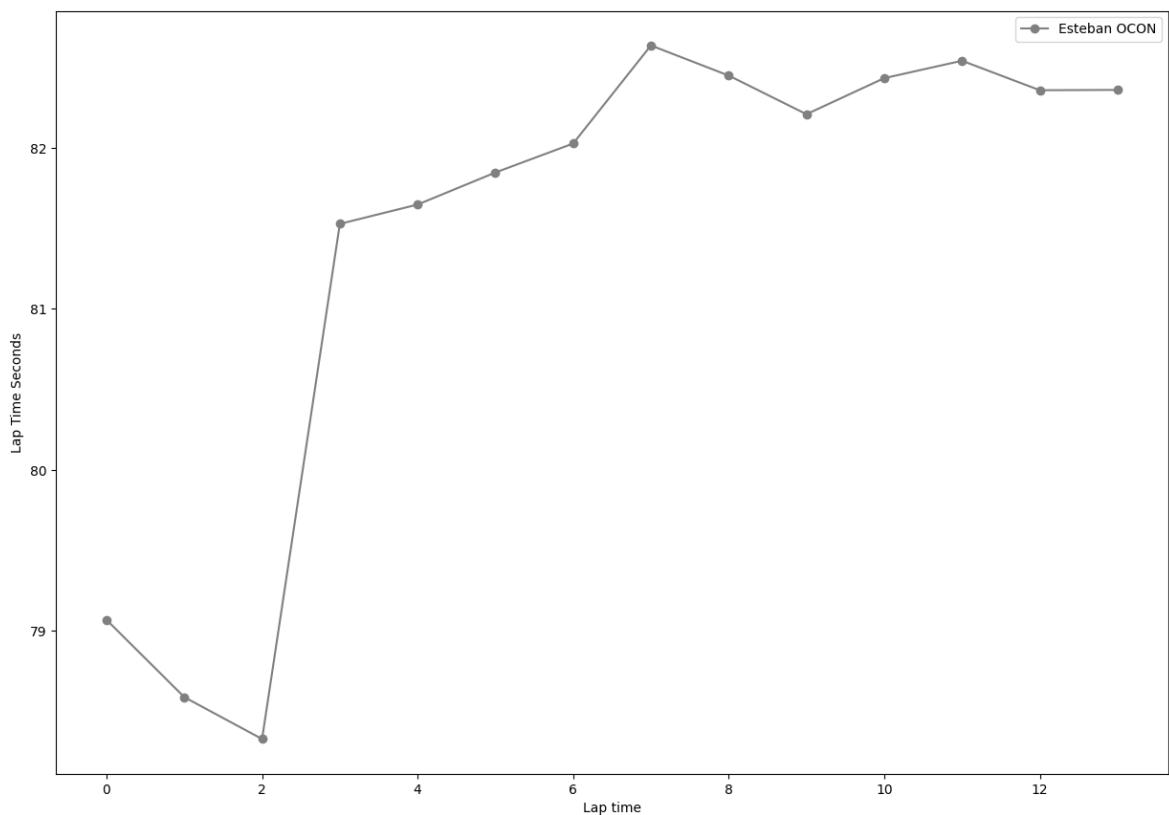
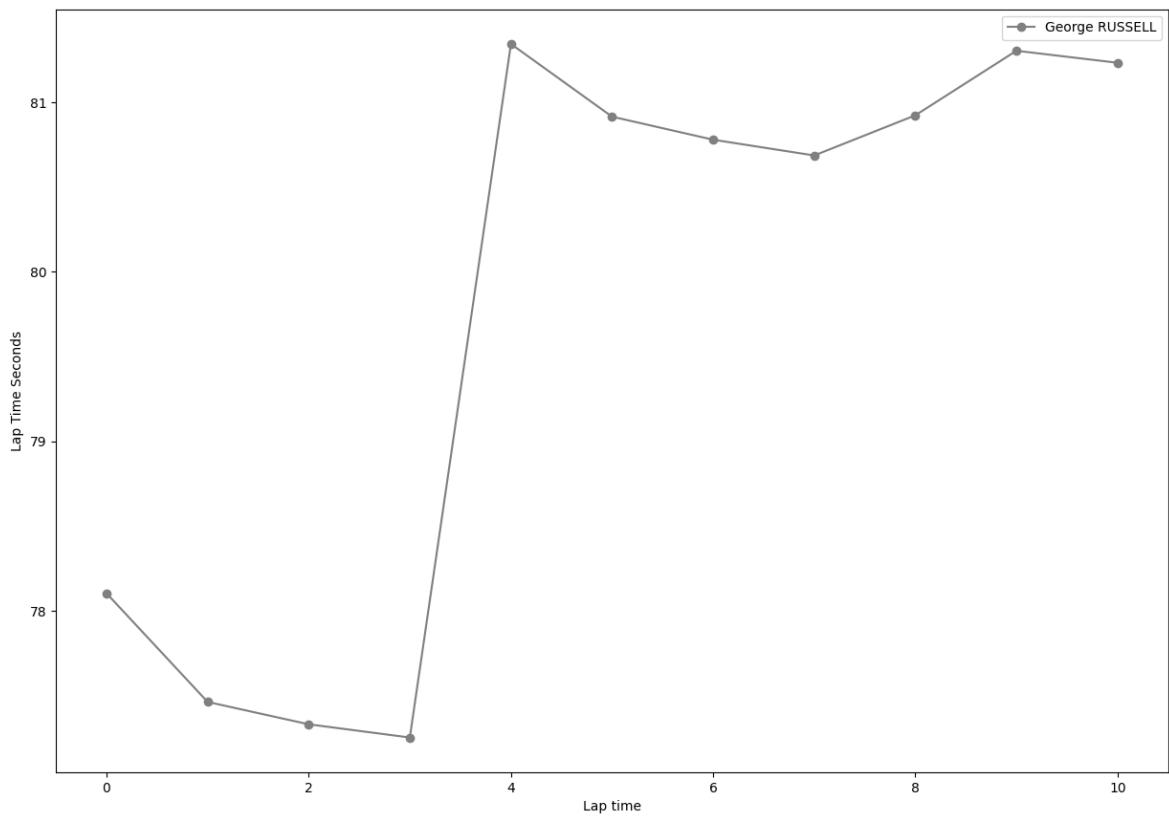


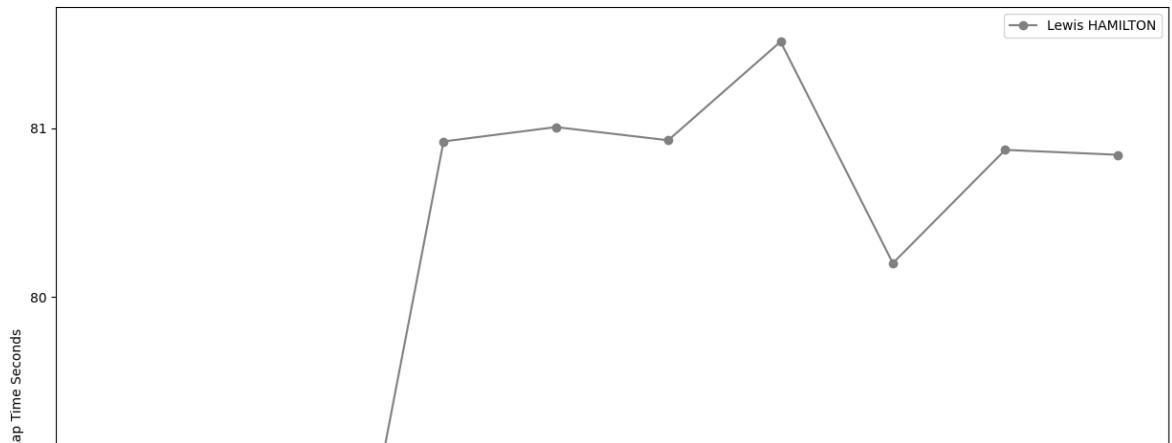
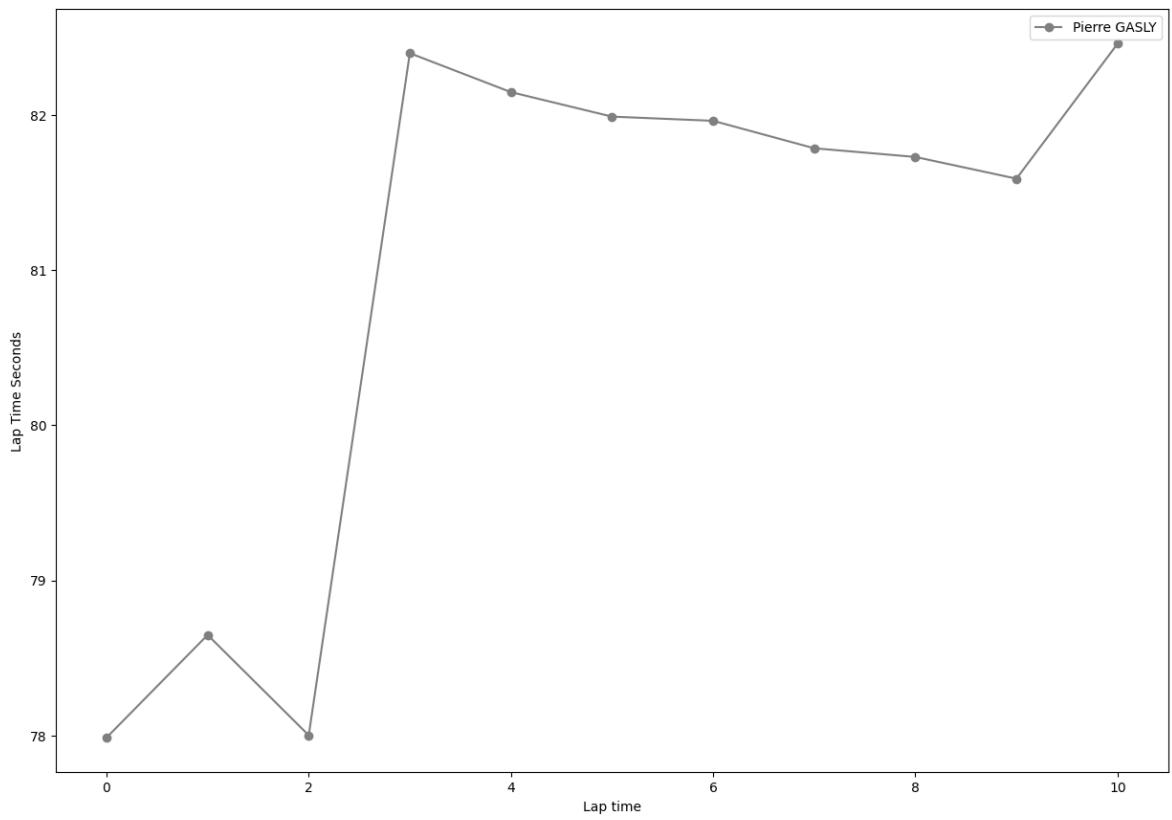
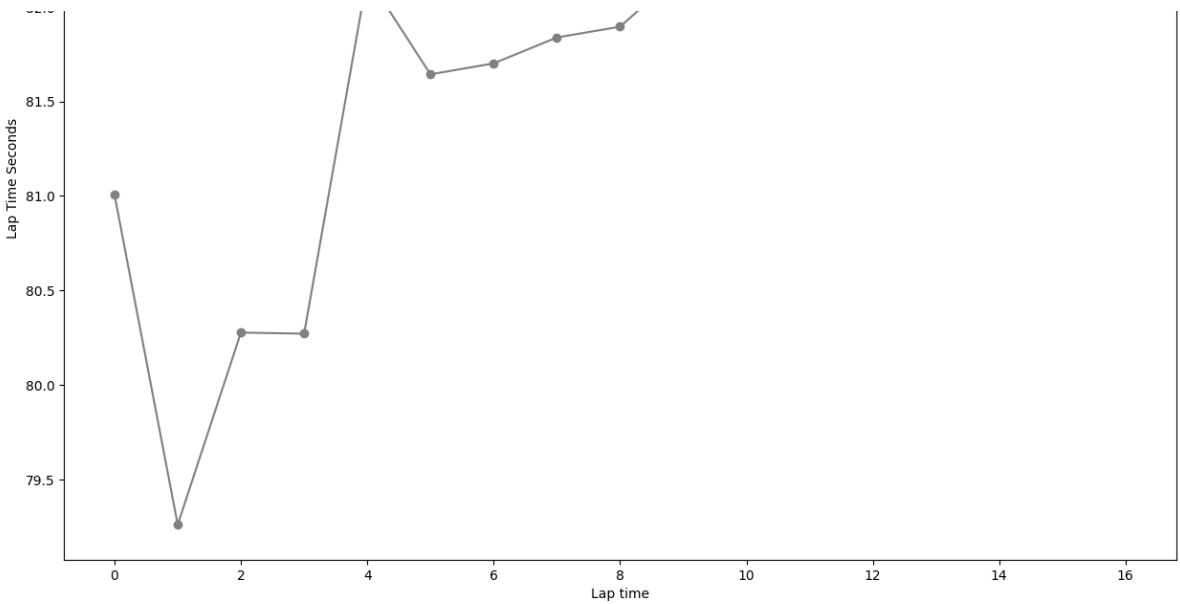


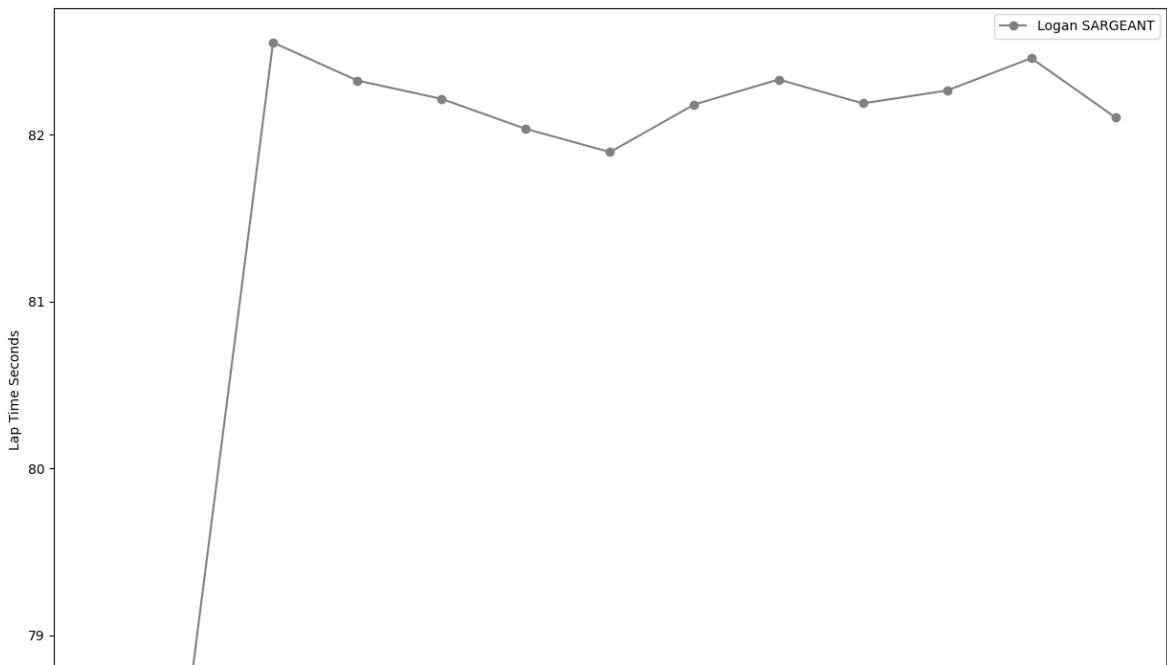
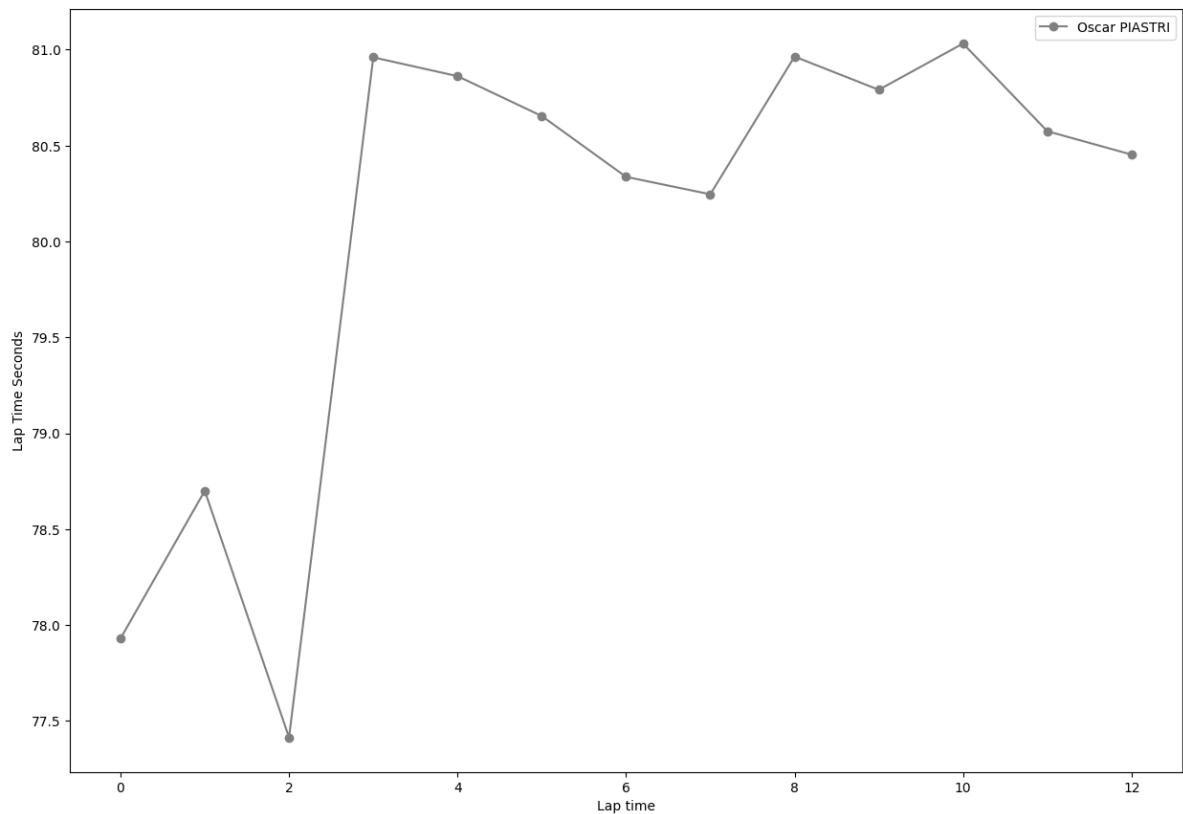
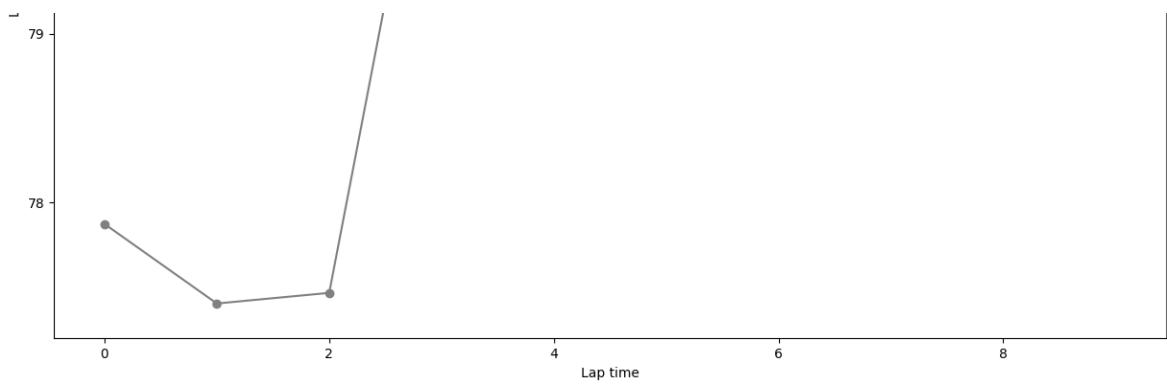
Hard tyres

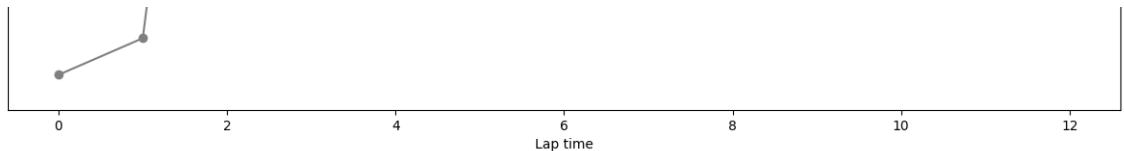
In [56]:

```
libraryDataF1.obtain_data_tyres(jointables2, "HARD", 83)
```





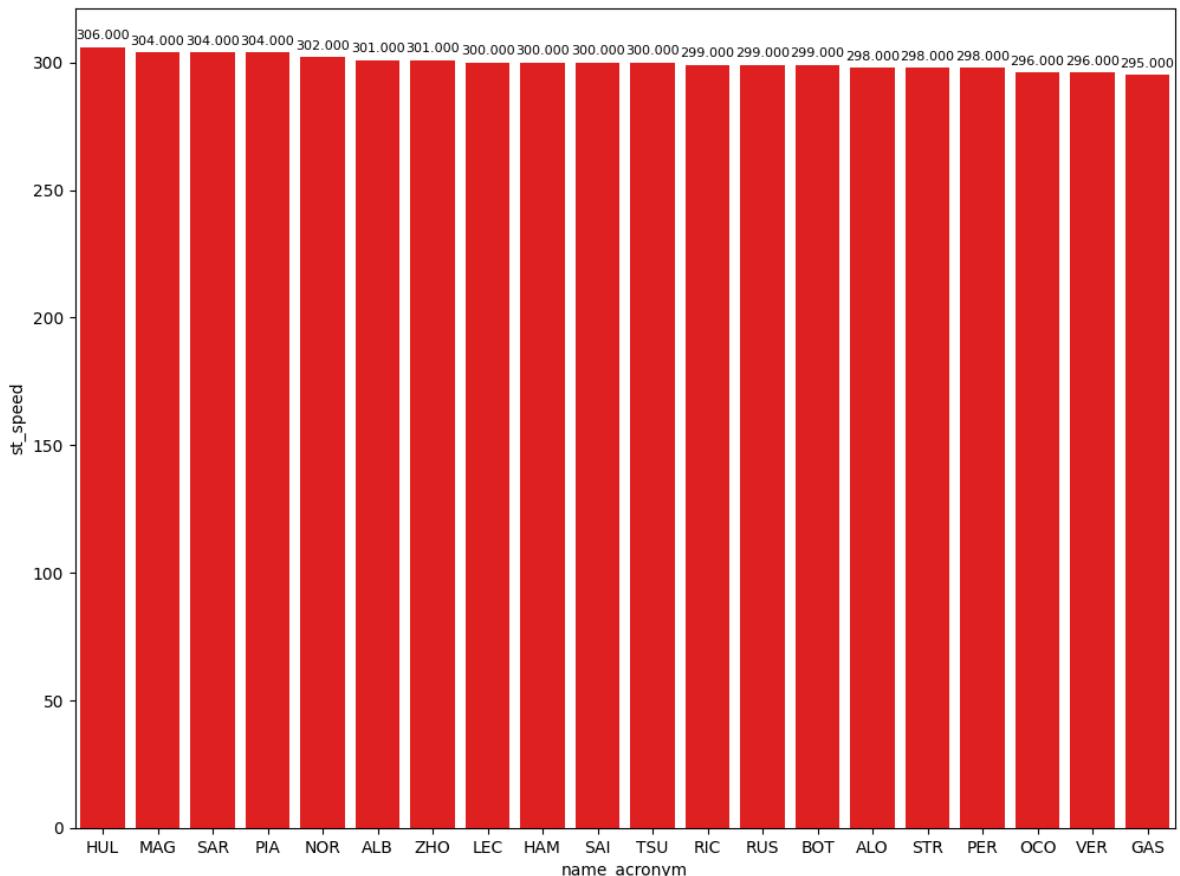




Speed trap

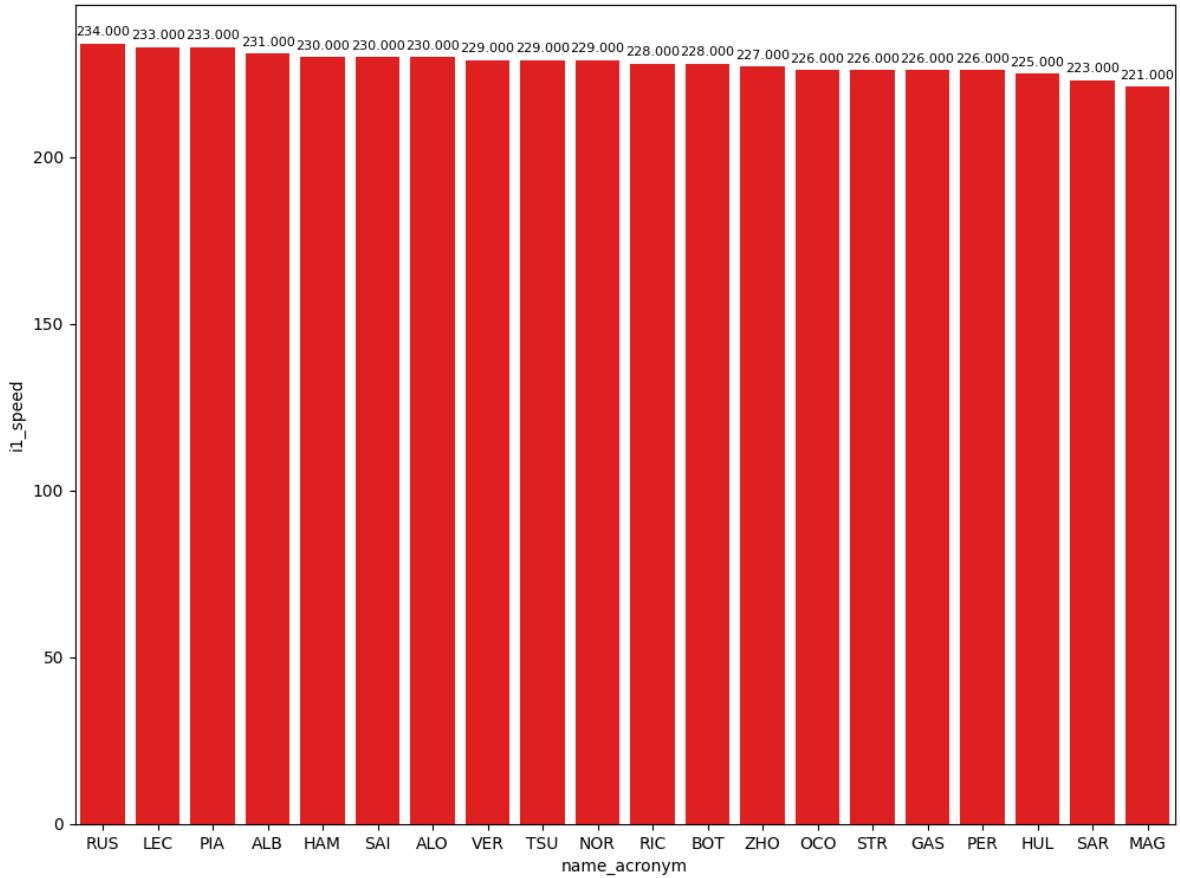
In [57]:

```
top_speed = jointables2.loc[jointables2.groupby(['name_acronym'])['st_speed'].max()]
libraryDataF1.obtainchart("name_acronym","st_speed",top_speed)
```



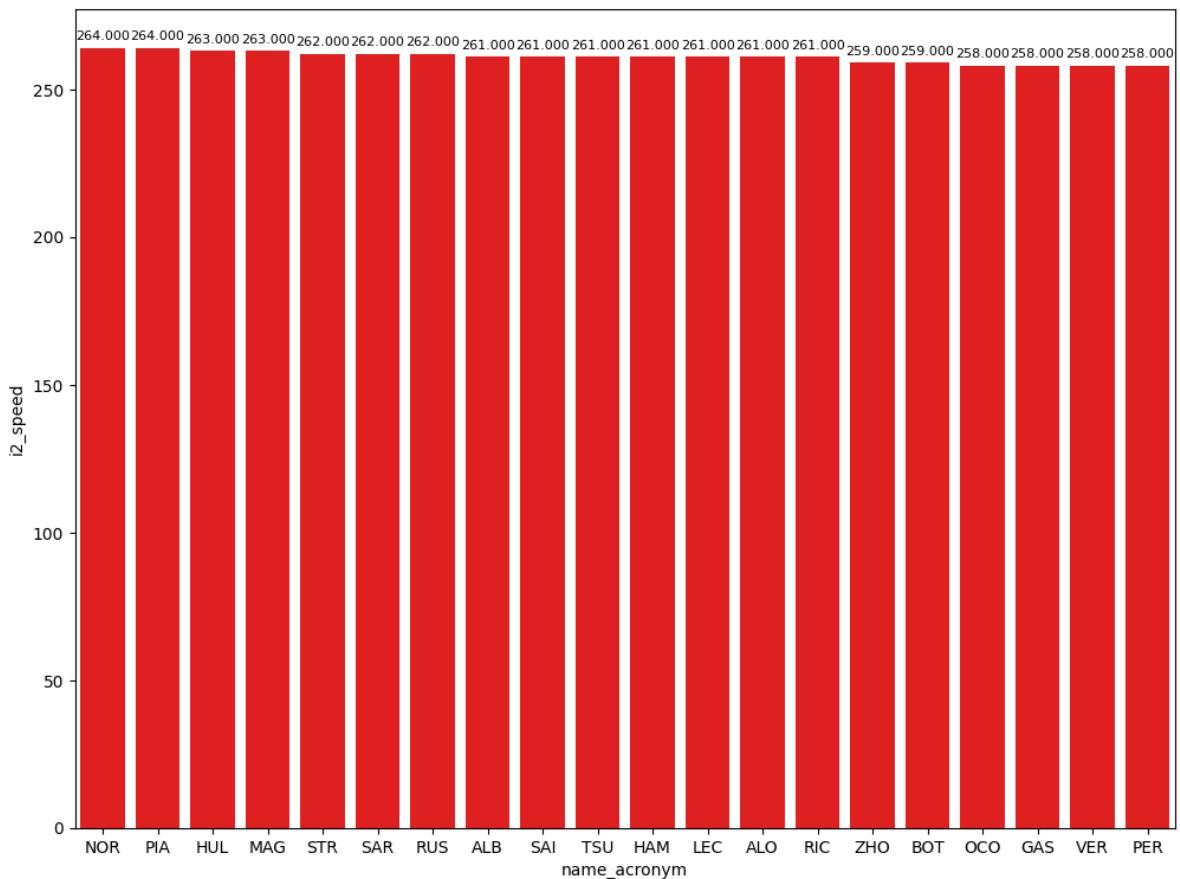
In [58]:

```
top_speed = jointables2.loc[jointables2.groupby(['name_acronym'])['i1_speed'].max()]
libraryDataF1.obtainchart("name_acronym","i1_speed",top_speed)
```



In [59]:

```
top_speed = jointables2.loc[jointables2.groupby(['name_acronym'])['i2_speed'].max()]
libraryDataF1.obtainchart("name_acronym","i2_speed",top_speed)
```



Fastest lap per compound

In this section, I will show the best lap with the different compounds of the session.

```
In [60]: compoundsPace = jointables2.loc[jointables2.groupby(['compound'])['lap_duration'].min()]
compoundsPace[['full_name', 'compound', 'duration_sector_1', 'duration_sector_2', 'duration_sector_3', 'lap_duration']]
```

```
Out[60]:   full_name  compound  duration_sector_1  duration_sector_2  duration_sector_3  lap_duration
131    George RUSSELL      HARD        24.376          26.758         26.117       77.25
98     Charles LECLERC     MEDIUM        24.192          26.492         25.993       76.67
245     Charles LECLERC     SOFT          23.926          26.315         25.665       75.90
```

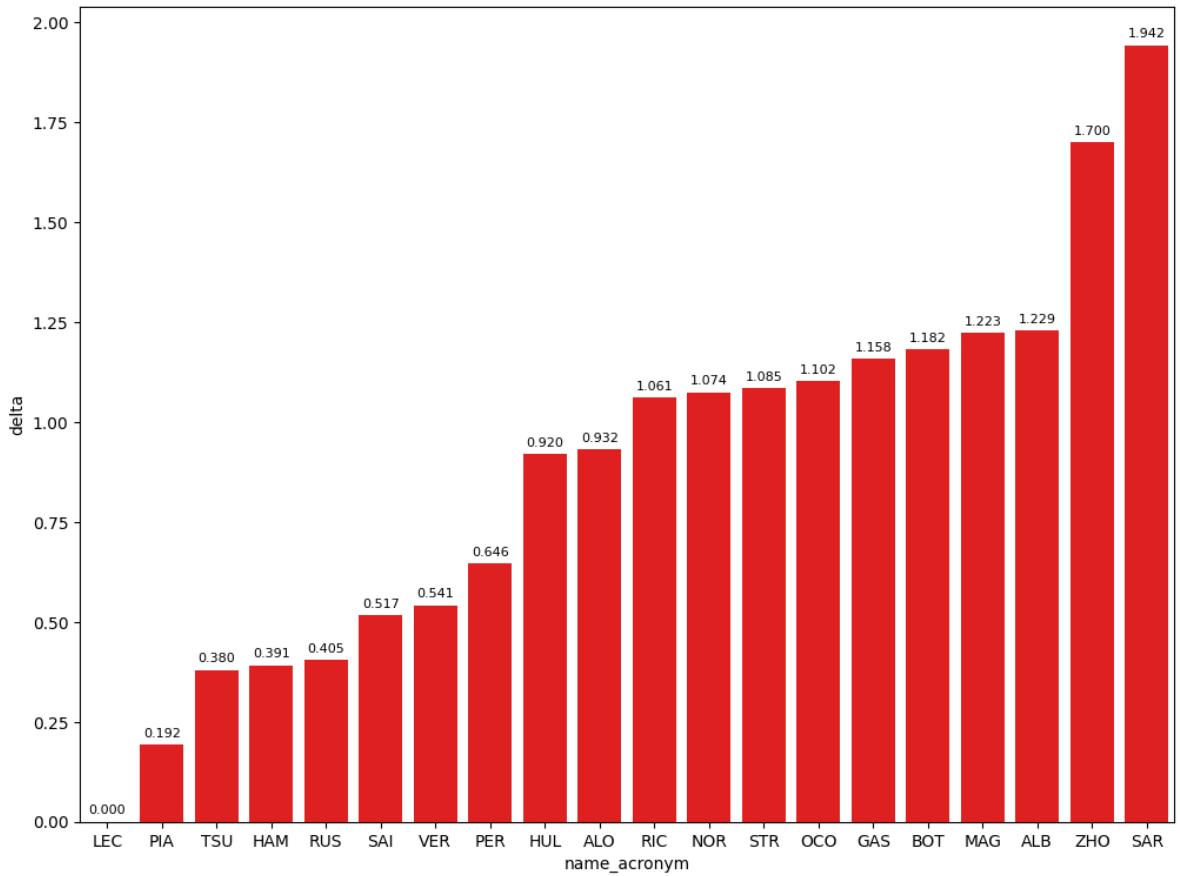
Deltas

In this section we can see the deltas of the fastest lap of each driver compared with the fastest lap of the session

```
In [61]: practiceCleaned = jointables2.query("lap_duration >1")
drivers_list = list(practiceCleaned['driver_number'].unique())
newdataset = pd.DataFrame()
for driver in drivers_list:
    newdataset = libraryDataF1.obtain_fastest_lap(driver, practiceCleaned, newdataset)

arr= libraryDataF1.obtain_deltas(newdataset)
newdataset.insert(3,'delta',arr)
```

```
In [62]: dt = newdataset.sort_values(ascending=True, by='delta')
libraryDataF1.obtainchart("name_acronym","delta",dt)
```



Track dominance

In this section, best sector are taken of each sector to see the car's performance in each sector.

In [63]:

```
sectorPace = jointables2.loc[jointables2.groupby(['driver_number'])['duration'].min()]
sectorPace[['duration_sector_1','full_name','compound','lap_duration','lap_number']]
```

Out[63]:

	duration_sector_1	full_name	compound	lap_duration	lap_number
245	23.926	Charles LECLERC	SOFT	75.906	13
191	23.942	Max VERSTAPPEN	SOFT	76.447	8
159	23.976	Lando NORRIS	SOFT	84.169	9
193	23.993	Oscar PIASTRI	SOFT	76.098	10
170	24.039	Carlos SAINZ	SOFT	76.423	10
257	24.090	George RUSSELL	SOFT	80.315	18
224	24.119	Lewis HAMILTON	SOFT	76.297	13
207	24.175	Fernando ALONSO	SOFT	76.838	13
232	24.186	Yuki TSUNODA	SOFT	76.286	14
209	24.262	Sergio PEREZ	SOFT	76.552	9
204	24.286	Lance STROLL	SOFT	77.091	8
220	24.349	Alexander ALBON	MEDIUM	77.552	6
205	24.391	Nico HULKENBERG	SOFT	76.826	9
235	24.425	Valtteri BOTTAS	SOFT	77.104	13

	duration_sector_1	full_name	compound	lap_duration	lap_number
182	24.429	ZHOU Guanyu	SOFT	77.606	11
231	24.429	Esteban OCON	SOFT	77.008	13
223	24.430	Daniel RICCIARDO	SOFT	76.967	14
160	24.484	Pierre GASLY	SOFT	77.064	11
263	24.549	Logan SARGEANT	SOFT	77.848	7

In [64]:

```
sectorPace = jointables2.loc[jointables2.groupby(['driver_number'])['duration_sector_1'].mean()]
sectorPace[['duration_sector_2','full_name','compound','lap_duration','lap_number']]
```

Out[64]:

	duration_sector_2	full_name	compound	lap_duration	lap_number
159	26.166	Lando NORRIS	SOFT	84.169	9
199	26.298	George RUSSELL	SOFT	76.311	15
169	26.299	Charles LECLERC	SOFT	75.969	9
193	26.304	Oscar PIASTRI	SOFT	76.098	10
209	26.356	Sergio PEREZ	SOFT	76.552	9
279	26.411	Lewis HAMILTON	SOFT	76.357	16
232	26.425	Yuki TSUNODA	SOFT	76.286	14
280	26.489	Carlos SAINZ	SOFT	81.896	16
156	26.562	Fernando ALONSO	SOFT	76.969	10
216	26.570	Pierre GASLY	SOFT	77.124	14
259	26.596	Nico HULKENBERG	SOFT	76.936	12
287	26.601	Lance STROLL	SOFT	76.991	14
174	26.618	Esteban OCON	SOFT	77.047	10
235	26.653	Valtteri BOTTAS	SOFT	77.104	13
91	26.654	Max VERSTAPPEN	MEDIUM	76.734	5
165	26.654	Daniel RICCIARDO	SOFT	77.136	11
277	26.685	Alexander ALBON	SOFT	77.135	10
167	26.786	Kevin MAGNUSSEN	SOFT	77.129	11
263	26.979	Logan SARGEANT	SOFT	77.848	7
237	26.998	ZHOU Guanyu	SOFT	77.617	14

In [65]:

```
sectorPace = jointables2.loc[jointables2.groupby(['driver_number'])['duration_sector_2'].mean()]
sectorPace[['duration_sector_3','full_name','compound','lap_duration','lap_number']]
```

Out[65]:

	duration_sector_3	full_name	compound	lap_duration	lap_number
224	25.591	Lewis HAMILTON	SOFT	76.297	13
169	25.662	Charles LECLERC	SOFT	75.969	9
232	25.675	Yuki TSUNODA	SOFT	76.286	14
167	25.746	Kevin MAGNUSSEN	SOFT	77.129	11
223	25.748	Daniel RICCIARDO	SOFT	76.967	14

	duration_sector_3	full_name	compound	lap_duration	lap_number
193	25.801	Oscar PIASTRI	SOFT	76.098	10
121	25.819	Carlos SAINZ	MEDIUM	76.680	7
205	25.828	Nico HULKENBERG	SOFT	76.826	9
191	25.837	Max VERSTAPPEN	SOFT	76.447	8
71	25.851	Lando NORRIS	MEDIUM	77.019	4
161	25.856	Valtteri BOTTAS	SOFT	77.088	9
199	25.886	George RUSSELL	SOFT	76.311	15
174	25.890	Esteban OCON	SOFT	77.047	10
209	25.934	Sergio PEREZ	SOFT	76.552	9
277	25.966	Alexander ALBON	SOFT	77.135	10
182	26.003	ZHOU Guanyu	SOFT	77.606	11
160	26.005	Pierre GASLY	SOFT	77.064	11
287	26.005	Lance STROLL	SOFT	76.991	14
156	26.008	Fernando ALONSO	SOFT	76.969	10

Mean pace with the different compound used on the session

```
In [66]: race_pace = pd.DataFrame(jointables2.query("is_pit_out_lap == False and lap > 10"))
race_pace
```

Out[66]:

compound	lap_duration
SOFT	77.503122
MEDIUM	80.720684
HARD	80.891955

Long runs

```
In [67]: MINIMUM_SECONDS = 80
MAXIMUM_SECONDS = 83.3
```

Red Bull Racing

```
In [68]: stintInformation.query('driver_number == 1 or driver_number == 11')
```

Out[68]:

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
1	1235	9509	1	11	1	5	MEDIUM	0
6	1235	9509	1	1	1	7	MEDIUM	0
21	1235	9509	2	11	6	8	MEDIUM	0
27	1235	9509	2	1	8	13	SOFT	0
30	1235	9509	3	11	9	11	SOFT	0

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
47	1235	9509		4	11	12	15	SOFT
52	1235	9509		3	1	14	24	MEDIUM

In [69]: `libraryDataF1.getinfolongruns(jointables2,1,'Red Bull Racing',MINIMUM_SECONDS,MAXIMUM_SECONDS)`

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
390	Max VERSTAPPEN	MEDIUM	2024-05-17T15:50:13.473000+00:00	14		26.102	
410	Max VERSTAPPEN	MEDIUM	2024-05-17T15:51:35.272000+00:00	15		25.752	
471	Max VERSTAPPEN	MEDIUM	2024-05-17T15:55:51.612000+00:00	18		25.519	
490	Max VERSTAPPEN	MEDIUM	2024-05-17T15:57:12.100000+00:00	19		25.728	
509	Max VERSTAPPEN	MEDIUM	2024-05-17T15:58:33.563000+00:00	20		25.721	
529	Max VERSTAPPEN	MEDIUM	2024-05-17T15:59:54.926000+00:00	21		25.789	

In [70]: `libraryDataF1.getinfolongruns(jointables2,11,'Red Bull Racing',MINIMUM_SECONDS,MAXIMUM_SECONDS)`

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
378	Sergio PEREZ	MEDIUM	2024-05-17T15:49:31.485000+00:00	16		25.905	
398	Sergio PEREZ	MEDIUM	2024-05-17T15:50:52.657000+00:00	17		25.676	
418	Sergio PEREZ	MEDIUM	2024-05-17T15:52:13.257000+00:00	18		25.485	
438	Sergio PEREZ	MEDIUM	2024-05-17T15:53:33.634000+00:00	19		25.538	
477	Sergio PEREZ	MEDIUM	2024-05-17T15:56:18.635000+00:00	21		25.726	
497	Sergio PEREZ	MEDIUM	2024-05-17T15:57:39.877000+00:00	22		25.663	
517	Sergio PEREZ	MEDIUM	2024-05-17T15:59:01.132000+00:00	23		25.853	

Ferrari

In [71]: `libraryDataF1.getinfolongruns(jointables2,16,'Ferrari',MINIMUM_SECONDS,MAXIMUM_SECONDS)`

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
312	Charles LECLERC	MEDIUM	2024-05-17T15:44:00.387000+00:00	16		25.691	
325	Charles LECLERC	MEDIUM	2024-05-17T15:45:21.393000+00:00	17		25.796	

	full_name	compound		date_start	lap_number	duration_sector_1	duration_lap
341	Charles LECLERC	MEDIUM		2024-05-17T15:46:42.402000+00:00	18	25.533	25.533
377	Charles LECLERC	MEDIUM		2024-05-17T15:49:29.390000+00:00	20	25.467	25.467
397	Charles LECLERC	MEDIUM		2024-05-17T15:50:49.468000+00:00	21	25.528	25.528
417	Charles LECLERC	MEDIUM		2024-05-17T15:52:09.957000+00:00	22	25.485	25.485
457	Charles LECLERC	MEDIUM		2024-05-17T15:54:53.901000+00:00	24	25.409	25.409
476	Charles LECLERC	MEDIUM		2024-05-17T15:56:14.645000+00:00	25	25.666	25.666

```
In [72]: libraryDataF1.getinfolongruns(jointables2,55,'Ferrari',MINIMUM_SECONDS,MAX:
```

Out[72]:	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3	duration_lap	duration_total
280	Carlos SAINZ	SOFT	2024-05-17T15:37:39.870000+00:00	16	24.372	24.372	0.000	0.000	24.372
326	Carlos SAINZ	MEDIUM	2024-05-17T15:45:30+00:00	18	25.824	25.824	0.000	0.000	25.824
343	Carlos SAINZ	MEDIUM	2024-05-17T15:46:51.058000+00:00	19	25.732	25.732	0.000	0.000	25.732
380	Carlos SAINZ	MEDIUM	2024-05-17T15:49:39.190000+00:00	21	25.234	25.234	0.000	0.000	25.234
400	Carlos SAINZ	MEDIUM	2024-05-17T15:51:01.684000+00:00	22	25.536	25.536	0.000	0.000	25.536
420	Carlos SAINZ	MEDIUM	2024-05-17T15:52:21.767000+00:00	23	25.659	25.659	0.000	0.000	25.659
460	Carlos SAINZ	MEDIUM	2024-05-17T15:55:06.297000+00:00	25	25.577	25.577	0.000	0.000	25.577
479	Carlos SAINZ	MEDIUM	2024-05-17T15:56:27.005000+00:00	26	25.647	25.647	0.000	0.000	25.647
499	Carlos SAINZ	MEDIUM	2024-05-17T15:57:48.296000+00:00	27	25.661	25.661	0.000	0.000	25.661
519	Carlos SAINZ	MEDIUM	2024-05-17T15:59:09.480000+00:00	28	25.492	25.492	0.000	0.000	25.492

Mercedes

```
In [73]: stintInformation.query('driver_number == 63 or driver_number == 44')
```

Out[73]:	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
15	1235	9509	1	44	1	9	HARD	
19	1235	9509	1	63	1	11	HARD	
37	1235	9509	2	44	10	15	SOFT	
49	1235	9509	2	63	12	20	SOFT	
56	1235	9509	3	44	16	18	SOFT	
68	1235	9509	4	44	19	19	SOFT	

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
71	1235	9509		5	44	20	30	HARD
72	1235	9509		3	63	21	21	SOFT
73	1235	9509		4	88	88	88	HARD

In [74]: `libraryDataF1.getinfolongruns(jointables2, 44, 'Mercedes', MINIMUM_SECONDS, MAXIMUM_SECONDS)`

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3	duration_total
383	Lewis HAMILTON	HARD	2024-05-17T15:49:49.681000+00:00	20				25.531
403	Lewis HAMILTON	HARD	2024-05-17T15:51:10.675000+00:00	21				25.850
423	Lewis HAMILTON	HARD	2024-05-17T15:52:31.746000+00:00	22				25.661
443	Lewis HAMILTON	HARD	2024-05-17T15:53:52.745000+00:00	23				25.542
463	Lewis HAMILTON	HARD	2024-05-17T15:55:14.035000+00:00	24				24.936
501	Lewis HAMILTON	HARD	2024-05-17T15:57:57.743000+00:00	26				25.484
521	Lewis HAMILTON	HARD	2024-05-17T15:59:18.593000+00:00	27				25.520

In [75]: `libraryDataF1.getinfolongruns(jointables2, 63, 'Mercedes', MINIMUM_SECONDS, MAXIMUM_SECONDS)`

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3	duration_total
257	George RUSSELL	SOFT	2024-05-17T15:33:55.591000+00:00	18				24.090
379	George RUSSELL	HARD	2024-05-17T15:49:36.030000+00:00	23				25.985
399	George RUSSELL	HARD	2024-05-17T15:50:57.276000+00:00	24				25.665
419	George RUSSELL	HARD	2024-05-17T15:52:18.308000+00:00	25				25.653
439	George RUSSELL	HARD	2024-05-17T15:53:39.208000+00:00	26				25.489
459	George RUSSELL	HARD	2024-05-17T15:54:59.624000+00:00	27				25.610
478	George RUSSELL	HARD	2024-05-17T15:56:22.927000+00:00	28				25.522
498	George RUSSELL	HARD	2024-05-17T15:57:43.728000+00:00	29				25.649
518	George RUSSELL	HARD	2024-05-17T15:59:05.111000+00:00	30				25.670

McLaren

In [76]: `stintInformation.query('driver_number == 81 or driver_number == 4')`

Out[76]:

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
5	1235	9509	1	81	1	6	HARD	
9	1235	9509	1	4	1	8	MEDIUM	
24	1235	9509	2	81	7	9	HARD	
29	1235	9509	2	4	9	10	SOFT	
36	1235	9509	3	81	10	14	SOFT	
46	1235	9509	3	4	11	27	MEDIUM	
54	1235	9509	4	81	15	27	HARD	
75	1235	9509	4	4	28	31	SOFT	
76	1235	9509	5	81	28	31	SOFT	

In [77]:

```
libraryDataF1.getinfolongruns(jointables2,4,'McLaren',MINIMUM_SECONDS,MAXIMUM_SECONDS)
```

Out[77]:

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3	duration_lap	duration_lap_plus_sectors
266	Lando NORRIS	MEDIUM	2024-05-17T15:35:17.389000+00:00	11					25.856
276	Lando NORRIS	MEDIUM	2024-05-17T15:36:38.385000+00:00	12					25.756
282	Lando NORRIS	MEDIUM	2024-05-17T15:37:59.375000+00:00	13					25.602
285	Lando NORRIS	MEDIUM	2024-05-17T15:39:20.277000+00:00	14					25.664
291	Lando NORRIS	MEDIUM	2024-05-17T15:40:40.942000+00:00	15					25.668
298	Lando NORRIS	MEDIUM	2024-05-17T15:42:01.590000+00:00	16					25.573
306	Lando NORRIS	MEDIUM	2024-05-17T15:43:22.460000+00:00	17					25.631
320	Lando NORRIS	MEDIUM	2024-05-17T15:44:43.113000+00:00	18					25.405
334	Lando NORRIS	MEDIUM	2024-05-17T15:46:03.435000+00:00	19					25.346
350	Lando NORRIS	MEDIUM	2024-05-17T15:47:23.946000+00:00	20					25.250
369	Lando NORRIS	MEDIUM	2024-05-17T15:48:44.844000+00:00	21					25.400
388	Lando NORRIS	MEDIUM	2024-05-17T15:50:05.411000+00:00	22					25.454
408	Lando NORRIS	MEDIUM	2024-05-17T15:51:26.346000+00:00	23					25.515
428	Lando NORRIS	MEDIUM	2024-05-17T15:52:47.151000+00:00	24					25.504
448	Lando NORRIS	MEDIUM	2024-05-17T15:54:08.644000+00:00	25					25.623
514	Lando NORRIS	SOFT	2024-05-17T15:58:51.137000+00:00	28					25.205

```
In [78]: libraryDataF1.getinfolongruns(jointables2, 81, 'McLaren', MINIMUM_SECONDS, MAX)
```

```
In [79]: libraryDataF1.getinfolongruns(jointables2, 81, 'McLaren', MINIMUM_SECONDS, MAX:
```

```
Out[79]: 80.6874
```

Aston Martin

```
In [80]: stintInformation_query('driver_number == 18 or driver_number == 14')
```

Out[80]:	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
8	1235	9509	1	18	1	7	MEDIUM	
12	1235	9509	1	14	1	9	MEDIUM	
28	1235	9509	2	18	8	16	SOFT	
38	1235	9509	2	14	10	17	SOFT	
60	1235	9509	3	18	17	27	MEDIUM	
65	1235	9509	3	14	18	30	MEDIUM	

```
In [81]: libraryDataF1.getinfolongruns(jointables2,14,'Aston Martin',MINIMUM_SECONDS)
```

Out[81]:	full_name	compound	date_start	lap_number	duration_sector_1	dl
336	Fernando ALONSO	MEDIUM	2024-05-17T15:46:24.605000+00:00	18	26.003	

	full_name	compound		date_start	lap_number	duration_sector_1	dt
353	Fernando ALONSO	MEDIUM	2024-05-17T15:47:46.590000+00:00		19	25.849	
372	Fernando ALONSO	MEDIUM	2024-05-17T15:49:08.150000+00:00		20	25.786	
392	Fernando ALONSO	MEDIUM	2024-05-17T15:50:29.475000+00:00		21	25.819	
412	Fernando ALONSO	MEDIUM	2024-05-17T15:51:51.027000+00:00		22	25.682	
432	Fernando ALONSO	MEDIUM	2024-05-17T15:53:12.297000+00:00		23	25.738	
452	Fernando ALONSO	MEDIUM	2024-05-17T15:54:33.678000+00:00		24	25.610	
472	Fernando ALONSO	MEDIUM	2024-05-17T15:55:54.939000+00:00		25	25.596	
491	Fernando ALONSO	MEDIUM	2024-05-17T15:57:16.864000+00:00		26	25.725	

In [82]: `libraryDataF1.getinfolongruns(jointables2, 18, 'Aston Martin', MINIMUM_SECOND)`

	full_name	compound		date_start	lap_number	duration_sector_1	dt
376	Lance STROLL	MEDIUM	2024-05-17T15:49:21.350000+00:00		17	25.801	
396	Lance STROLL	MEDIUM	2024-05-17T15:50:42.799000+00:00		18	25.910	
416	Lance STROLL	MEDIUM	2024-05-17T15:52:04.277000+00:00		19	25.875	
456	Lance STROLL	MEDIUM	2024-05-17T15:54:50.222000+00:00		21	25.860	
475	Lance STROLL	MEDIUM	2024-05-17T15:56:11.789000+00:00		22	25.789	
494	Lance STROLL	MEDIUM	2024-05-17T15:57:32.861000+00:00		23	25.817	
515	Lance STROLL	MEDIUM	2024-05-17T15:58:54.283000+00:00		24	25.753	

RB

In [83]: `stintInformation.query('driver_number == 3 or driver_number == 22')`

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
7	1235	9509	1	3	1	7	MEDIUM	
17	1235	9509	1	22	1	10	MEDIUM	
26	1235	9509	2	3	8	10	MEDIUM	
41	1235	9509	3	3	11	16	SOFT	
43	1235	9509	2	22	11	16	SOFT	
62	1235	9509	4	3	17	33	MEDIUM	
64	1235	9509	3	22	17	33	MEDIUM	

```
In [84]: libraryDataF1.getinfolongruns(jointables2,3,'RB',MINIMUN_SECONDS,MAXIMUM_SI
```

	full_name	compound	date_start	lap_number	duration_sector_1
299	Daniel RICCIARDO	MEDIUM	2024-05-17T15:42:06.567000+00:00	17	25.869
307	Daniel RICCIARDO	MEDIUM	2024-05-17T15:43:27.893000+00:00	18	25.764
321	Daniel RICCIARDO	MEDIUM	2024-05-17T15:44:49.214000+00:00	19	25.711
335	Daniel RICCIARDO	MEDIUM	2024-05-17T15:46:10.523000+00:00	20	25.752
351	Daniel RICCIARDO	MEDIUM	2024-05-17T15:47:31.774000+00:00	21	25.767
371	Daniel RICCIARDO	MEDIUM	2024-05-17T15:48:53.091000+00:00	22	25.737
391	Daniel RICCIARDO	MEDIUM	2024-05-17T15:50:14.712000+00:00	23	25.977
411	Daniel RICCIARDO	MEDIUM	2024-05-17T15:51:36.943000+00:00	24	25.897
431	Daniel RICCIARDO	MEDIUM	2024-05-17T15:52:59.037000+00:00	25	25.867
450	Daniel RICCIARDO	MEDIUM	2024-05-17T15:54:22.095000+00:00	26	25.841
470	Daniel RICCIARDO	MEDIUM	2024-05-17T15:55:43.750000+00:00	27	25.820
489	Daniel RICCIARDO	MEDIUM	2024-05-17T15:57:05.783000+00:00	28	25.647
507	Daniel RICCIARDO	MEDIUM	2024-05-17T15:58:27.587000+00:00	29	25.578
528	Daniel RICCIARDO	MEDIUM	2024-05-17T15:59:50.266000+00:00	30	26.132

```
In [85]: libraryDataF1.getinfolongruns(jointables2,22,'RB',MINIMUN_SECONDS,MAXIMUM_SI
```

	full_name	compound	date_start	lap_number	duration_sector_1	duration_lap
294	Yuki TSUNODA	MEDIUM	2024-05-17T15:41:36.489000+00:00	17	26.105	26.105
302	Yuki TSUNODA	MEDIUM	2024-05-17T15:42:58.042000+00:00	18	25.902	25.902
313	Yuki TSUNODA	MEDIUM	2024-05-17T15:44:19.034000+00:00	19	26.055	26.055
327	Yuki TSUNODA	MEDIUM	2024-05-17T15:45:40.479000+00:00	20	25.852	25.852
344	Yuki TSUNODA	MEDIUM	2024-05-17T15:47:01.868000+00:00	21	25.882	25.882
362	Yuki TSUNODA	MEDIUM	2024-05-17T15:48:23.418000+00:00	22	25.817	25.817
382	Yuki TSUNODA	MEDIUM	2024-05-17T15:49:44.887000+00:00	23	25.934	25.934

	full_name	compound		date_start	lap_number	duration_sector_1	d
402	Yuki TSUNODA	MEDIUM	2024-05-17T15:51:06.912000+00:00		24		26.153
422	Yuki TSUNODA	MEDIUM	2024-05-17T15:52:29.094000+00:00		25		26.134
442	Yuki TSUNODA	MEDIUM	2024-05-17T15:53:51.226000+00:00		26		26.203
462	Yuki TSUNODA	MEDIUM	2024-05-17T15:55:13.701000+00:00		27		26.613
482	Yuki TSUNODA	MEDIUM	2024-05-17T15:56:37.050000+00:00		28		26.199
502	Yuki TSUNODA	MEDIUM	2024-05-17T15:57:59.940000+00:00		29		26.294
522	Yuki	MEDIUM	2024-05-17T15:59:22.871000+00:00		30		25.997

Haas

```
In [86]: stintInformation.query('driver_number == 20 or driver_number == 27')
```

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
0	1235	9509	1	27	1	3	MEDIUM	
3	1235	9509	1	20	1	6	HARD	
20	1235	9509	2	27	4	8	MEDIUM	
25	1235	9509	2	20	7	10	HARD	
32	1235	9509	3	27	9	14	SOFT	
42	1235	9509	3	20	11	16	SOFT	
53	1235	9509	4	27	15	25	MEDIUM	
63	1235	9509	4	20	17	33	HARD	
74	1235	9509	5	27	26	29	SOFT	

```
In [87]: libraryDataF1.getinfolongruns(jointables2, 20, 'Haas F1 Team', MINIMUM_SECOND)
```

	full_name	compound		date_start	lap_number	duration_sector_1
19	Kevin MAGNUSEN	HARD	2024-05-17T15:01:49.255000+00:00		2	25.703
104	Kevin MAGNUSEN	HARD	2024-05-17T15:10:30.643000+00:00		7	25.882
118	Kevin MAGNUSEN	HARD	2024-05-17T15:11:51.030000+00:00		8	25.759
297	Kevin MAGNUSEN	HARD	2024-05-17T15:41:55.266000+00:00		17	26.192
305	Kevin MAGNUSEN	HARD	2024-05-17T15:43:17.225000+00:00		18	25.997
319	Kevin MAGNUSEN	HARD	2024-05-17T15:44:38.828000+00:00		19	26.040
333	Kevin MAGNUSEN	HARD	2024-05-17T15:46:00.587000+00:00		20	25.937

		full_name	compound	date_start	lap_number	duration_sector_1
349		Kevin MAGNUSEN	HARD	2024-05-17T15:47:22.404000+00:00	21	25.890
368		Kevin MAGNUSEN	HARD	2024-05-17T15:48:44.306000+00:00	22	26.704
389		Kevin MAGNUSEN	HARD	2024-05-17T15:50:07.466000+00:00	23	25.952
409		Kevin MAGNUSEN	HARD	2024-05-17T15:51:29.520000+00:00	24	25.988
429		Kevin MAGNUSEN	HARD	2024-05-17T15:52:51.797000+00:00	25	25.992
449		Kevin MAGNUSEN	HARD	2024-05-17T15:54:14.579000+00:00	26	26.047
469		Kevin MAGNUSEN	HARD	2024-05-17T15:55:37.037000+00:00	27	26.232
488		Kevin MAGNUSEN	HARD	2024-05-17T15:56:59.630000+00:00	28	26.162
506		Kevin MAGNUSEN	HARD	2024-05-17T15:58:22.217000+00:00	29	26.060
---		Kevin

In [88]: `libraryDataF1.getinfolongruns(jointables2, 27, 'Haas F1 Team', MINIMUN_SECOND)`

		full_name	compound	date_start	lap_number	duration_sector_1
316		Nico HULKENBERG	MEDIUM	2024-05-17T15:44:28.663000+00:00	15	26.748
331		Nico HULKENBERG	MEDIUM	2024-05-17T15:45:51.277000+00:00	16	25.968
347		Nico HULKENBERG	MEDIUM	2024-05-17T15:47:13.068000+00:00	17	25.780
366		Nico HULKENBERG	MEDIUM	2024-05-17T15:48:34.553000+00:00	18	25.780
386		Nico HULKENBERG	MEDIUM	2024-05-17T15:49:56.034000+00:00	19	25.654
406		Nico HULKENBERG	MEDIUM	2024-05-17T15:51:18.873000+00:00	20	25.981
426		Nico HULKENBERG	MEDIUM	2024-05-17T15:52:40.929000+00:00	21	25.951
446		Nico HULKENBERG	MEDIUM	2024-05-17T15:54:03.219000+00:00	22	25.881
466		Nico HULKENBERG	MEDIUM	2024-05-17T15:55:25.436000+00:00	23	25.891
530		Nico HULKENBERG	SOFT	2024-05-17T15:59:58.542000+00:00	26	25.638

Alpine

In [89]: `stintInformation.query('driver_number == 10 or driver_number == 31')`

Out[89]: `meeting_key session_key stint_number driver_number lap_start lap_end compound tyre`

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
14	1235	9509	1	1	31	1	9	HARD
16	1235	9509	1	1	10	1	10	HARD
39	1235	9509	2	2	31	10	17	SOFT
45	1235	9509	2	2	10	11	18	SOFT
67	1235	9509	3	3	31	18	32	HARD
69	1235	9509	3	3	10	19	28	HARD

In [90]: `libraryDataF1.getinfolongruns(jointables2, 31, 'Alpine', MINIMUN_SECONDS, MAXIMUM_SECONDS)`

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3	duration_sector_4	duration_sector_5
314	Esteban OCON	HARD	2024-05-17T15:44:23.971000+00:00	18					25.891
329	Esteban OCON	HARD	2024-05-17T15:45:45.590000+00:00	19					26.026
345	Esteban OCON	HARD	2024-05-17T15:47:07.888000+00:00	20					26.040
364	Esteban OCON	HARD	2024-05-17T15:48:29.077000+00:00	21					25.952
384	Esteban OCON	HARD	2024-05-17T15:49:51.079000+00:00	22					25.884
404	Esteban OCON	HARD	2024-05-17T15:51:13.807000+00:00	23					26.224
424	Esteban OCON	HARD	2024-05-17T15:52:36.270000+00:00	24					25.989
465	Esteban OCON	HARD	2024-05-17T15:55:21.793000+00:00	26					26.078
485	Esteban OCON	HARD	2024-05-17T15:56:44.155000+00:00	27					26.124
504	Esteban OCON	HARD	2024-05-17T15:58:06.729000+00:00	28					26.046
524	Esteban OCON	HARD	2024-05-17T15:59:28.980000+00:00	29					25.893

In [91]: `libraryDataF1.getinfolongruns(jointables2, 10, 'Alpine', MINIMUN_SECONDS, MAXIMUM_SECONDS)`

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3	duration_sector_4	duration_sector_5
309	Pierre GASLY	HARD	2024-05-17T15:43:48.299000+00:00	19					26.254
324	Pierre GASLY	HARD	2024-05-17T15:45:10.612000+00:00	20					26.259
339	Pierre GASLY	HARD	2024-05-17T15:46:32.759000+00:00	21					26.163
357	Pierre GASLY	HARD	2024-05-17T15:47:54.804000+00:00	22					25.938
375	Pierre GASLY	HARD	2024-05-17T15:49:16.913000+00:00	23					25.830

	full_name	compound		date_start	lap_number	duration_sector_1	dt
395	Pierre GASLY	HARD	2024-05-17T15:50:38.579000+00:00		24		25.885
415	Pierre GASLY	HARD	2024-05-17T15:52:00.261000+00:00		25		25.834
435	Pierre GASLY	HARD	2024-05-17T15:53:21.880000+00:00		26		26.094
503	Pierre GASLY	SOFT	2024-05-17T15:58:04+00:00		29		25.754

Williams

In [92]: `stintInformation.query('driver_number == 2 or driver_number == 23')`

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
2	1235	9509	1	2	1	6	HARD	
13	1235	9509	1	23	1	9	MEDIUM	
22	1235	9509	2	2	7	9	SOFT	
34	1235	9509	2	23	10	12	SOFT	
40	1235	9509	3	2	10	23	HARD	
51	1235	9509	3	23	13	24	MEDIUM	

In [93]: `libraryDataF1.getinfolongruns(jointables2, 23, 'Williams', MINIMUM_SECONDS, MAXIMUM_SECONDS)`

	full_name	compound		date_start	lap_number	duration_sector_1	dt
361	Alexander ALBON	MEDIUM	2024-05-17T15:48:17.959000+00:00		13		25.988
381	Alexander ALBON	MEDIUM	2024-05-17T15:49:39.675000+00:00		14		25.674
401	Alexander ALBON	MEDIUM	2024-05-17T15:51:01.761000+00:00		15		25.917
421	Alexander ALBON	MEDIUM	2024-05-17T15:52:23.590000+00:00		16		25.961
441	Alexander ALBON	MEDIUM	2024-05-17T15:53:45.675000+00:00		17		26.059
461	Alexander ALBON	MEDIUM	2024-05-17T15:55:07.498000+00:00		18		25.953
480	Alexander ALBON	MEDIUM	2024-05-17T15:56:29.658000+00:00		19		25.936
500	Alexander ALBON	MEDIUM	2024-05-17T15:57:51.941000+00:00		20		26.007
520	Alexander ALBON	MEDIUM	2024-05-17T15:59:14.430000+00:00		21		25.950

In [94]: `libraryDataF1.getinfolongruns(jointables2, 2, 'Williams', MINIMUM_SECONDS, MAXIMUM_SECONDS)`

	full_name	compound		date_start	lap_number	duration_sector_1	dt
395	Pierre GASLY	HARD	2024-05-17T15:50:38.579000+00:00		24		25.885

	full_name	compound		date_start	lap_number	duration_sector_1
323	Logan SARGEANT	HARD	2024-05-17T15:45:03.487000+00:00		10	26.311
338	Logan SARGEANT	HARD	2024-05-17T15:46:25.975000+00:00		11	26.240
354	Logan SARGEANT	HARD	2024-05-17T15:47:48.280000+00:00		12	25.973
373	Logan SARGEANT	HARD	2024-05-17T15:49:10.623000+00:00		13	26.030
393	Logan SARGEANT	HARD	2024-05-17T15:50:32.609000+00:00		14	25.866
413	Logan SARGEANT	HARD	2024-05-17T15:51:54.505000+00:00		15	26.047
433	Logan SARGEANT	HARD	2024-05-17T15:53:16.746000+00:00		16	26.126
453	Logan SARGEANT	HARD	2024-05-17T15:54:38.964000+00:00		17	25.989
473	Logan SARGEANT	HARD	2024-05-17T15:56:01.267000+00:00		18	25.951
492	Logan SARGEANT	HARD	2024-05-17T15:57:23.388000+00:00		19	26.064
512	Logan	HARD	2024-05-17T15:58:46.048000+00:00		20	25.896

Kick Sauber

In [95]: `stintInformation.query('driver_number == 24 or driver_number == 77')`

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
11	1235	9509	1	77	1	8	MEDIUM	
18	1235	9509	1	24	1	10	MEDIUM	
33	1235	9509	2	77	9	15	SOFT	
44	1235	9509	2	24	11	16	SOFT	
55	1235	9509	3	77	16	16	SOFT	
59	1235	9509	3	24	17	18	SOFT	
61	1235	9509	4	77	17	29	MEDIUM	
70	1235	9509	4	24	19	29	MEDIUM	

In [96]: `libraryDataF1.getinfolongruns(jointables2, 24, 'Kick Sauber', MINIMUM_SECONDS)`

	full_name	compound		date_start	lap_number	duration_sector_1	du
374	ZHOU Guanyu	MEDIUM	2024-05-17T15:49:14.122000+00:00		19	25.906	
394	ZHOU Guanyu	MEDIUM	2024-05-17T15:50:35.917000+00:00		20	25.990	
414	ZHOU Guanyu	MEDIUM	2024-05-17T15:51:57.975000+00:00		21	25.924	

	full_name	compound		date_start	lap_number	duration_sector_1	dt
434	ZHOU Guanyu	MEDIUM	2024-05-17T15:53:20.163000+00:00		22	25.848	
454	ZHOU Guanyu	MEDIUM	2024-05-17T15:54:41.980000+00:00		23	25.843	
474	ZHOU Guanyu	MEDIUM	2024-05-17T15:56:04.137000+00:00		24	25.936	

In [97]: `libraryDataF1.getinfolongruns(jointables2, 77, 'Kick Sauber', MINIMUM_SECONDS)`

	full_name	compound		date_start	lap_number	duration_sector_1	dt
348	Valtteri BOTTAS	MEDIUM	2024-05-17T15:47:17.979000+00:00		17	25.906	
367	Valtteri BOTTAS	MEDIUM	2024-05-17T15:48:39.178000+00:00		18	26.174	
387	Valtteri BOTTAS	MEDIUM	2024-05-17T15:50:01.567000+00:00		19	25.814	
407	Valtteri BOTTAS	MEDIUM	2024-05-17T15:51:22.577000+00:00		20	25.897	
427	Valtteri BOTTAS	MEDIUM	2024-05-17T15:52:44.537000+00:00		21	26.275	
447	Valtteri BOTTAS	MEDIUM	2024-05-17T15:54:07.782000+00:00		22	26.116	
467	Valtteri BOTTAS	MEDIUM	2024-05-17T15:55:29.206000+00:00		23	25.976	
487	Valtteri BOTTAS	MEDIUM	2024-05-17T15:56:51.234000+00:00		24	26.135	
505	Valtteri BOTTAS	MEDIUM	2024-05-17T15:58:13.616000+00:00		25	26.181	
525	Valtteri BOTTAS	MEDIUM	2024-05-17T15:59:35.953000+00:00		26	26.221	

Long runs mean for each driver

In [98]: `longrun_data = libraryDataF1.obtainLongRunData(drivers, jointables2, MINIMUM_SECONDS)`

Sorted by lap duration

In [99]: `pd.DataFrame(longrun_data, columns=['driver', 'compound', 'lap_duration', 'sector1', 'sector2', 'sector3'])`

	driver	compound	lap_duration	sector1	sector2	sector3
19	Oscar PIASTRI	HARD	80.687400	25.376800	28.143700	27.166900
7	Charles LECLERC	MEDIUM	80.736444	25.594222	28.082889	27.059333
3	Lando NORRIS	MEDIUM	80.842500	25.528250	28.166312	27.147937
15	Lewis HAMILTON	HARD	80.897143	25.503429	28.199857	27.193857
5	Sergio PEREZ	MEDIUM	81.110000	25.692286	28.161143	27.256571
17	George RUSSELL	HARD	81.180667	25.481444	27.985333	27.713889
16	Carlos SAINZ	MEDIUM	81.226200	25.473400	28.092200	27.660600

	driver	compound	lap_duration	sector1	sector2	sector3
0	Max VERSTAPPEN	MEDIUM	81.335333	25.768500	28.289000	27.277833
8	Lance STROLL	MEDIUM	81.405857	25.829286	28.235429	27.341143
6	Fernando ALONSO	MEDIUM	81.600700	25.796300	28.347400	27.457000
4	Pierre GASLY	HARD	81.819400	25.974900	28.416600	27.427900
2	Daniel RICCIARDO	MEDIUM	81.911214	25.811357	28.469643	27.630214
13	Nico HULKENBERG	MEDIUM	81.928500	25.929100	28.449200	27.550200
9	Kevin MAGNUSEN	HARD	81.984294	26.008882	28.595294	27.380118
18	Valtteri BOTTAS	MEDIUM	82.024700	26.069500	28.495500	27.459700
10	Yuki TSUNODA	MEDIUM	82.048500	26.081429	28.424286	27.542786
11	Alexander ALBON	MEDIUM	82.064000	25.938333	28.637889	27.487778
12	ZHOU Guanyu	MEDIUM	82.176714	25.913857	28.674143	27.588714
14	Esteban OCON	HARD	82.184091	26.013364	28.529364	27.641364

Sorted by sector 1

In [100...]

```
pd.DataFrame(longrun_data,columns=['driver','compound','lap_duration','sector1','sector2','sector3'])
```

Out[100...]

	driver	compound	lap_duration	sector1	sector2	sector3
19	Oscar PIASTRI	HARD	80.687400	25.376800	28.143700	27.166900
16	Carlos SAINZ	MEDIUM	81.226200	25.473400	28.092200	27.660600
17	George RUSSELL	HARD	81.180667	25.481444	27.985333	27.713889
15	Lewis HAMILTON	HARD	80.897143	25.503429	28.199857	27.193857
3	Lando NORRIS	MEDIUM	80.842500	25.528250	28.166312	27.147937
7	Charles LECLERC	MEDIUM	80.736444	25.594222	28.082889	27.059333
5	Sergio PEREZ	MEDIUM	81.110000	25.692286	28.161143	27.256571
0	Max VERSTAPPEN	MEDIUM	81.335333	25.768500	28.289000	27.277833
6	Fernando ALONSO	MEDIUM	81.600700	25.796300	28.347400	27.457000
2	Daniel RICCIARDO	MEDIUM	81.911214	25.811357	28.469643	27.630214
8	Lance STROLL	MEDIUM	81.405857	25.829286	28.235429	27.341143
12	ZHOU Guanyu	MEDIUM	82.176714	25.913857	28.674143	27.588714
13	Nico HULKENBERG	MEDIUM	81.928500	25.929100	28.449200	27.550200
11	Alexander ALBON	MEDIUM	82.064000	25.938333	28.637889	27.487778
4	Pierre GASLY	HARD	81.819400	25.974900	28.416600	27.427900
9	Kevin MAGNUSEN	HARD	81.984294	26.008882	28.595294	27.380118
14	Esteban OCON	HARD	82.184091	26.013364	28.529364	27.641364
1	Logan SARGEANT	HARD	82.231909	26.044818	28.625000	27.562091
18	Valtteri BOTTAS	MEDIUM	82.024700	26.069500	28.495500	27.459700
10	Yuki TSUNODA	MEDIUM	82.048500	26.081429	28.424286	27.542786

Sorted by sector 2

```
In [101... pd.DataFrame(longrun_data,columns=['driver','compound','lap_duration','sector1','sector2','sector3'])
```

```
Out[101...

|    | driver           | compound | lap_duration | sector1   | sector2   | sector3   |
|----|------------------|----------|--------------|-----------|-----------|-----------|
| 17 | George RUSSELL   | HARD     | 81.180667    | 25.481444 | 27.985333 | 27.713889 |
| 7  | Charles LECLERC  | MEDIUM   | 80.736444    | 25.594222 | 28.082889 | 27.059333 |
| 16 | Carlos SAINZ     | MEDIUM   | 81.226200    | 25.473400 | 28.092200 | 27.660600 |
| 19 | Oscar PIASTRI    | HARD     | 80.687400    | 25.376800 | 28.143700 | 27.166900 |
| 5  | Sergio PEREZ     | MEDIUM   | 81.110000    | 25.692286 | 28.161143 | 27.256571 |
| 3  | Lando NORRIS     | MEDIUM   | 80.842500    | 25.528250 | 28.166312 | 27.147937 |
| 15 | Lewis HAMILTON   | HARD     | 80.897143    | 25.503429 | 28.199857 | 27.193857 |
| 8  | Lance STROLL     | MEDIUM   | 81.405857    | 25.829286 | 28.235429 | 27.341143 |
| 0  | Max VERSTAPPEN   | MEDIUM   | 81.335333    | 25.768500 | 28.289000 | 27.277833 |
| 6  | Fernando ALONSO  | MEDIUM   | 81.600700    | 25.796300 | 28.347400 | 27.457000 |
| 4  | Pierre GASLY     | HARD     | 81.819400    | 25.974900 | 28.416600 | 27.427900 |
| 10 | Yuki TSUNODA     | MEDIUM   | 82.048500    | 26.081429 | 28.424286 | 27.542786 |
| 13 | Nico HULKENBERG  | MEDIUM   | 81.928500    | 25.929100 | 28.449200 | 27.550200 |
| 2  | Daniel RICCIARDO | MEDIUM   | 81.911214    | 25.811357 | 28.469643 | 27.630214 |
| 18 | Valtteri BOTTAS  | MEDIUM   | 82.024700    | 26.069500 | 28.495500 | 27.459700 |
| 14 | Esteban OCON     | HARD     | 82.184091    | 26.013364 | 28.529364 | 27.641364 |
| 9  | Kevin MAGNUSEN   | HARD     | 81.984294    | 26.008882 | 28.595294 | 27.380118 |
| 1  | Logan SARGEANT   | HARD     | 82.231909    | 26.044818 | 28.625000 | 27.562091 |
| 11 | Alexander ALBON  | MEDIUM   | 82.064000    | 25.938333 | 28.637889 | 27.487778 |
| 12 | ZHOU Guanyu      | MEDIUM   | 82.176714    | 25.913857 | 28.674143 | 27.588714 |


```

Sorted by sector 3

```
In [102... pd.DataFrame(longrun_data,columns=['driver','compound','lap_duration','sector1','sector2','sector3'])
```

```
Out[102...

|    | driver          | compound | lap_duration | sector1   | sector2   | sector3   |
|----|-----------------|----------|--------------|-----------|-----------|-----------|
| 7  | Charles LECLERC | MEDIUM   | 80.736444    | 25.594222 | 28.082889 | 27.059333 |
| 3  | Lando NORRIS    | MEDIUM   | 80.842500    | 25.528250 | 28.166312 | 27.147937 |
| 19 | Oscar PIASTRI   | HARD     | 80.687400    | 25.376800 | 28.143700 | 27.166900 |
| 15 | Lewis HAMILTON  | HARD     | 80.897143    | 25.503429 | 28.199857 | 27.193857 |
| 5  | Sergio PEREZ    | MEDIUM   | 81.110000    | 25.692286 | 28.161143 | 27.256571 |
| 0  | Max VERSTAPPEN  | MEDIUM   | 81.335333    | 25.768500 | 28.289000 | 27.277833 |
| 8  | Lance STROLL    | MEDIUM   | 81.405857    | 25.829286 | 28.235429 | 27.341143 |
| 9  | Kevin MAGNUSEN  | HARD     | 81.984294    | 26.008882 | 28.595294 | 27.380118 |
| 4  | Pierre GASLY    | HARD     | 81.819400    | 25.974900 | 28.416600 | 27.427900 |
| 6  | Fernando ALONSO | MEDIUM   | 81.600700    | 25.796300 | 28.347400 | 27.457000 |
| 18 | Valtteri BOTTAS | MEDIUM   | 82.024700    | 26.069500 | 28.495500 | 27.459700 |


```

		driver	compound	lap_duration	sector1	sector2	sector3
11	Alexander ALBON	MEDIUM	82.064000	25.938333	28.637889	27.487778	
10	Yuki TSUNODA	MEDIUM	82.048500	26.081429	28.424286	27.542786	
13	Nico HULKENBERG	MEDIUM	81.928500	25.929100	28.449200	27.550200	
1	Logan SARGEANT	HARD	82.231909	26.044818	28.625000	27.562091	
12	ZHOU Guanyu	MEDIUM	82.176714	25.913857	28.674143	27.588714	
2	Daniel RICCIARDO	MEDIUM	81.911214	25.811357	28.469643	27.630214	
14	Esteban OCON	HARD	82.184091	26.013364	28.529364	27.641364	
16	Carlos SAINZ	MEDIUM	81.226200	25.473400	28.092200	27.660600	

Free Practice 3

Obtain setup

In [103...]

```
practice = libraryDataF1.obtain_information('laps', session_key=9510)
stintInformation = libraryDataF1.obtain_information('stints', session_key=9510)
drivers = libraryDataF1.obtain_information('drivers', session_key=9510)
```

In [104...]

```
stintsDataFrame = libraryDataF1.stint_configuration(drivers, stintInformation)
jointables2 = pd.merge(practice, stintsDataFrame, on=['lap_number', 'driver_number'])
jointables2
```

Out[104...]

	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
0	1235	9510	1	149.0	216.0	241.0	2024-05-18T10:30:
1	1235	9510	2	110.0	231.0	274.0	2024-05-18T10:50:
2	1235	9510	3	160.0	232.0	265.0	2024-05-18T10:49:
3	1235	9510	4	173.0	202.0	184.0	2024-05-18T10:30:
4	1235	9510	10	168.0	209.0	89.0	2024-05-18T10:36:
...
324	1235	9510	55	125.0	145.0	137.0	2024-05-18T11:31:
325	1235	9510	18	217.0	261.0	292.0	2024-05-18T11:30:
326	1235	9510	55	228.0	256.0	169.0	2024-05-18T11:33:

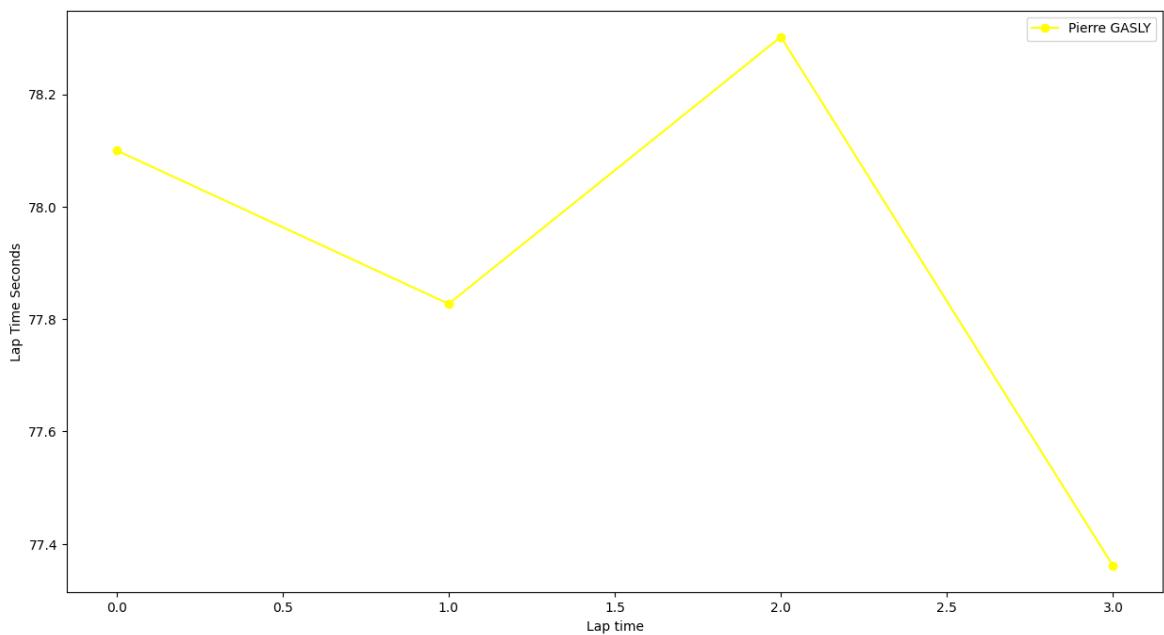
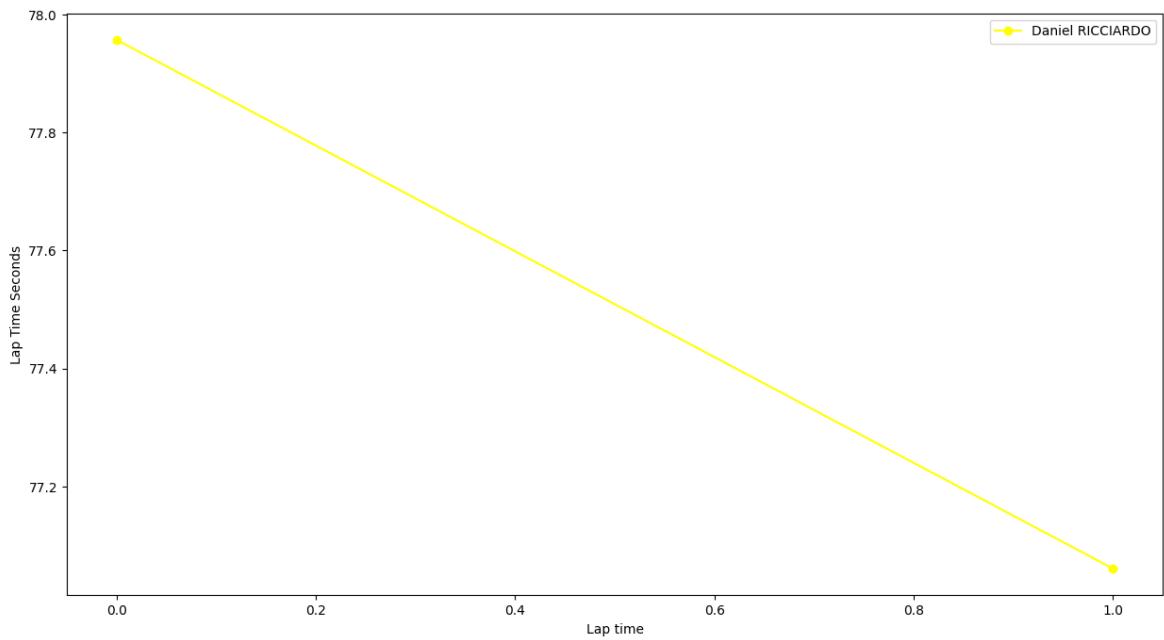
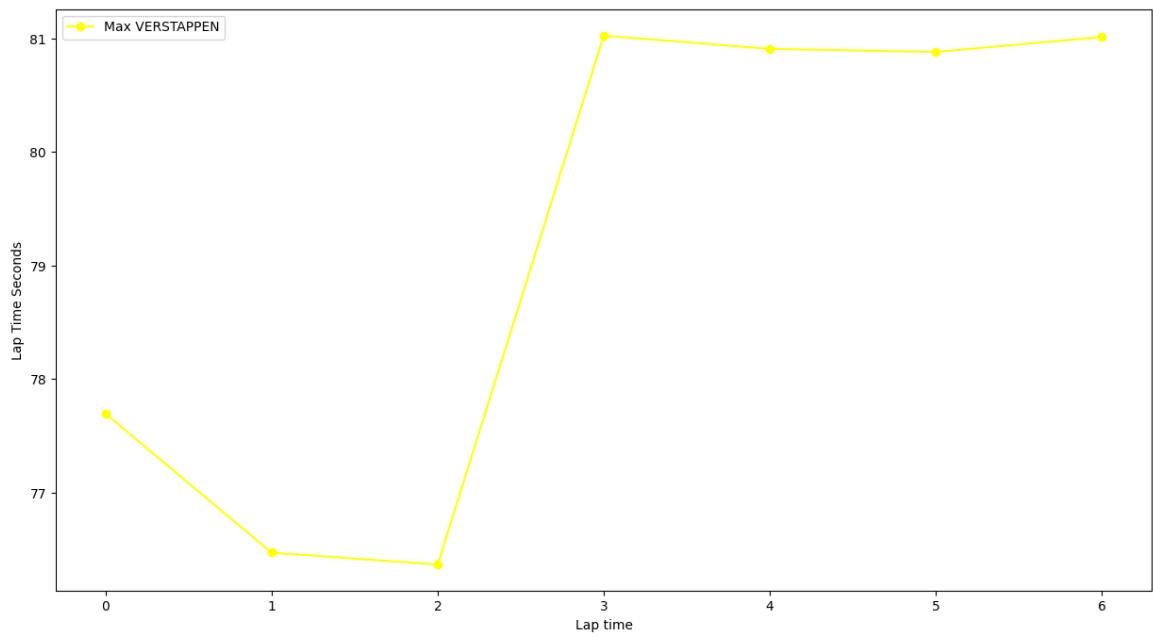
	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
327	1235	9510	18	168.0	165.0	142.0	2024-05-18T11:31:
328	1235	9510	18	215.0	216.0	130.0	2024-05-18T11:33:

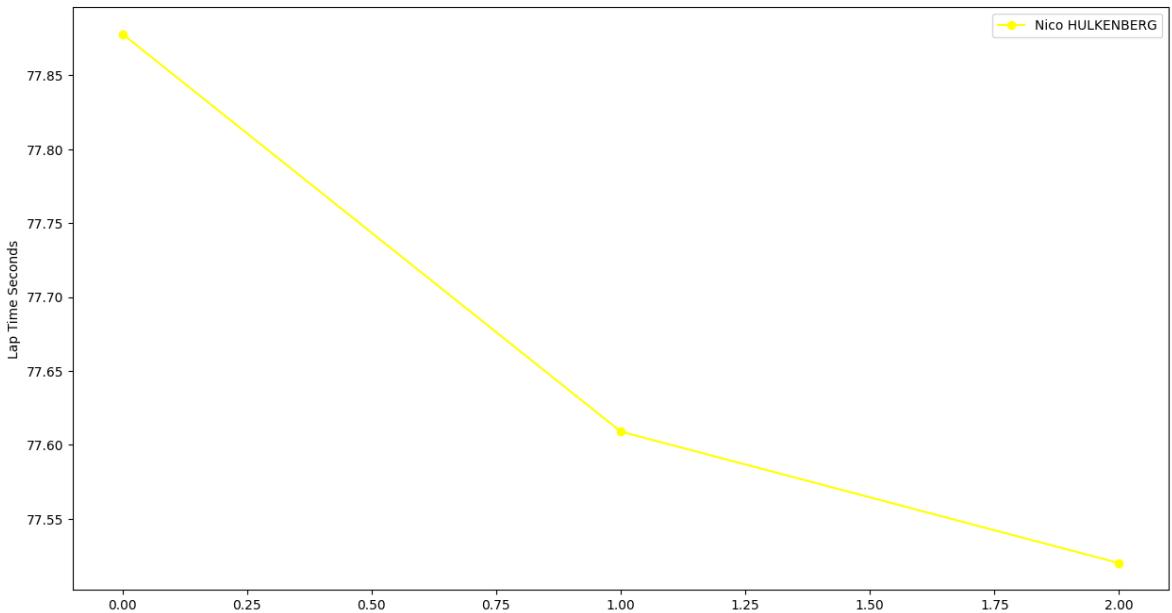
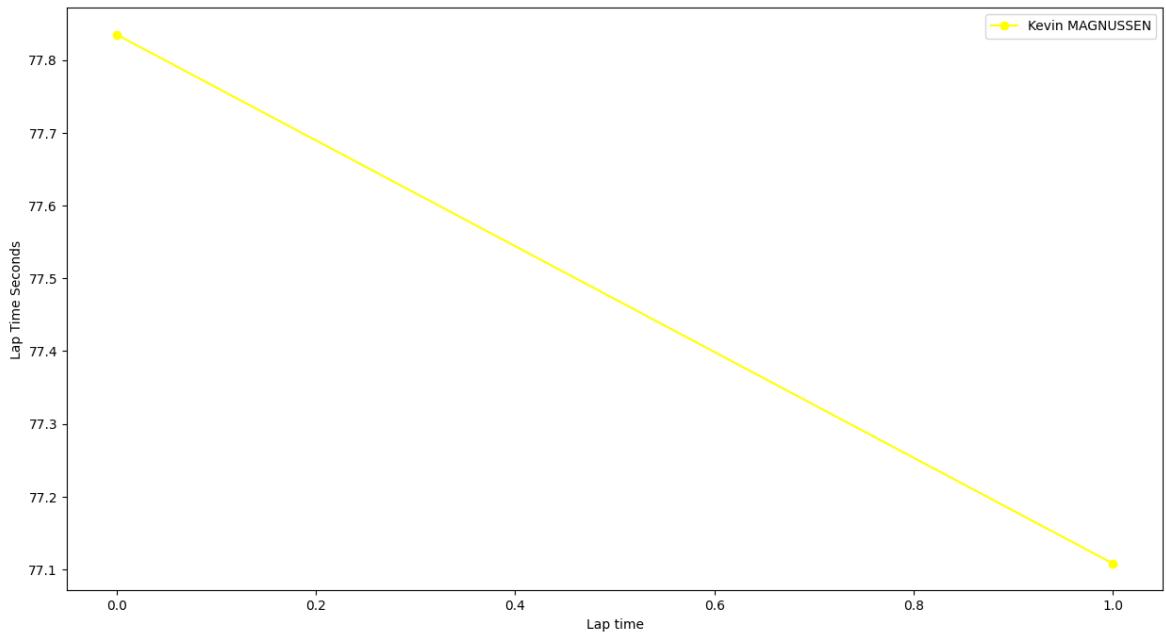
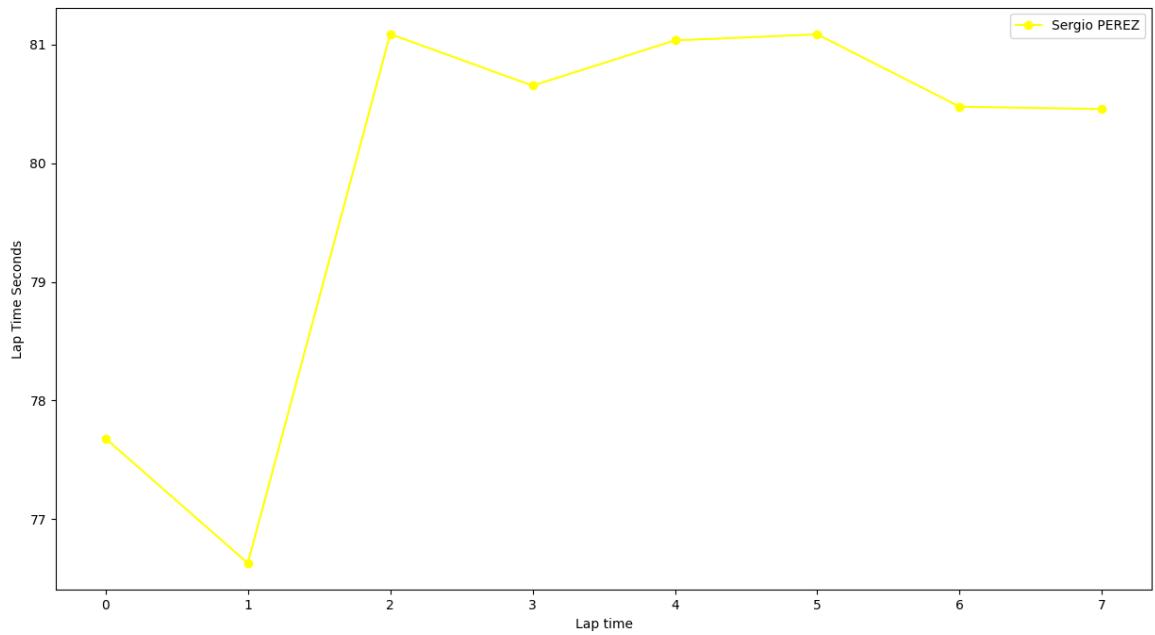
See race pace by means of the charts

Medium tyres

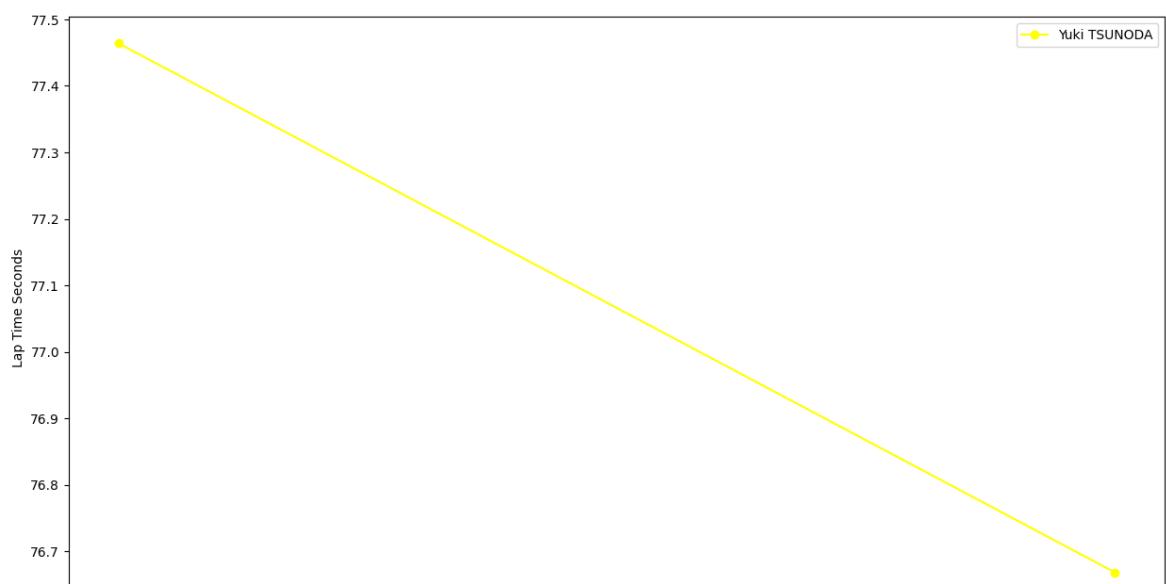
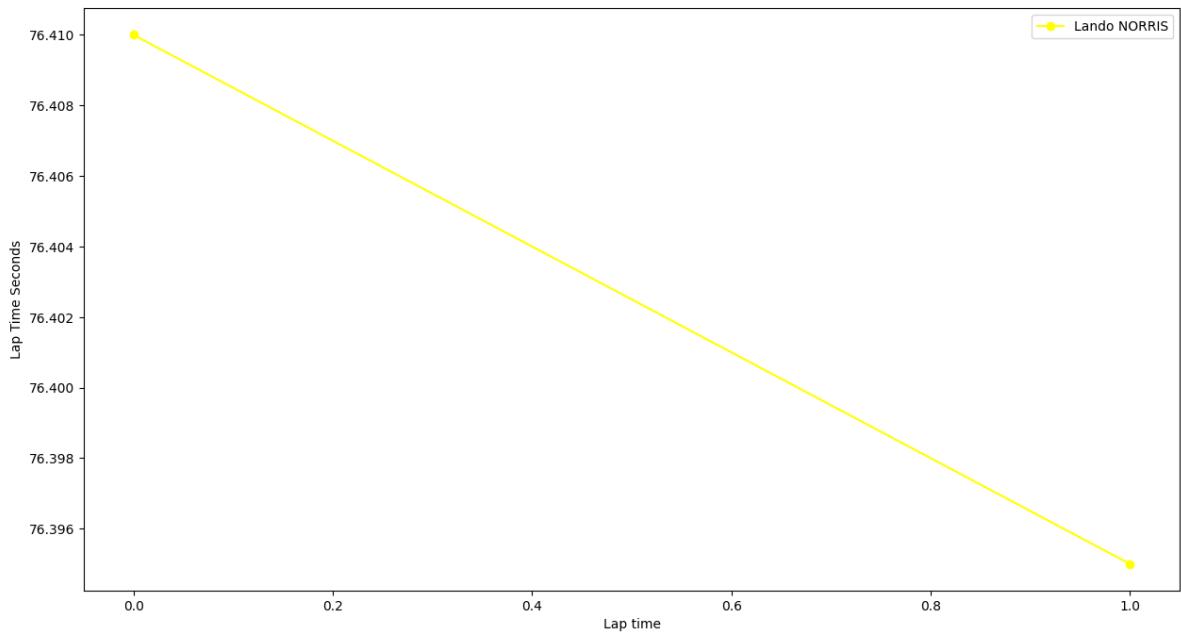
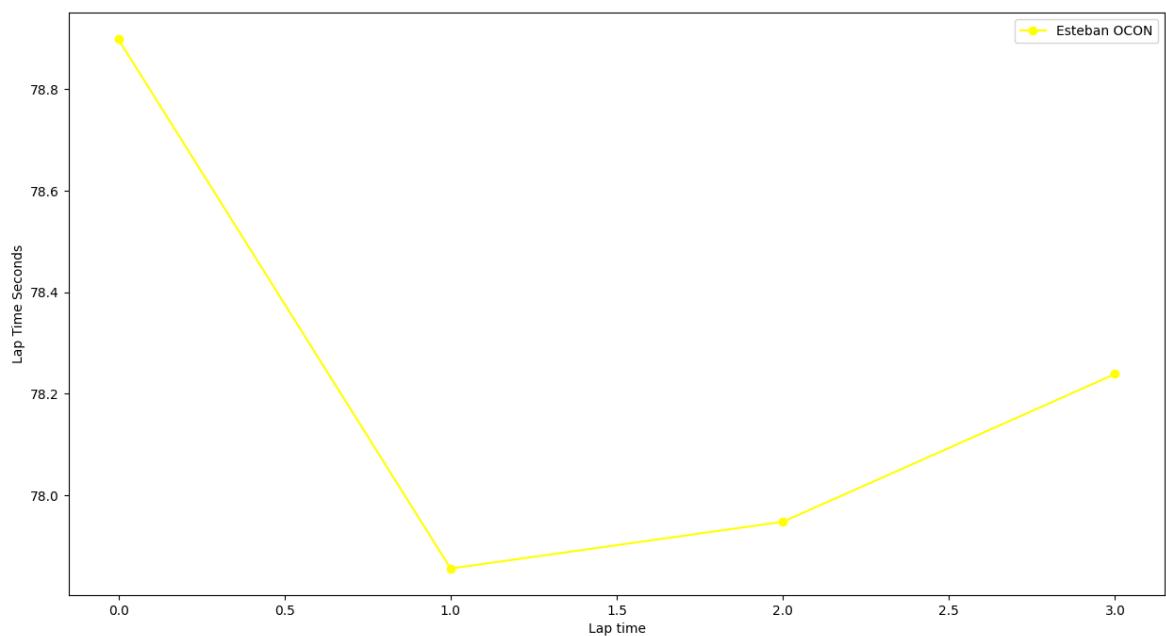
In [105...]

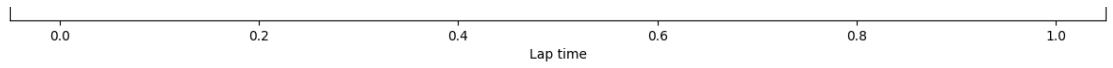
```
libraryDataF1.obtain_data_tyres(jointables2,"MEDIUM",83)
```





Lap time

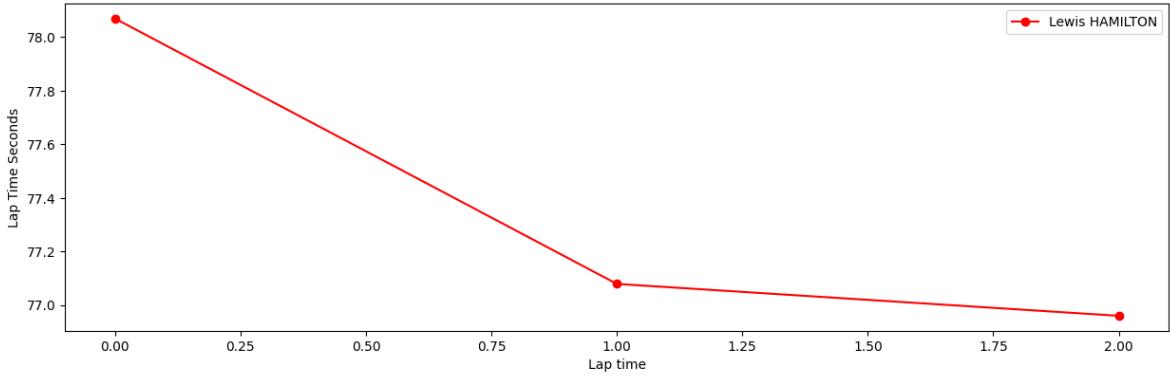
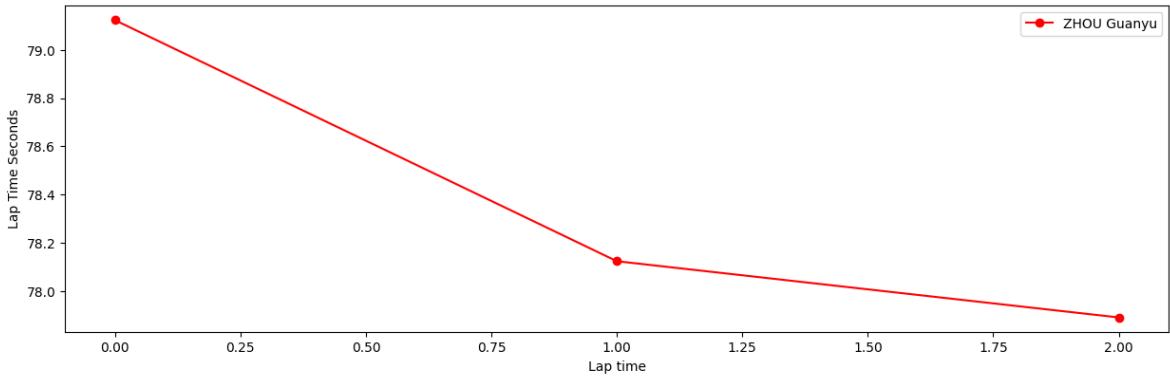
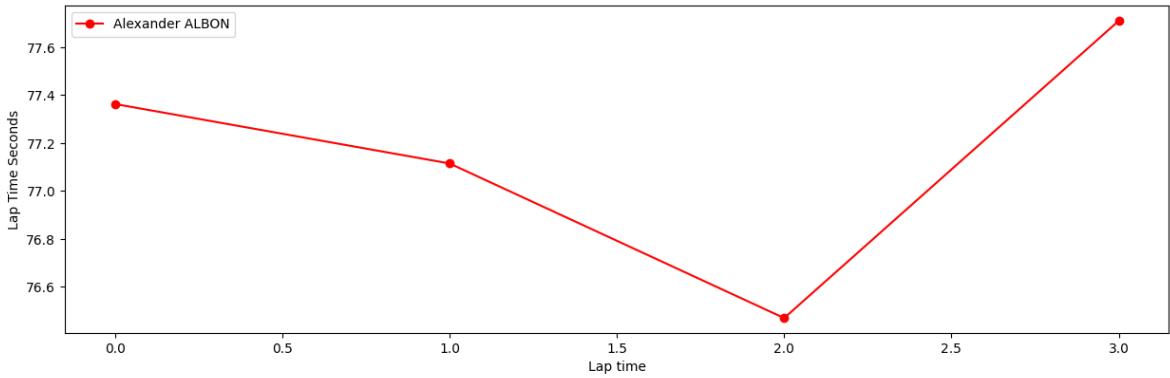
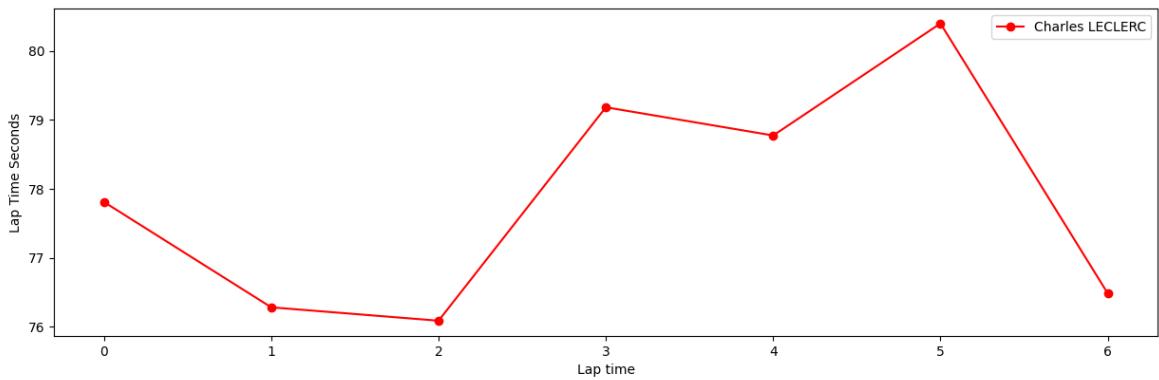
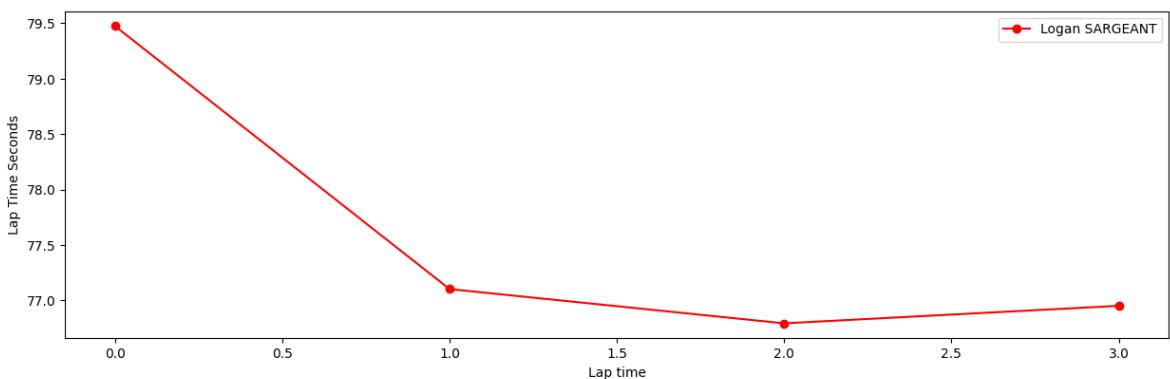


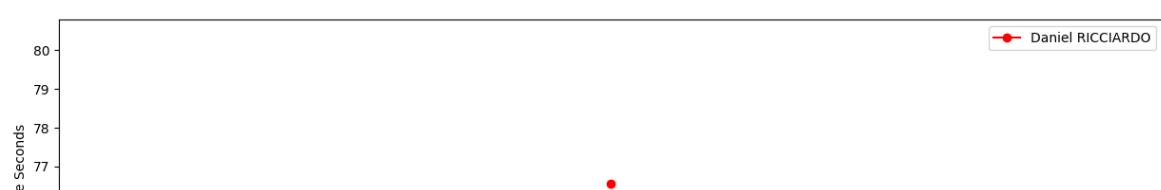
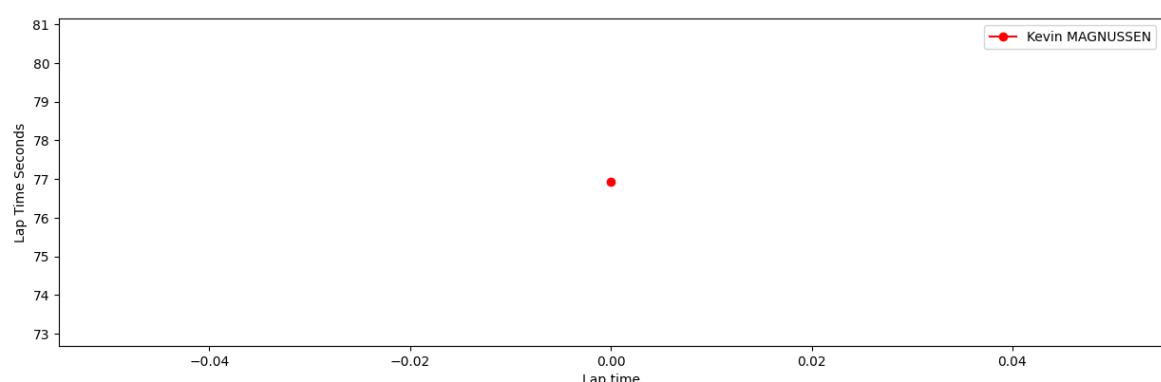
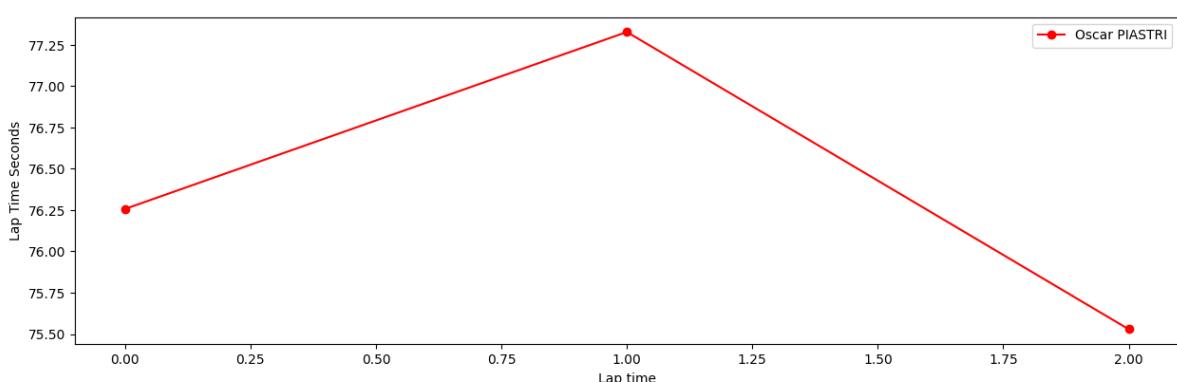
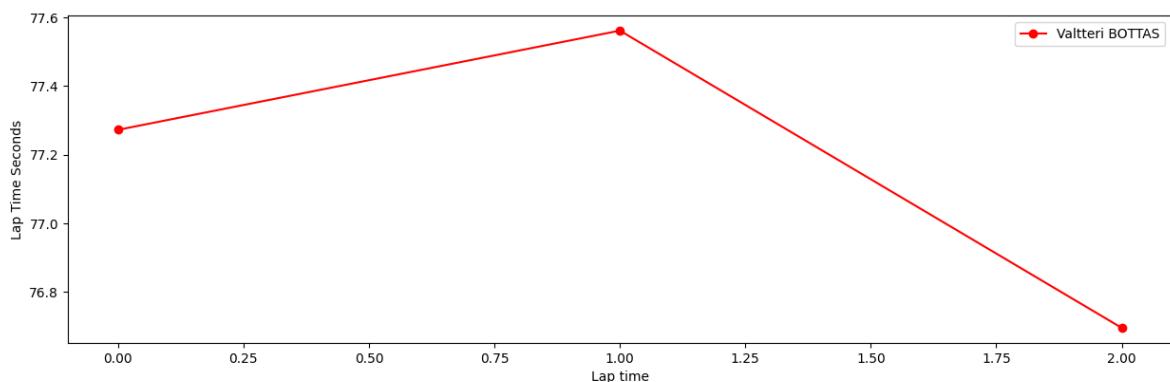
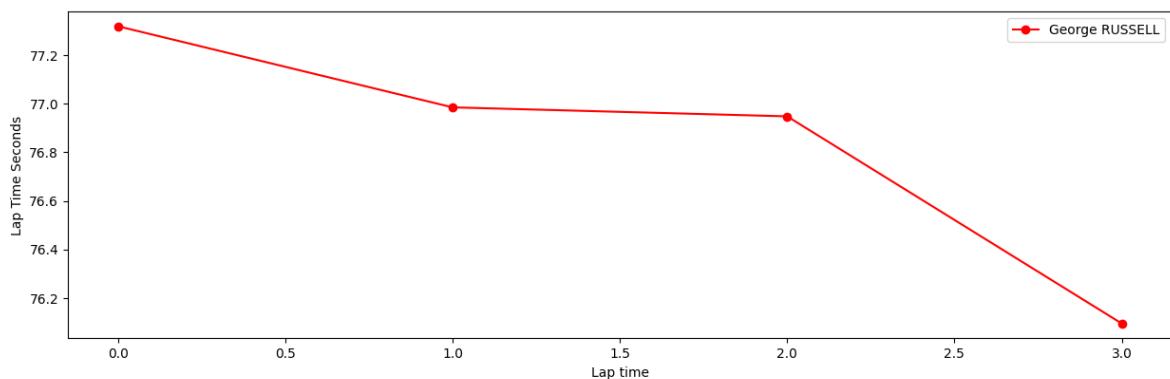
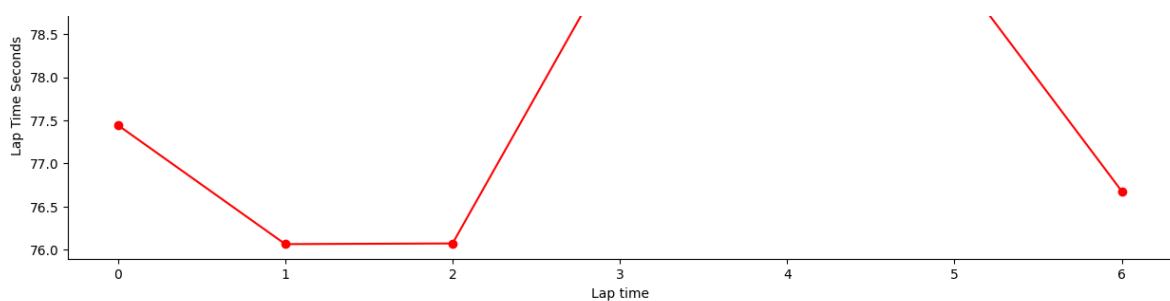


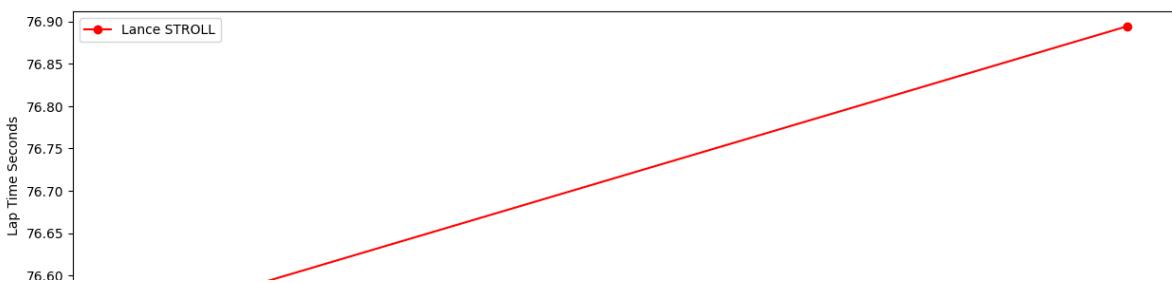
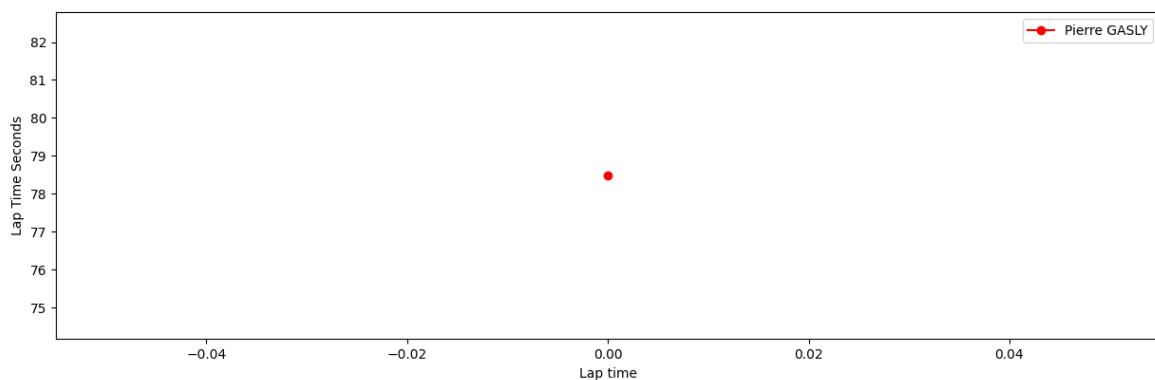
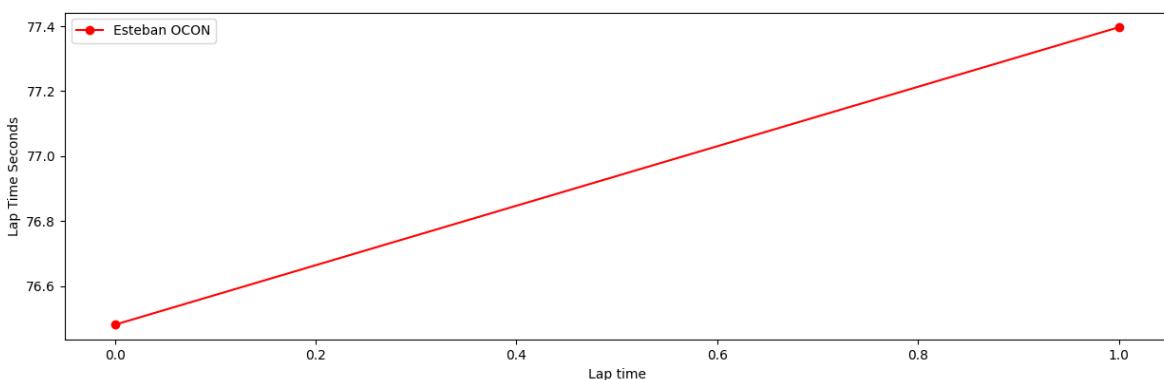
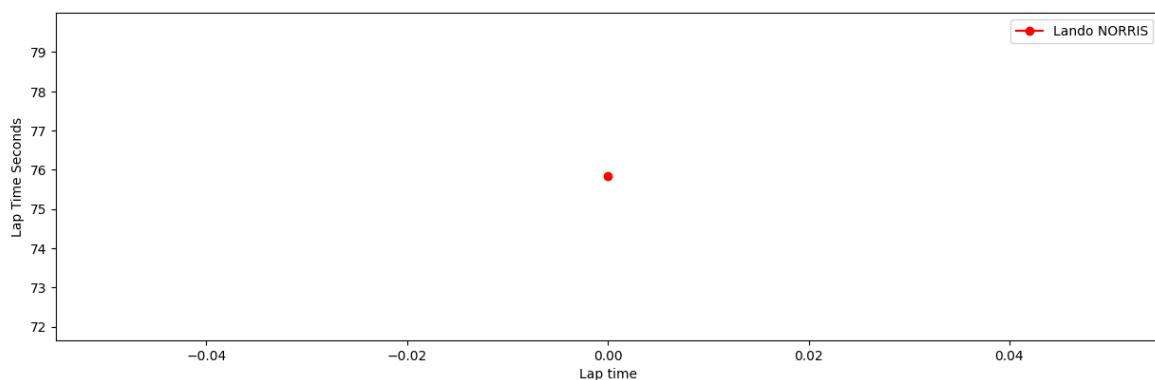
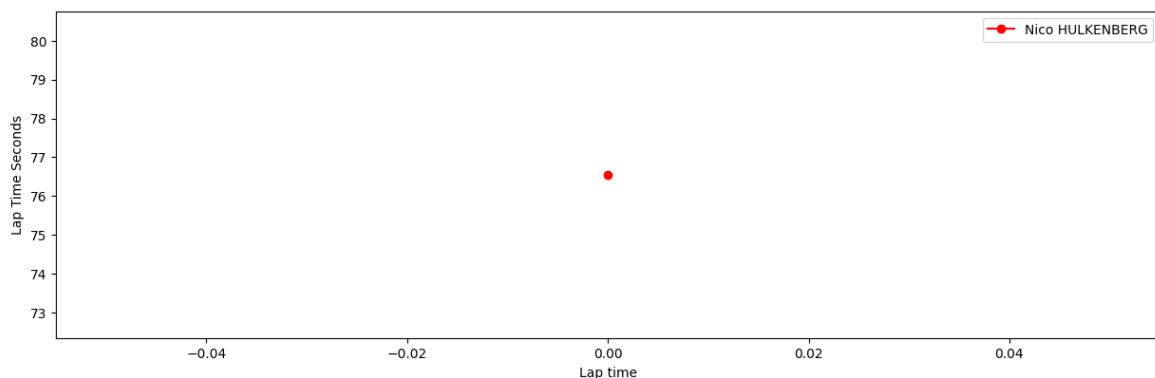
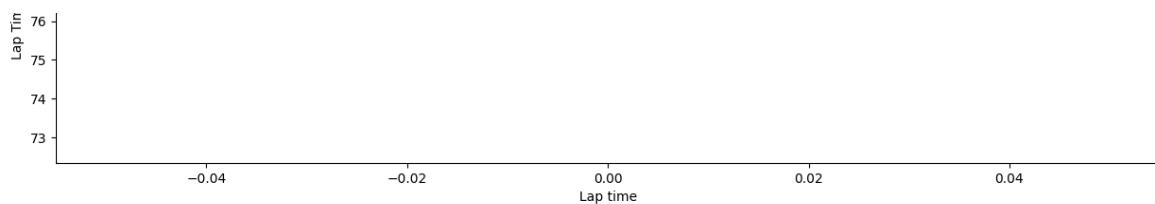
Soft tyres

In [106...]

```
libraryDataF1.obtain_data_tyres(jointables2, "SOFT", 83)
```





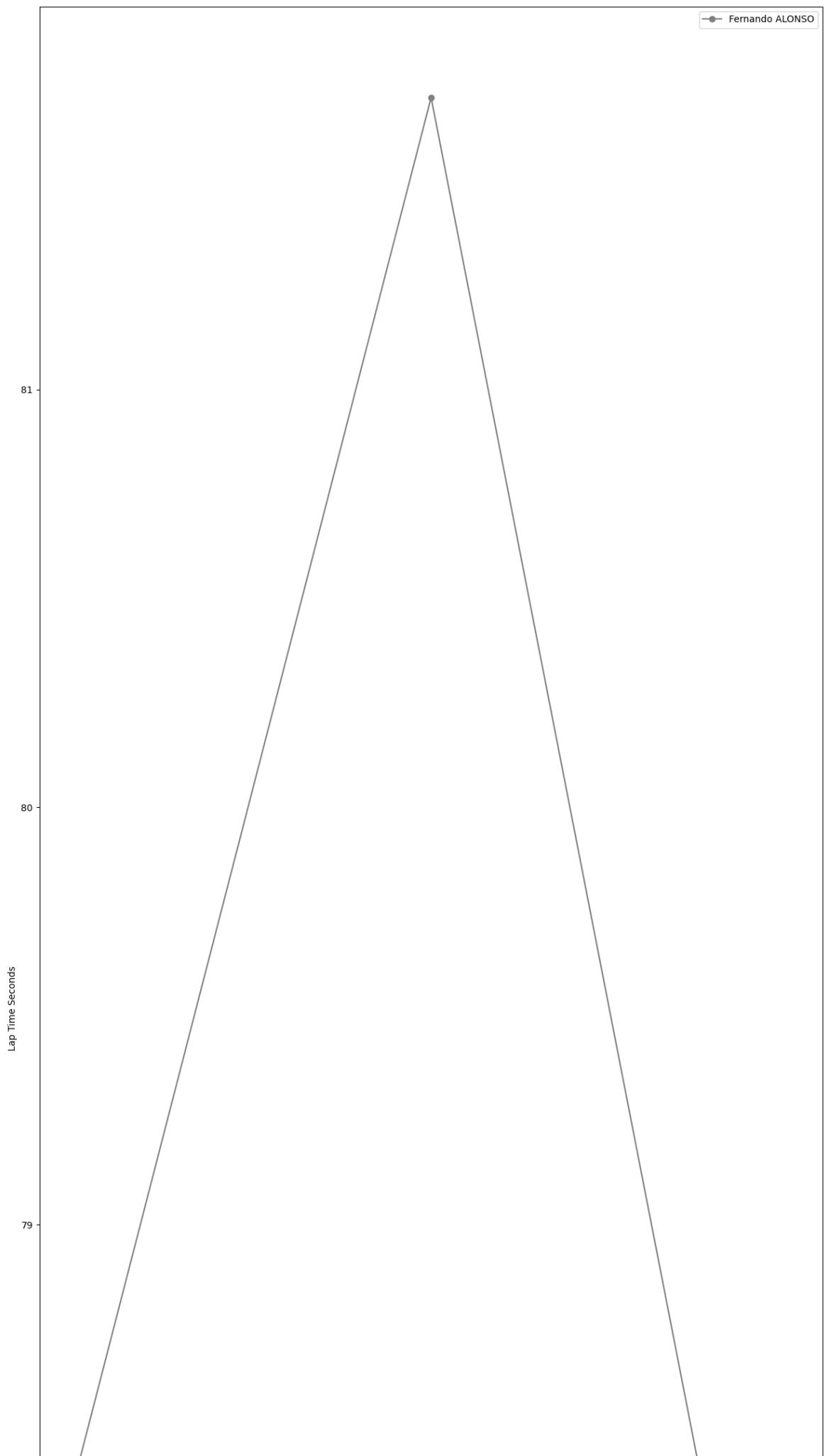


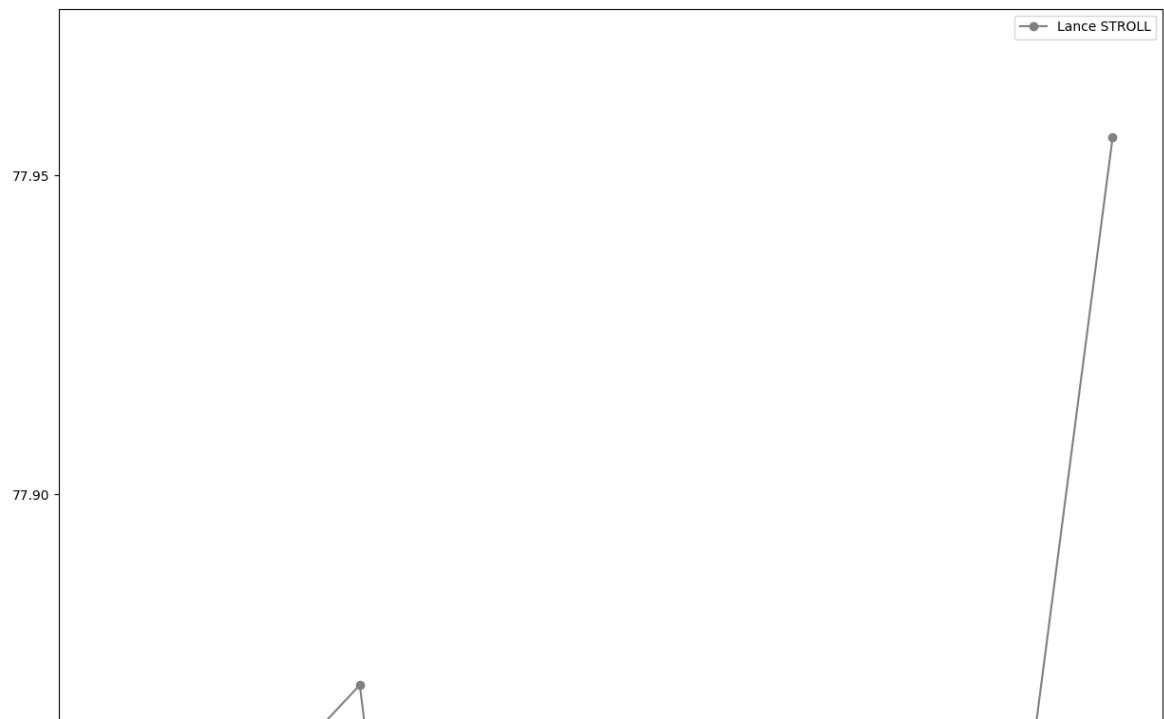
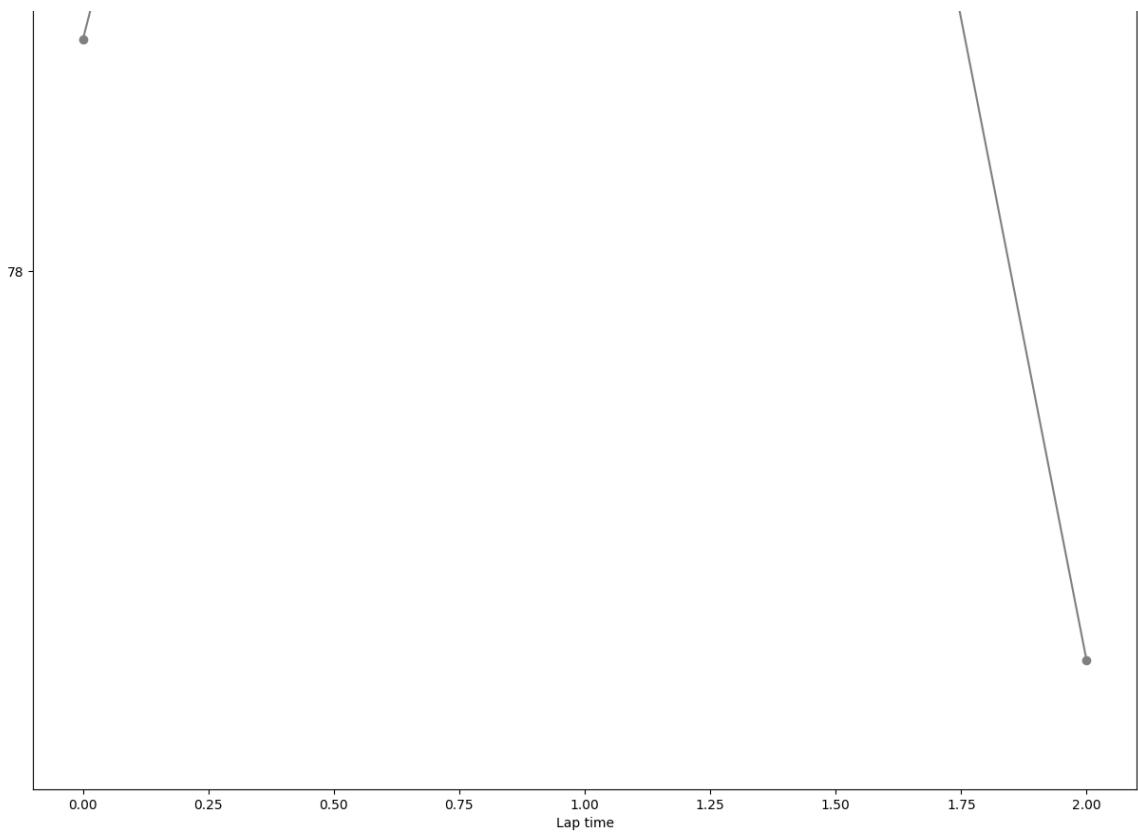


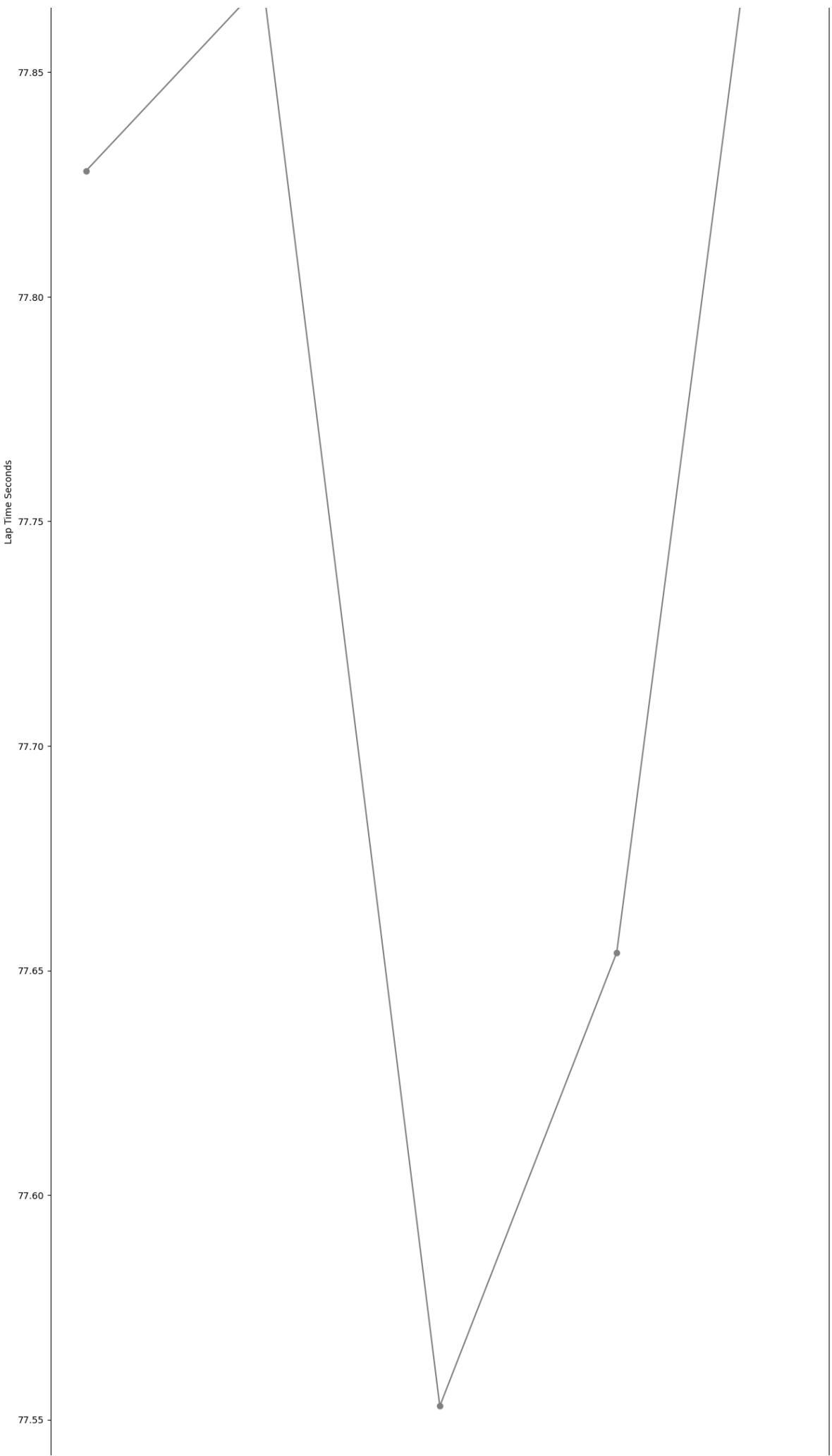
Hard tyres

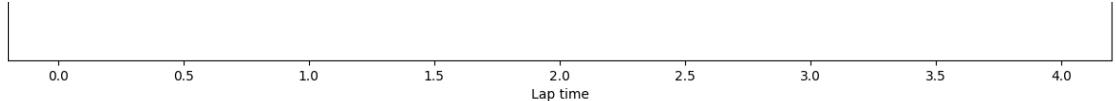
In [107]:

```
libraryDataF1.obtain_data_tyres(jointables2, "HARD", 83)
```





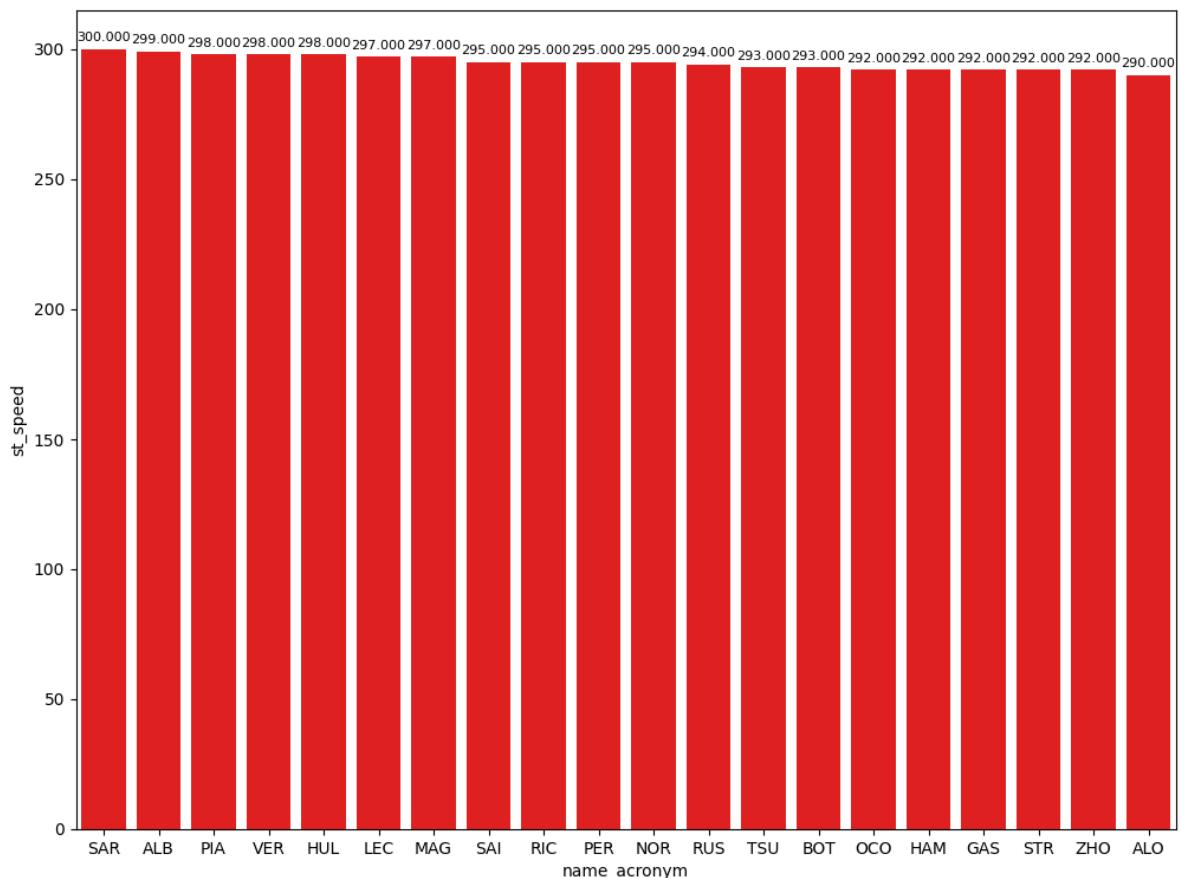




Speed trap

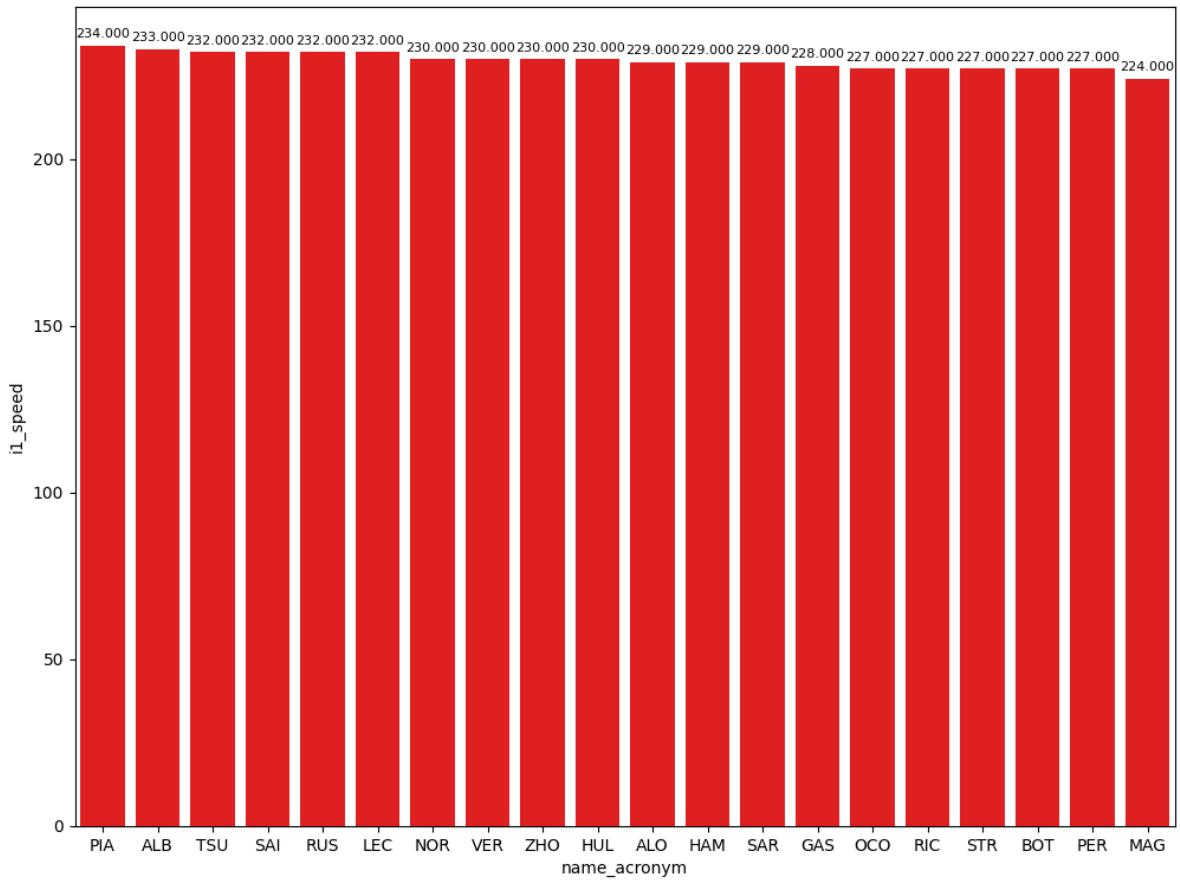
In [108...]

```
top_speed = jointables2.loc[jointables2.groupby(['name_acronym'])['st_speed'].max()]
libraryDataF1.obtainchart("name_acronym","st_speed",top_speed)
```



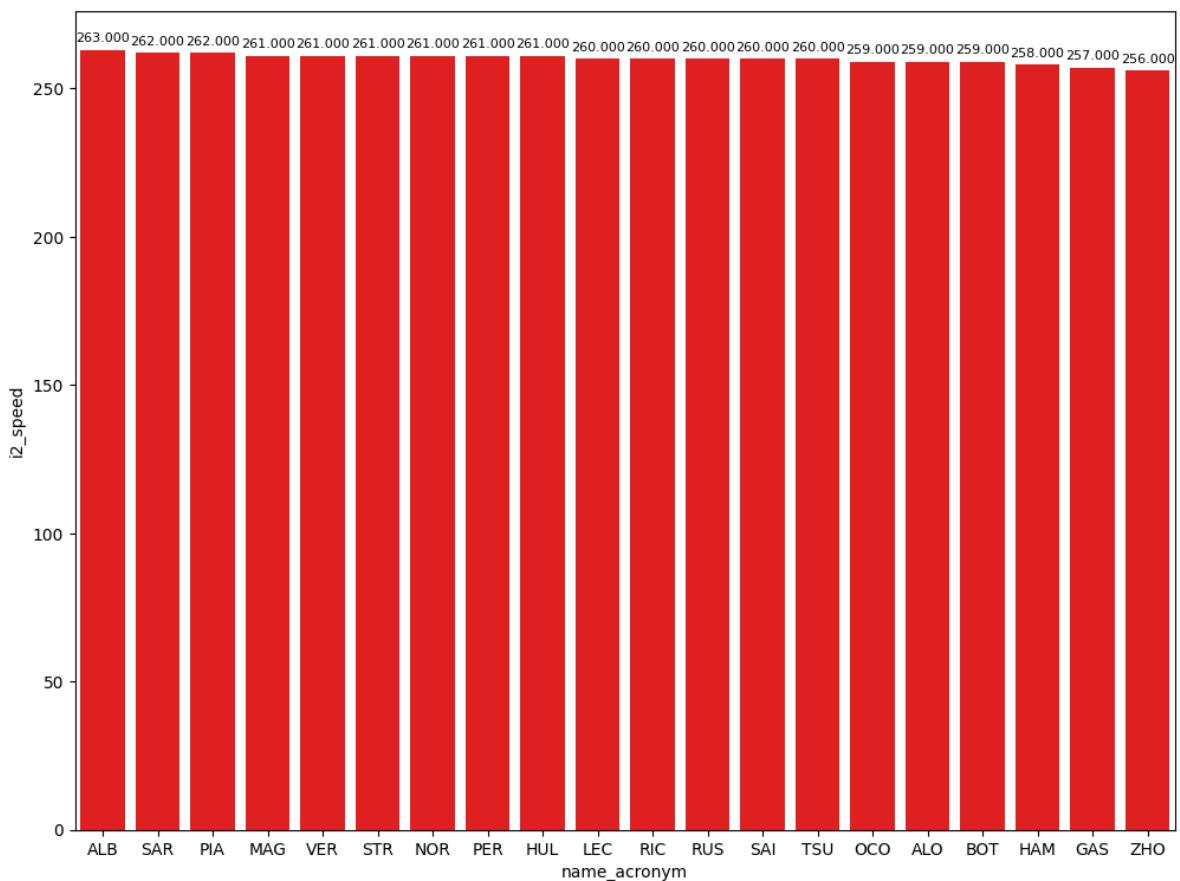
In [109...]

```
top_speed = jointables2.loc[jointables2.groupby(['name_acronym'])['i1_speed'].max()]
libraryDataF1.obtainchart("name_acronym","i1_speed",top_speed)
```



In [110]:

```
top_speed = jointables2.loc[jointables2.groupby(['name_acronym'])['i2_speed'].max()]
libraryDataF1.obtainchart("name_acronym","i2_speed",top_speed)
```



Fastest lap per compound

In this section, I will show the best lap with the different compounds of the session.

```
In [111...     compoundsPace = jointables2.loc[jointables2.groupby(['compound'])['lap_dura
compoundsPace[['full_name','compound','duration_sector_1','duration_sector_2','duration_se

```

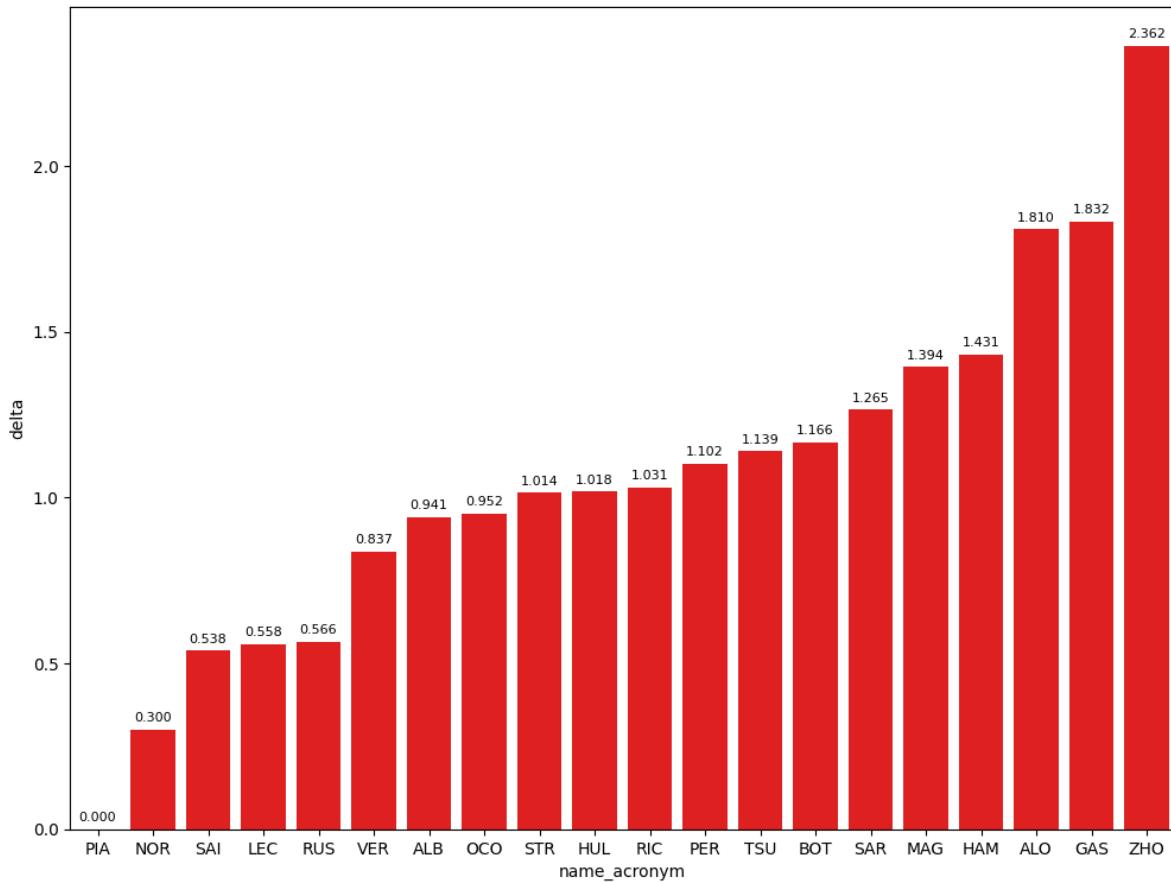
		full_name	compound	duration_sector_1	duration_sector_2	duration_sector_3	lap_dur
146		Fernando ALONSO	HARD	24.310	26.976	26.053	7
140		Max VERSTAPPEN	MEDIUM	24.180	26.448	25.738	7
199		Oscar PIASTRI	SOFT	23.742	26.232	25.555	7

Deltas

In this section we can see the deltas of the fastest lap of each driver compared with the fastest lap of the session

```
In [112...     practiceCleaned = jointables2.query("lap_duration >1")
drivers_list = list(practiceCleaned['driver_number'].unique())
newdataset = pd.DataFrame()
for driver in drivers_list:
    newdataset = libraryDataF1.obtain_fastest_lap(driver,practiceCleaned,newdataset)
arr= libraryDataF1.obtain_deltas(newdataset)
newdataset.insert(3,'delta',arr)
```

```
In [113...     dt = newdataset.sort_values(ascending=True,by='delta')
libraryDataF1.obtainchart("name_acronym","delta",dt)
```



Track dominance

In this section, best sector are taken of each sector to see the car's performance in each sector.

In [114...]

```
sectorPace = jointables2.loc[jointables2.groupby(['driver_number'])['duration_sector_1'].mean()]
sectorPace[['duration_sector_1','full_name','compound','lap_duration','lap_number']]
```

Out[114...]

	duration_sector_1	full_name	compound	lap_duration	lap_number
199	23.742	Oscar PIASTRI	SOFT	75.529	10
318	23.875	Max VERSTAPPEN	SOFT	84.341	20
235	23.956	George RUSSELL	SOFT	76.095	12
136	23.966	Carlos SAINZ	SOFT	76.067	7
209	23.972	Yuki TSUNODA	SOFT	NaN	11
241	24.002	Lando NORRIS	SOFT	75.829	13
147	24.030	Charles LECLERC	SOFT	76.087	8
151	24.045	Alexander ALBON	SOFT	76.470	8
186	24.084	Fernando ALONSO	HARD	NaN	10
308	24.114	Sergio PEREZ	SOFT	NaN	18
315	24.121	Lance STROLL	SOFT	76.543	19
220	24.167	Logan SARGEANT	SOFT	76.952	12
202	24.197	Daniel RICCIARDO	SOFT	76.560	11
285	24.202	Lewis HAMILTON	SOFT	97.649	15

	duration_sector_1	full_name	compound	lap_duration	lap_number
212	24.227	Nico HULKENBERG	SOFT	76.547	11
268	24.233	Esteban OCON	SOFT	76.481	14
208	24.297	Kevin MAGNUSSEN	SOFT	94.543	11
158	24.341	Valtteri BOTTAS	SOFT	76.695	8
204	24.481	Pierre GASLY	MEDIUM	77.361	11

In [115...]

```
sectorPace = jointables2.loc[jointables2.groupby(['driver_number'])['duration_sector_1','full_name','compound','lap_duration','lap_number'].mean()]
sectorPace[['duration_sector_2','full_name','compound','lap_duration','lap_number']]
```

Out[115...]

	duration_sector_2	full_name	compound	lap_duration	lap_number
199	26.232	Oscar PIASTRI	SOFT	75.529	10
241	26.317	Lando NORRIS	SOFT	75.829	13
147	26.355	Charles LECLERC	SOFT	76.087	8
136	26.380	Carlos SAINZ	SOFT	76.067	7
318	26.386	Max VERSTAPPEN	SOFT	84.341	20
209	26.400	Yuki TSUNODA	SOFT	NaN	11
285	26.403	Lewis HAMILTON	SOFT	97.649	15
235	26.490	George RUSSELL	SOFT	76.095	12
212	26.514	Nico HULKENBERG	SOFT	76.547	11
85	26.515	Sergio PEREZ	MEDIUM	76.631	5
202	26.522	Daniel RICCIARDO	SOFT	76.560	11
151	26.532	Alexander ALBON	SOFT	76.470	8
268	26.535	Esteban OCON	SOFT	76.481	14
315	26.569	Lance STROLL	SOFT	76.543	19
149	26.574	Kevin MAGNUSSEN	SOFT	76.923	8
158	26.593	Valtteri BOTTAS	SOFT	76.695	8
186	26.653	Fernando ALONSO	HARD	NaN	10
161	26.745	Logan SARGEANT	SOFT	76.794	9
278	26.860	Pierre GASLY	SOFT	78.477	15
192	27.011	ZHOU Guanyu	SOFT	77.891	10

In [116...]

```
sectorPace = jointables2.loc[jointables2.groupby(['driver_number'])['duration_sector_2','full_name','compound','lap_duration','lap_number'].mean()]
sectorPace[['duration_sector_3','full_name','compound','lap_duration','lap_number']]
```

Out[116...]

	duration_sector_3	full_name	compound	lap_duration	lap_number
241	25.510	Lando NORRIS	SOFT	75.829	13
199	25.555	Oscar PIASTRI	SOFT	75.529	10
176	25.591	Carlos SAINZ	SOFT	76.075	9
67	25.643	Charles LECLERC	SOFT	76.281	4
235	25.649	George RUSSELL	SOFT	76.095	12

	duration_sector_3	full_name	compound	lap_duration	lap_number
268	25.713	Esteban OCON	SOFT	76.481	14
80	25.724	Max VERSTAPPEN	MEDIUM	76.471	5
158	25.761	Valtteri BOTTAS	SOFT	76.695	8
81	25.781	Logan SARGEANT	SOFT	77.103	5
212	25.806	Nico HULKENBERG	SOFT	76.547	11
85	25.812	Sergio PEREZ	MEDIUM	76.631	5
202	25.841	Daniel RICCIARDO	SOFT	76.560	11
89	25.844	Kevin MAGNUSSEN	MEDIUM	77.108	5
315	25.853	Lance STROLL	SOFT	76.543	19
151	25.893	Alexander ALBON	SOFT	76.470	8
130	25.919	Yuki TSUNODA	MEDIUM	76.668	7
195	25.945	Lewis HAMILTON	SOFT	76.960	10
204	25.999	Pierre GASLY	MEDIUM	77.361	11
146	26.053	Fernando ALONSO	HARD	77.339	8
---	---	---	---	---	---

Mean pace with the different compound used on the session

```
In [117...]: race_pace = pd.DataFrame(jointables2.query("is_pit_out_lap == False and lap_number > 10"))
race_pace
```

```
Out[117...]:      lap_duration
compound
SOFT    77.341617
HARD   78.286625
MEDIUM 78.467500
```

Long laps

```
In [118...]: MINIMUM_SECONDS = 78
MAXIMUM_SECONDS = 83
```

Red Bull Racing

```
In [119...]: stintInformation.query('driver_number == 1 or driver_number == 11')
```

```
Out[119...]:   meeting_key  session_key  stint_number  driver_number  lap_start  lap_end  compound  tyre
14          1235       9510           1              1            1         1        7 MEDIUM
16          1235       9510           1             11            1         1        7 MEDIUM
43          1235       9510           2              1            1         8       10 MEDIUM
50          1235       9510           2             11            8         12       12 MEDIUM
57          1235       9510           3              1            10        11       11 MEDIUM
```

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
71	1235	9510	4		1	12	17	MEDIUM
77	1235	9510	3		11	13	17	MEDIUM
92	1235	9510	5		1	18	19	SOFT
93	1235	9510	4		11	18	19	SOFT

In [120...]: libraryDataF1.getinfolongruns(jointables2, 1, 'Red Bull Racing', MINIMUM_SECONDS)

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
219	Max VERSTAPPEN	MEDIUM	2024-05-18T11:04:05.482000+00:00		12		25.838
238	Max VERSTAPPEN	MEDIUM	2024-05-18T11:05:26.597000+00:00		13		25.686
256	Max VERSTAPPEN	MEDIUM	2024-05-18T11:06:47.489000+00:00		14		25.641
274	Max VERSTAPPEN	MEDIUM	2024-05-18T11:08:08.423000+00:00		15		25.636

In [121...]: libraryDataF1.getinfolongruns(jointables2, 11, 'Red Bull Racing', MINIMUM_SECONDS)

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
145	Sergio PEREZ	MEDIUM	2024-05-18T10:50:07.357000+00:00		8		25.741
165	Sergio PEREZ	MEDIUM	2024-05-18T10:51:28.388000+00:00		9		25.622
185	Sergio PEREZ	MEDIUM	2024-05-18T10:52:49.041000+00:00		10		25.640
243	Sergio PEREZ	MEDIUM	2024-05-18T11:04:52.519000+00:00		13		25.679
261	Sergio PEREZ	MEDIUM	2024-05-18T11:06:13.521000+00:00		14		25.572
279	Sergio PEREZ	MEDIUM	2024-05-18T11:07:33.960000+00:00		15		25.537

Ferrari

In [122...]: libraryDataF1.getinfolongruns(jointables2, 16, 'Ferrari', MINIMUM_SECONDS, MAX_SECONDS)

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
206	Charles LECLERC	SOFT	2024-05-18T11:05:31.375000+00:00		11		25.205
225	Charles LECLERC	SOFT	2024-05-18T11:06:50.540000+00:00		12		25.035
244	Charles LECLERC	SOFT	2024-05-18T11:08:09.207000+00:00		13		25.064

```
In [123... libraryDataF1.getinfolongruns(jointables2,55,'Ferrari',MINIMUN_SECONDS,MAX)
```

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2
234	Carlos SAINZ	SOFT	2024-05-18T11:04:40.550000+00:00		12	25.373	
252	Carlos SAINZ	SOFT	2024-05-18T11:06:00.105000+00:00		13	25.341	
270	Carlos SAINZ	SOFT	2024-05-18T11:07:19.250000+00:00		14	25.220	

Mercedes

```
In [124... stintInformation.query('driver_number == 63 or driver_number == 44')
```

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
10	1235	9510	1	63	1	4	SOFT	
13	1235	9510	1	44	1	6	SOFT	
29	1235	9510	2	63	5	5	SOFT	
36	1235	9510	3	63	6	8	SOFT	
41	1235	9510	2	44	7	12	SOFT	
51	1235	9510	4	63	9	11	SOFT	
68	1235	9510	5	63	12	14	SOFT	
73	1235	9510	3	44	13	14	SOFT	
86	1235	9510	4	44	15	17	SOFT	
87	1235	9510	6	63	15	17	SOFT	

```
In [125... libraryDataF1.getinfolongruns(jointables2,44,'Mercedes',MINIMUN_SECONDS,MAX)
```

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2
35	Lewis HAMILTON	SOFT	2024-05-18T10:47:27.296000+00:00		2	24.457	

```
In [126... libraryDataF1.getinfolongruns(jointables2,63,'Mercedes',MINIMUN_SECONDS,MAX)
```

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
--	-----------	----------	------------	------------	-------------------	-------------------	-------------------

McLaren

```
In [127... stintInformation.query('driver_number == 81 or driver_number == 4')
```

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
0	1235	9510	1	4	1	2	HARD	
3	1235	9510	1	81	1	2	HARD	

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
20	1235	9510	2		4	3	3	HARD
23	1235	9510	2		81	3	3	SOFT
24	1235	9510	3		4	4	6	MEDIUM
25	1235	9510	3		81	4	6	SOFT
38	1235	9510	4		81	7	9	SOFT
40	1235	9510	4		4	7	11	MEDIUM
56	1235	9510	5		81	10	12	SOFT
67	1235	9510	5		4	12	12	SOFT
75	1235	9510	6		4	13	16	SOFT

In [128...]: libraryDataF1.getinfolongruns(jointables2, 4, 'McLaren', MINIMUM_SECONDS, MAXIMUM_SECONDS)

Out[128...]: full_name compound date_start lap_number duration_sector_1 duration_sector_2 duration

In [129...]: libraryDataF1.getinfolongruns(jointables2, 81, 'McLaren', MINIMUM_SECONDS, MAXIMUM_SECONDS)

Out[129...]: full_name compound date_start lap_number duration_sector_1 duration_sector_2 duration

Aston Martin

In [130...]: stintInformation.query('driver_number == 18 or driver_number == 14')

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
1	1235	9510	1	14	1	2	MEDIUM	
2	1235	9510	1	18	1	2	MEDIUM	
21	1235	9510	2	14	3	3	HARD	
22	1235	9510	2	18	3	3	HARD	
27	1235	9510	3	14	4	11	HARD	
28	1235	9510	3	18	4	12	HARD	
78	1235	9510	4	18	13	18	HARD	
96	1235	9510	5	18	19	21	SOFT	
99	1235	9510	6	18	22	25	SOFT	

In [131...]: libraryDataF1.getinfolongruns(jointables2, 14, 'Aston Martin', MINIMUM_SECONDS, MAXIMUM_SECONDS)

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration
66	Fernando ALONSO	HARD	2024-05-18T10:43:16.415000+00:00			4	24.712
106	Fernando ALONSO	HARD	2024-05-18T10:46:23.215000+00:00			6	24.200

```
In [132... libraryDataF1.getinfolongruns(jointables2,18,'Aston Martin',MINIMUN_SECONDS)
```

```
Out[132... full_name compound date_start lap_number duration_sector_1 duration_sector_2 duration_
```

RB

```
In [133... stintInformation.query('driver_number == 3 or driver_number == 22')
```

```
Out[133... meeting_key session_key stint_number driver_number lap_start lap_end compound tyre
```

4	1235	9510	1	22	1	3	MEDIUM
6	1235	9510	1	3	1	4	MEDIUM
26	1235	9510	2	22	4	9	MEDIUM
34	1235	9510	2	3	5	9	MEDIUM
53	1235	9510	3	3	10	10	MEDIUM
54	1235	9510	3	22	10	10	MEDIUM
59	1235	9510	4	22	11	12	SOFT
60	1235	9510	4	3	11	13	SOFT
74	1235	9510	5	22	13	15	SOFT
80	1235	9510	5	3	14	16	SOFT

```
In [134... libraryDataF1.getinfolongruns(jointables2,3,'RB',MINIMUN_SECONDS,MAXIMUM_SECONDS)
```

```
Out[134... full_name compound date_start lap_number duration_sector_1 duration_sector_2 duration_
```

```
In [135... libraryDataF1.getinfolongruns(jointables2,22,'RB',MINIMUN_SECONDS,MAXIMUM_SECONDS)
```

```
Out[135... full_name compound date_start lap_number duration_sector_1 duration_sector_2 duration_
```

Haas

```
In [136... libraryDataF1.getinfolongruns(jointables2,20,'Haas F1 Team',MINIMUN_SECONDS,MAXIMUM_SECONDS)
```

```
Out[136... full_name compound date_start lap_number duration_sector_1 duration_sector_2 duration_
```

```
In [137... libraryDataF1.getinfolongruns(jointables2,27,'Haas F1 Team',MINIMUN_SECONDS,MAXIMUM_SECONDS)
```

```
Out[137... full_name compound date_start lap_number duration_sector_1 duration_sector_2 duration_
```

Alpine

```
In [138... libraryDataF1.getinfolongruns(jointables2,31,'Alpine',MINIMUN_SECONDS,MAXIMUM_SECONDS)
```

```
Out[138... full_name compound date_start lap_number duration_sector_1 duration_sector_2 duration_
```

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2
34	Esteban OCON	MEDIUM	2024-05-18T10:37:49.090000+00:00		2	24.879	
213	Esteban OCON	MEDIUM	2024-05-18T11:09:02.416000+00:00		11	24.897	

In [139...]: libraryDataF1.getinfolongruns(jointables2, 10, 'Alpine', MINIMUM_SECONDS, MAXIMUM_SECONDS)

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2
24	Pierre GASLY	MEDIUM	2024-05-18T10:38:19.788000+00:00		2	24.851	
144	Pierre GASLY	MEDIUM	2024-05-18T11:04:00.339000+00:00		8	24.697	
278	Pierre GASLY	SOFT	2024-05-18T11:29:52.674000+00:00		15	25.354	

Williams

In [140...]: libraryDataF1.getinfolongruns(jointables2, 23, 'Williams', MINIMUM_SECONDS, MAXIMUM_SECONDS)

Out[140...]: full_name compound date_start lap_number duration_sector_1 duration_sector_2 duration_mean

In [141...]: libraryDataF1.getinfolongruns(jointables2, 2, 'Williams', MINIMUM_SECONDS, MAXIMUM_SECONDS)

	full_name	compound		date_start	lap_number	duration_sector_1	duration_mean
21	Logan SARGEANT	SOFT	2024-05-18T10:52:21.320000+00:00		2	24.518	

Kick Sauber

In [142...]: libraryDataF1.getinfolongruns(jointables2, 24, 'Kick Sauber', MINIMUM_SECONDS, MAXIMUM_SECONDS)

	full_name	compound		date_start	lap_number	duration_sector_1	duration_mean
32	ZHOU Guanyu	SOFT	2024-05-18T10:47:33.517000+00:00		2	24.96	
132	ZHOU Guanyu	SOFT	2024-05-18T11:05:43.406000+00:00		7	24.68	

In [143...]: libraryDataF1.getinfolongruns(jointables2, 77, 'Kick Sauber', MINIMUM_SECONDS, MAXIMUM_SECONDS)

Out[143...]: full_name compound date_start lap_number duration_sector_1 duration_sector_2 duration_mean

Long runs mean for each driver

In [144...]: longrun_data = libraryDataF1.obtainLongRunData(drivers, jointables2, MINIMUM_SECONDS, MAXIMUM_SECONDS)

Sorted by lap duration

```
In [145... pd.DataFrame(longrun_data,columns=['driver','compound','lap_duration','sector1','sector2','sector3'])
```

```
Out[145...      driver compound  lap_duration  sector1  sector2  sector3
 8   Lewis HAMILTON    SOFT  78.069000  24.457000  27.209000  26.403000
 2   Pierre GASLY     MEDIUM  78.293000  24.967333  27.128667  26.197000
 7   Esteban OCON     MEDIUM  78.568500  24.888000  27.306000  26.374500
 6   ZHOU Guanyu      SOFT  78.623500  24.820000  27.332000  26.471500
 9   Carlos SAINZ     SOFT  79.305333  25.311333  27.538000  26.456000
 5   Charles LECLERC  SOFT  79.449667  25.101333  27.698333  26.650000
 1   Logan SARGEANT   SOFT  79.474000  24.518000  27.242000  27.714000
 4   Fernando ALONSO   HARD  80.046500  24.456000  27.046500  28.544000
 3   Sergio PEREZ     MEDIUM  80.797667  25.631833  28.083000  27.082833
 0   Max VERSTAPPEN   MEDIUM  80.956750  25.700250  28.138500  27.118000
```

Sorted by sector 1

```
In [146... pd.DataFrame(longrun_data,columns=['driver','compound','lap_duration','sector1','sector2','sector3'])
```

```
Out[146...      driver compound  lap_duration  sector1  sector2  sector3
 4   Fernando ALONSO   HARD  80.046500  24.456000  27.046500  28.544000
 8   Lewis HAMILTON   SOFT  78.069000  24.457000  27.209000  26.403000
 1   Logan SARGEANT   SOFT  79.474000  24.518000  27.242000  27.714000
 6   ZHOU Guanyu      SOFT  78.623500  24.820000  27.332000  26.471500
 7   Esteban OCON     MEDIUM  78.568500  24.888000  27.306000  26.374500
 2   Pierre GASLY     MEDIUM  78.293000  24.967333  27.128667  26.197000
 5   Charles LECLERC  SOFT  79.449667  25.101333  27.698333  26.650000
 9   Carlos SAINZ     SOFT  79.305333  25.311333  27.538000  26.456000
 3   Sergio PEREZ     MEDIUM  80.797667  25.631833  28.083000  27.082833
 0   Max VERSTAPPEN   MEDIUM  80.956750  25.700250  28.138500  27.118000
```

Sorted by sector 2

```
In [147... pd.DataFrame(longrun_data,columns=['driver','compound','lap_duration','sector1','sector2','sector3'])
```

```
Out[147...      driver compound  lap_duration  sector1  sector2  sector3
 4   Fernando ALONSO   HARD  80.046500  24.456000  27.046500  28.544000
 2   Pierre GASLY     MEDIUM  78.293000  24.967333  27.128667  26.197000
 8   Lewis HAMILTON   SOFT  78.069000  24.457000  27.209000  26.403000
 1   Logan SARGEANT   SOFT  79.474000  24.518000  27.242000  27.714000
 7   Esteban OCON     MEDIUM  78.568500  24.888000  27.306000  26.374500
 6   ZHOU Guanyu      SOFT  78.623500  24.820000  27.332000  26.471500
```

	driver	compound	lap_duration	sector1	sector2	sector3
9	Carlos SAINZ	SOFT	79.305333	25.311333	27.538000	26.456000
5	Charles LECLERC	SOFT	79.449667	25.101333	27.698333	26.650000
3	Sergio PEREZ	MEDIUM	80.797667	25.631833	28.083000	27.082833

Sorted by sector 3

In [148...]

```
pd.DataFrame(longrun_data,columns=['driver','compound','lap_duration','sec
```

Out[148...]

	driver	compound	lap_duration	sector1	sector2	sector3
2	Pierre GASLY	MEDIUM	78.293000	24.967333	27.128667	26.197000
7	Esteban OCON	MEDIUM	78.568500	24.888000	27.306000	26.374500
8	Lewis HAMILTON	SOFT	78.069000	24.457000	27.209000	26.403000
9	Carlos SAINZ	SOFT	79.305333	25.311333	27.538000	26.456000
6	ZHOU Guanyu	SOFT	78.623500	24.820000	27.332000	26.471500
5	Charles LECLERC	SOFT	79.449667	25.101333	27.698333	26.650000
3	Sergio PEREZ	MEDIUM	80.797667	25.631833	28.083000	27.082833
0	Max VERSTAPPEN	MEDIUM	80.956750	25.700250	28.138500	27.118000
1	Logan SARGEANT	SOFT	79.474000	24.518000	27.242000	27.714000
4	Fernando ALONSO	HARD	80.046500	24.456000	27.046500	28.544000

Qualifying

Set up

First of all, it is necessary to obtain the data about the qualifying

Race control

This section has been added in order to know which laps have been deleted and knowing what happened on track during this session.

In [149...]

```
libraryDataF1.obtain_information('race_control',session_key=9511)
```

Out[149...]

	session_key	meeting_key	date	category	flag	lap_number
0	9511	1235	2024-05-18T14:00:00+00:00	Flag	GREEN	None
1	9511	1235	2024-05-18T14:04:28+00:00	Other	None	None
2	9511	1235	2024-05-18T14:06:25+00:00	Other	None	None

	session_key	meeting_key		date	category	flag	lap_number
3	9511	1235	2024-05-18T14:09:58+00:00	Flag	YELLOW	None	
4	9511	1235	2024-05-18T14:10:03+00:00	Flag	CLEAR	None	
5	9511	1235	2024-05-18T14:11:40+00:00	Other	None	None	
6	9511	1235	2024-05-18T14:13:18+00:00	Other	None	None	
7	9511	1235	2024-05-18T14:18:00+00:00	Flag	CHEQUERED	None	
8	9511	1235	2024-05-18T14:18:35+00:00	Other	None	None	
9	9511	1235	2024-05-18T14:19:06+00:00	Other	None	None	
10	9511	1235	2024-05-18T14:20:03+00:00	Other	None	None	
11	9511	1235	2024-05-18T14:21:19+00:00	Other	None	None	
12	9511	1235	2024-05-18T14:21:28+00:00	Other	None	None	
13	9511	1235	2024-05-18T14:22:13+00:00	Other	None	None	
14	9511	1235	2024-05-18T14:22:54+00:00	Other	None	None	
15	9511	1235	2024-05-18T14:22:59+00:00	Flag	YELLOW	None	
16	9511	1235	2024-05-18T14:23:30+00:00	Flag	CLEAR	None	

	session_key	meeting_key		date	category	flag	lap_number
17	9511	1235	2024-05-18T14:25:00+00:00	Flag	GREEN	None	
18	9511	1235	2024-05-18T14:39:40+00:00	Other	None	None	
19	9511	1235	2024-05-18T14:40:00+00:00	Flag	CHEQUERED	None	
20	9511	1235	2024-05-18T14:40:12+00:00	Other	None	None	
21	9511	1235	2024-05-18T14:42:52+00:00	Other	None	None	
22	9511	1235	2024-05-18T14:43:01+00:00	Other	None	None	
23	9511	1235	2024-05-18T14:48:00+00:00	Flag	GREEN	None	
24	9511	1235	2024-05-18T15:00:00+00:00	Flag	CHEQUERED	None	
25	9511	1235	2024-05-18T15:00:07+00:00	Other	None	None	
26	9511	1235	2024-05-18T15:01:42+00:00	Other	None	None	

Obtain setup

In [150...]

```
qualyfing = libraryDataF1.obtain_information('laps', session_key=9511)
stintInformation = libraryDataF1.obtain_information('stints', session_key=9511)
drivers = libraryDataF1.obtain_information('drivers', session_key=9511)
```

To obtain a better analysis, those laptimes deleted will be removed from this analysis in order to obtain the data with valid values. So that,taking into account the race control table, it will be neccesary to consult the qualyfing data to obtain the ids.

In [151...]

```
qualyfing = qualyfing.drop(12)
qualyfing = qualyfing.drop(33)
qualyfing = qualyfing.drop(118)
qualyfing = qualyfing.drop(203)
```

In [152...]

```
bestlap = qualyfing.loc[qualyfing.groupby(['driver_number'])['lap_duration'].idxmin()]
bestlap[0:1]
```

Out[152...]	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
	274	1235	9511	1	233.0	261	296 2024-05-18T14:59:

In this case, the fastest lap is 74.746 seconds (1.14.746= so that to obtain the competitive laps the fastest lap will be multiplied by 1.07 (79.97 seconds) due to, according to the rules all the drivers have to do unless one lap within this gap.

In [153...]	competitiveLaps = qualyfing.query("is_pit_out_lap == False and lap_duration < 74.746")
	competitiveLaps

Out[153...]	meeting_key	session_key	driver_number	i1_speed	i2_speed	st_speed	
	9	1235	9511	10	228.0	257	289 2024-05-18T14:01:
	10	1235	9511	31	228.0	258	292 2024-05-18T14:01:
	13	1235	9511	27	229.0	259	295 2024-05-18T14:02:
	14	1235	9511	20	225.0	260	295 2024-05-18T14:02:
	18	1235	9511	18	227.0	260	289 2024-05-18T14:02:

	271	1235	9511	63	234.0	260	294 2024-05-18T14:58:
	272	1235	9511	44	226.0	260	294 2024-05-18T14:58:
	274	1235	9511	1	233.0	261	296 2024-05-18T14:59:
	275	1235	9511	4	232.0	260	296 2024-05-18T14:59:
	277	1235	9511	81	236.0	263	296 2024-05-18T14:59:

83 rows × 16 columns

In [154...]	drivers_list = list(competitiveLaps['driver_number'].unique())
	newdataset = pd.DataFrame()
	for driver in drivers_list:
	newdataset = libraryDataF1.obtain_information_qualy(driver,competitiveLaps)
	jointables = pd.merge(newdataset,drivers,on=['driver_number'])
	jointables.sort_values(by=['fastest_lap'],ascending=True)

Out[154...]

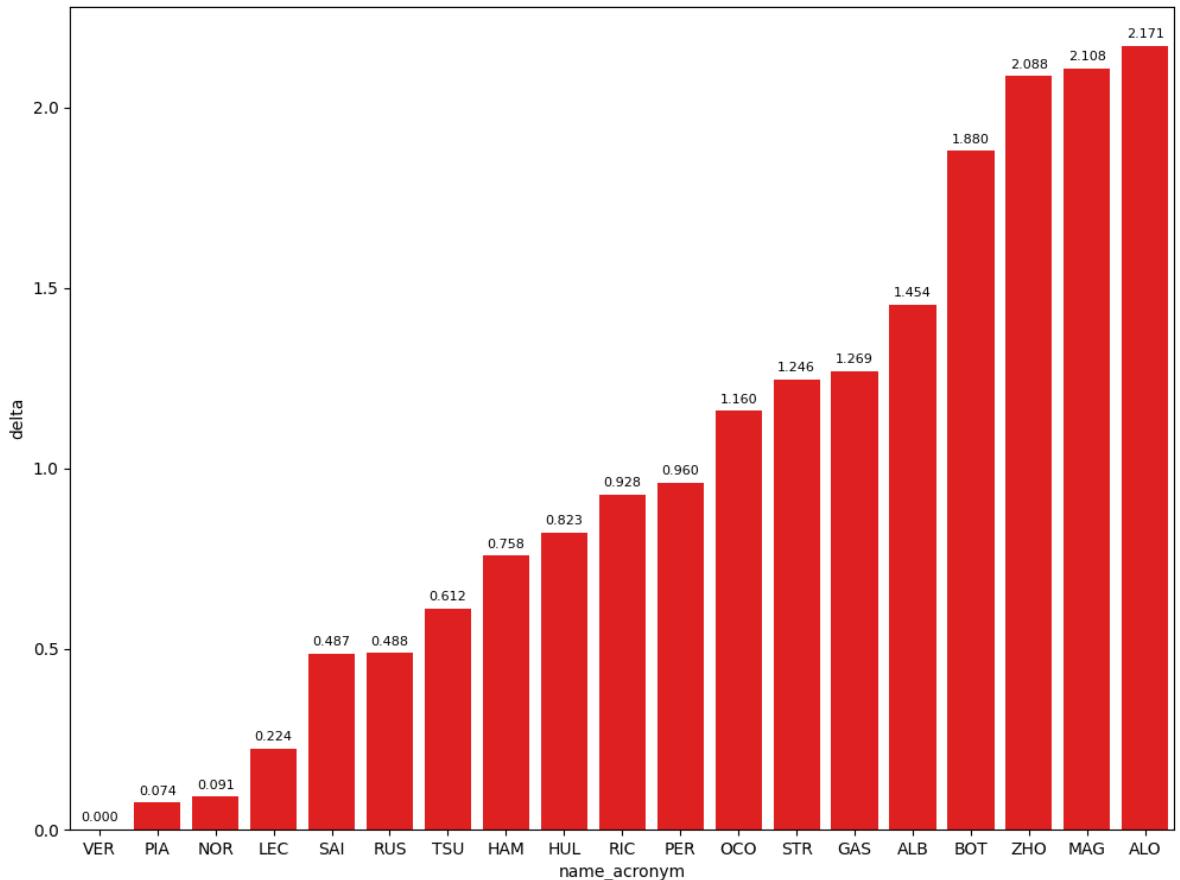
	driver_number	fastest_lap	delta	st_speed	i1_speed	i2_speed	session_key	meeting_key
11	1	74.746	0.000	296	230.0	261	9511	1235
12	81	74.820	0.074	296	233.0	262	9511	1235
8	4	74.837	0.091	294	231.0	260	9511	1235
7	16	74.970	0.224	292	223.0	259	9511	1235
6	55	75.233	0.487	292	225.0	259	9511	1235
14	63	75.234	0.488	290	232.0	259	9511	1235
15	22	75.358	0.612	293	230.0	259	9511	1235
5	44	75.504	0.758	292	226.0	258	9511	1235
2	27	75.569	0.823	295	227.0	259	9511	1235
17	3	75.674	0.928	293	224.0	259	9511	1235
9	11	75.706	0.960	296	225.0	261	9511	1235
1	31	75.906	1.160	291	227.0	257	9511	1235
4	18	75.992	1.246	289	226.0	260	9511	1235
0	10	76.015	1.269	289	228.0	256	9511	1235
18	23	76.200	1.454	295	229.0	260	9511	1235
16	77	76.626	1.880	295	226.0	257	9511	1235
13	24	76.834	2.088	294	231.0	258	9511	1235
3	20	76.854	2.108	295	225.0	258	9511	1235
10	14	76.917	2.171	289	229.0	259	9511	1235

Best lap per driver compared with the best lap of the session

In this chart we can see the deltas with compared with the fastest lap of the session that it could be different than the pole. In this case, this happened with Leclerc taking the best time but not taking the pole because his best time in Q3 was not the best time of the session.

In [155...]

```
libraryDataF1.obtainchart("name_acronym","delta",jointables.sort_values(by=
```

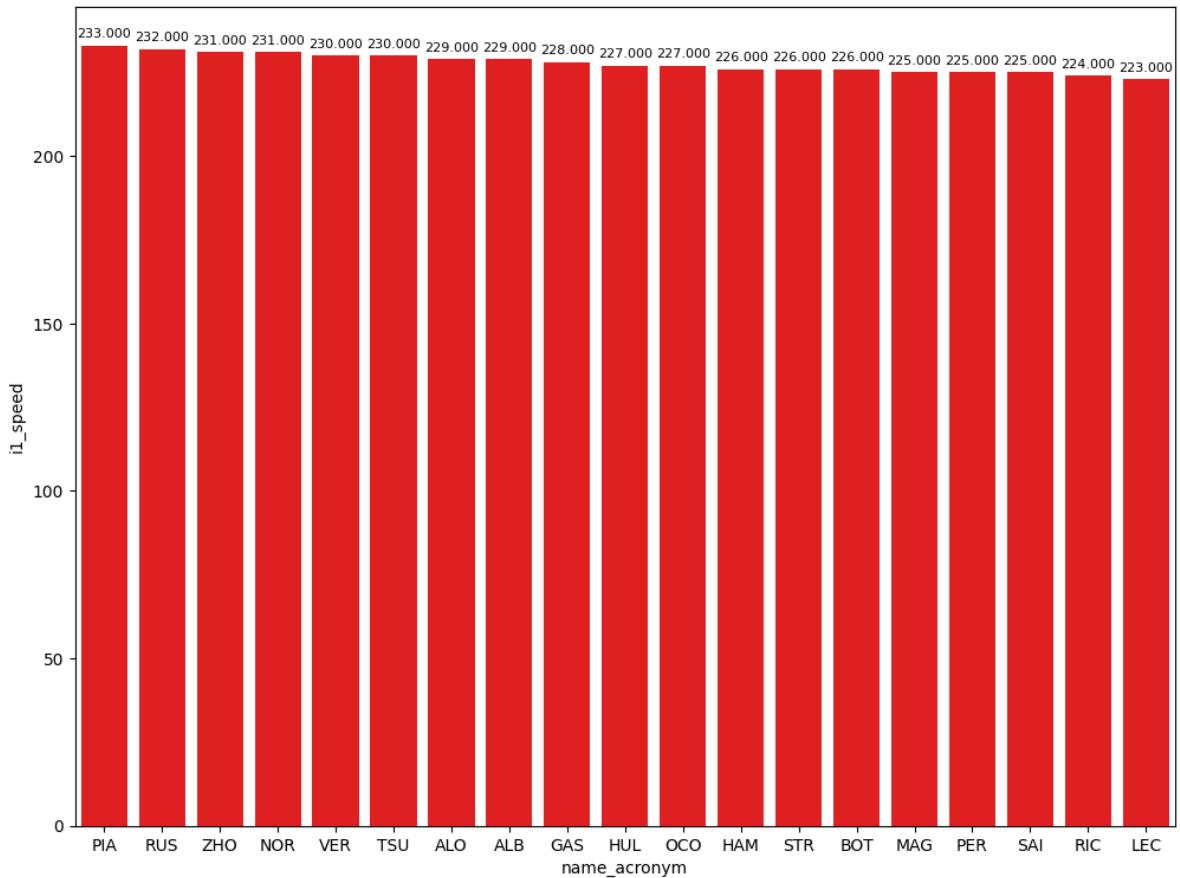


Speed trap

Maximum speed per drivers

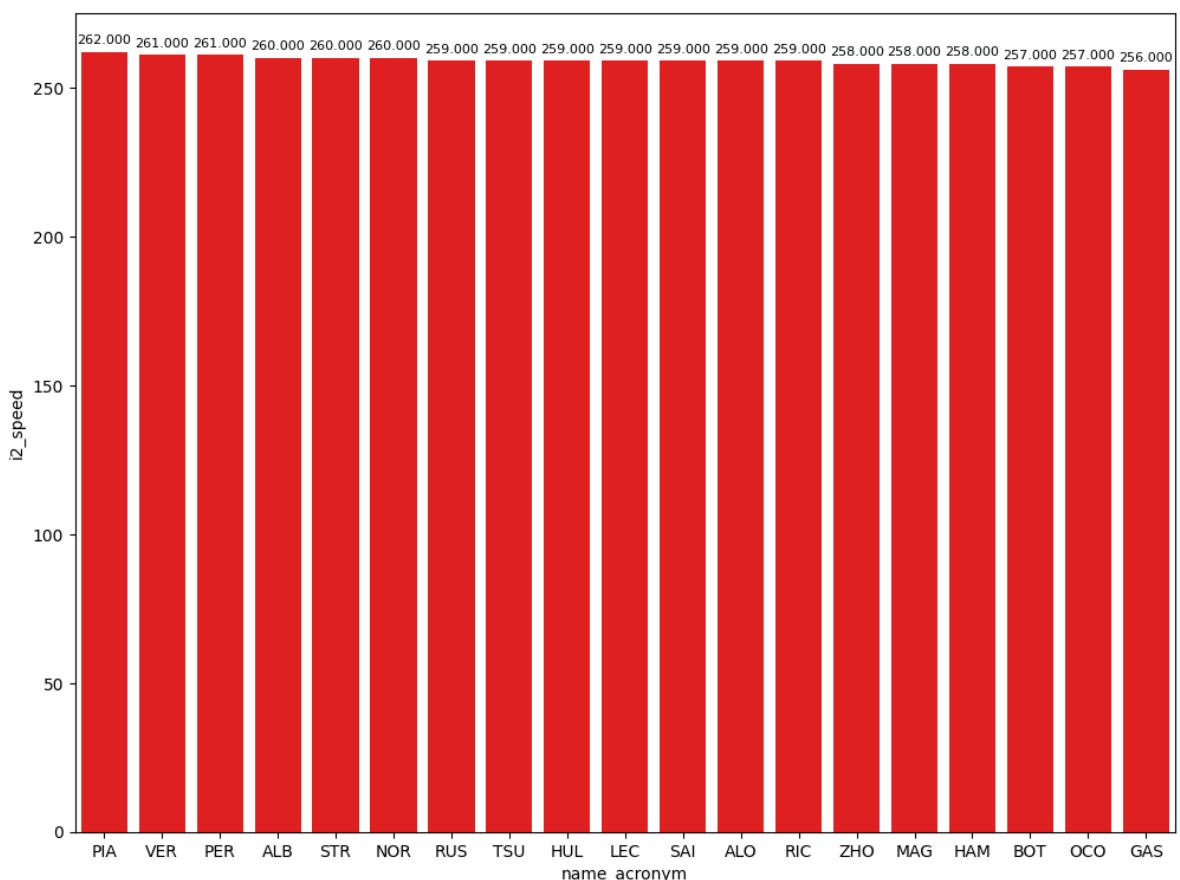
In [156]:

```
top_speed = jointables.loc[jointables.groupby(['name_acronym'])['i1_speed'].  
libraryDataF1.obtainchart("name_acronym","i1_speed",top_speed)
```



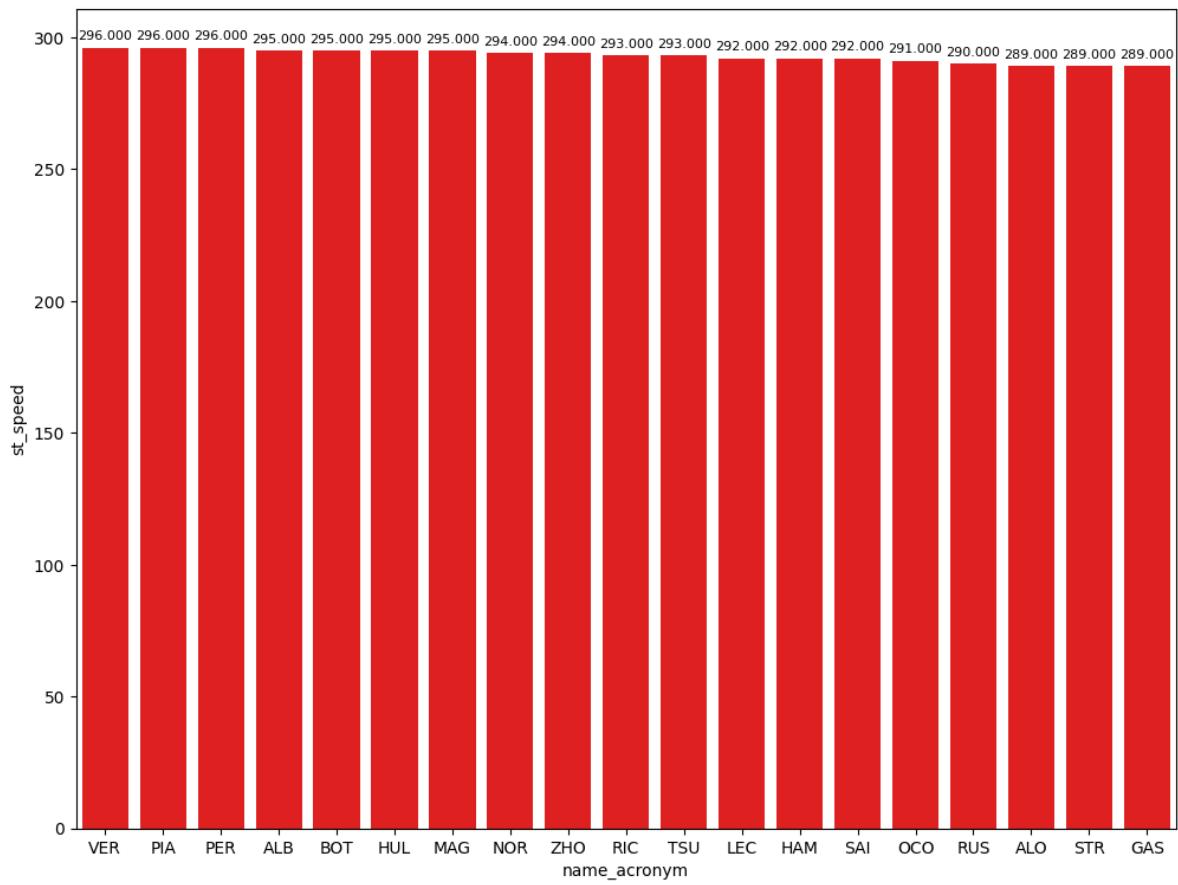
In [157]:

```
top_speed = jointables.loc[jointables.groupby(['name_acronym'])['i2_speed'].max()]
libraryDataF1.obtainchart("name_acronym","i2_speed",top_speed)
```



In [158...]

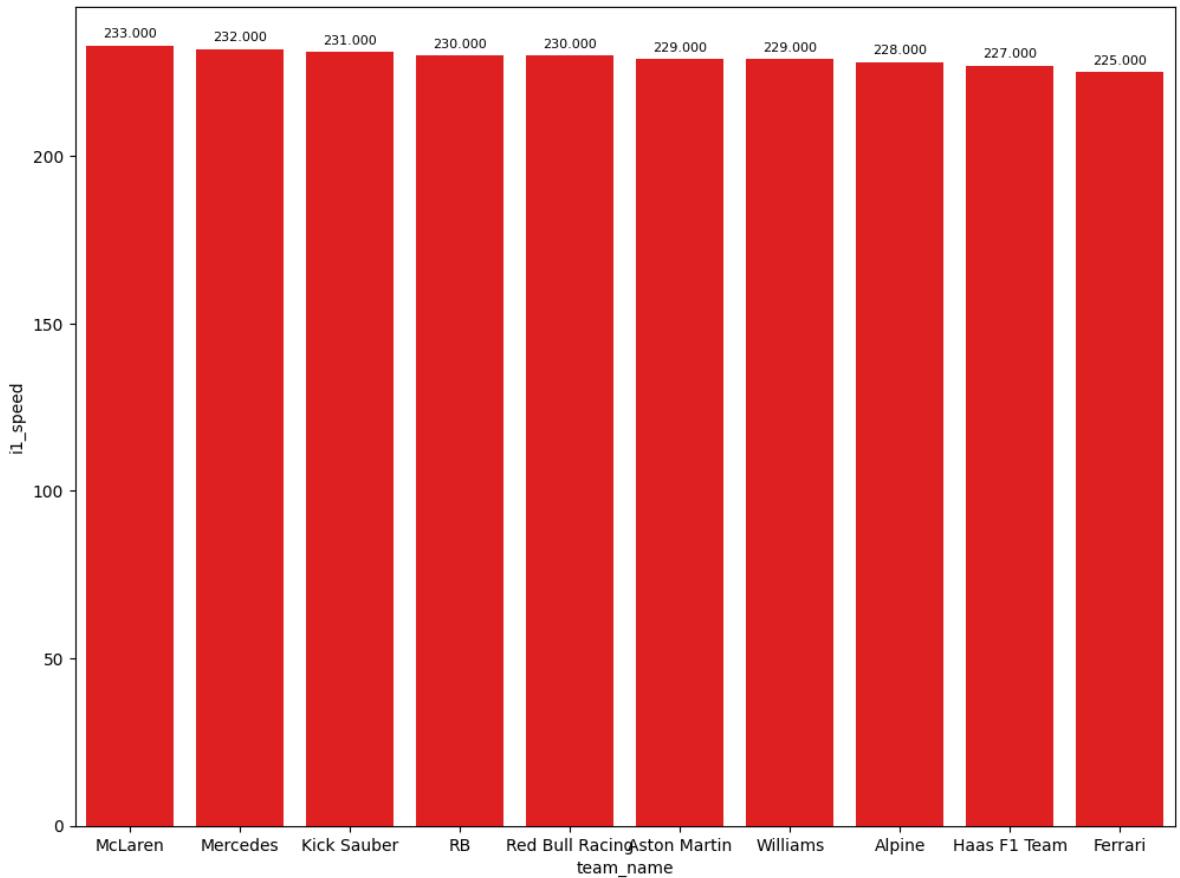
```
top_speed = jointables.loc[jointables.groupby(['name_acronym'])['st_speed']]  
libraryDataF1.obtainchart("name_acronym","st_speed",top_speed)
```



Maximum speed per teams

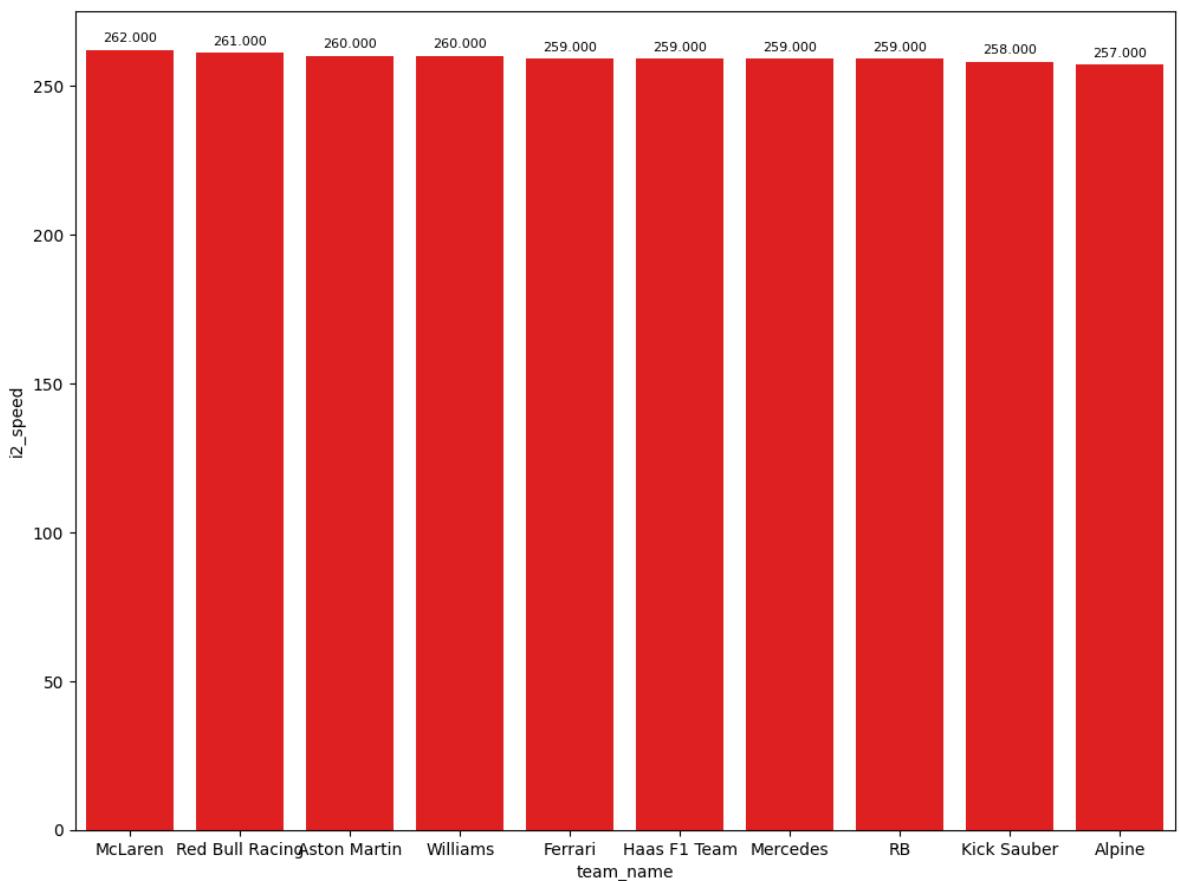
In [159...]

```
top_speed = jointables.loc[jointables.groupby(['team_name'])['i1_speed']].i  
libraryDataF1.obtainchart("team_name","i1_speed",top_speed)
```

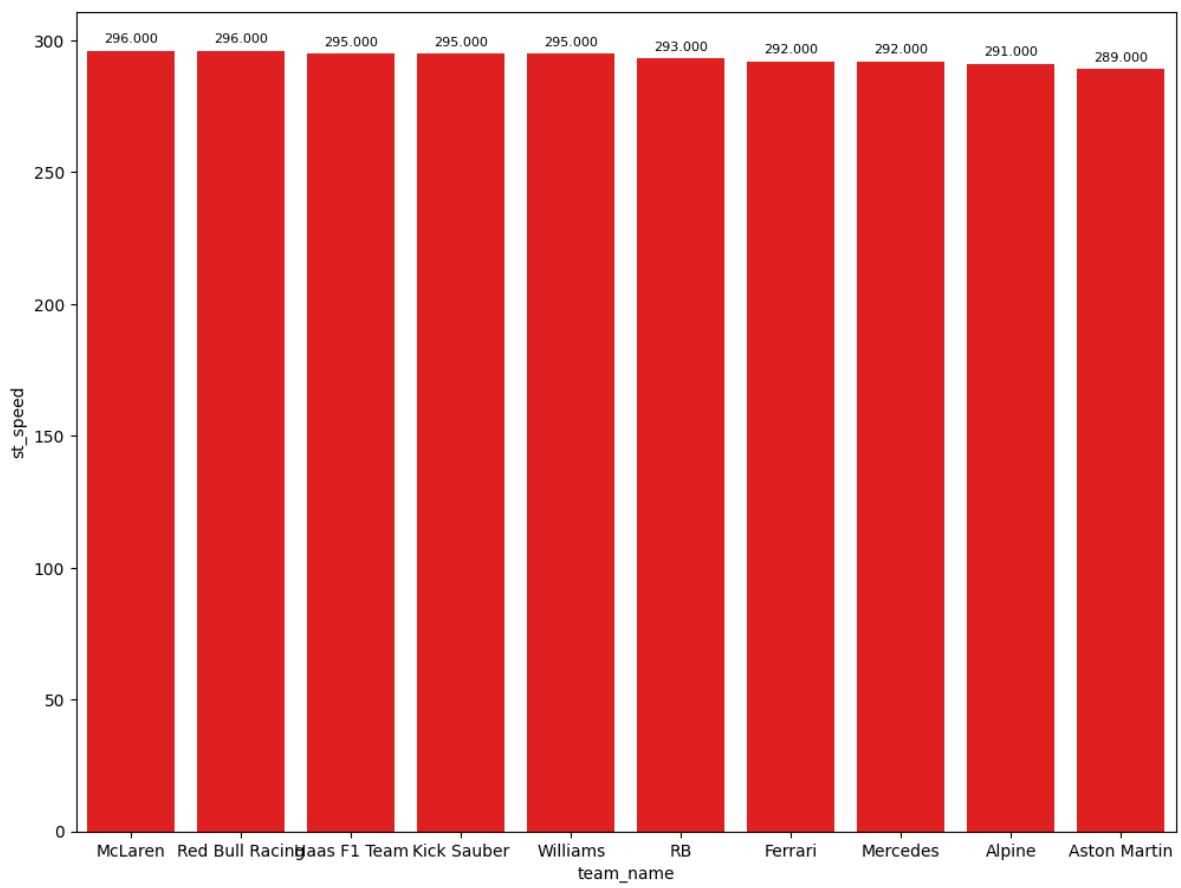


In [160]:

```
top_speed = jointables.loc[jointables.groupby(['team_name'])['i2_speed'].max()]
libraryDataF1.obtainchart("team_name","i2_speed",top_speed)
```



```
In [161...  
top_speed = jointables.loc[jointables.groupby(['team_name'])['st_speed'].idxmax()]  
libraryDataF1.obtainchart("team_name","st_speed",top_speed)
```



```
In [162...  
mergeequally = pd.merge(competitiveLaps,drivers,on=['driver_number'])  
mergeequally
```

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
0	1235	9511	10	228.0	257	289	2024-05-18T14
1	1235	9511	10	228.0	258	292	2024-05-18T14
2	1235	9511	10	232.0	256	290	2024-05-18T14
3	1235	9511	31	228.0	258	292	2024-05-18T14
4	1235	9511	31	227.0	257	293	2024-05-18T14
...
78	1235	9511	3	231.0	261	294	2024-05-18T14
79	1235	9511	3	228.0	259	293	2024-05-18T14
80	1235	9511	23	231.0	263	295	2024-05-18T14
81	1235	9511	23	229.0	261	295	2024-05-18T14

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
82	1235	9511	23	232.0	260	296	2024-05-18T14

In order to know when each session finished, race control dataset will be consulted.

In [163...]

```
maximumDateQ1 = "date_start <'2024-05-18T14:25:00+00:00'"
maximumDateQ2 = "date_start <'2024-05-18T14:48:00+00:00' and date_start >]"
maximumDateQ3 = "date_start >'2024-05-18T14:48:00+00:00'"
```

Qualifying 1

In this session the surprise came from Aston Martin with Fernando that knocked-out in Q1.

The rest of the drivers were expected to be knocked-out

In [164...]

```
q1Data = libraryDataF1.obtainInfoAboutQualySession(mergequaly, maximumDateQ1)
```

Out[164...]

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
52	1235	9511	1	231.0	261	297	2024-05-18T14
36	1235	9511	16	226.0	261	296	2024-05-18T14
10	1235	9511	27	229.0	262	297	2024-05-18T14
69	1235	9511	22	231.0	259	294	2024-05-18T14
42	1235	9511	4	235.0	262	296	2024-05-18T14
57	1235	9511	81	233.0	262	297	2024-05-18T14
1	1235	9511	10	228.0	258	292	2024-05-18T14
29	1235	9511	55	225.0	259	295	2024-05-18T14
76	1235	9511	3	231.0	260	294	2024-05-18T14
63	1235	9511	63	234.0	259	294	2024-05-18T14
5	1235	9511	31	228.0	259	292	2024-05-18T14
47	1235	9511	11	227.0	261	298	2024-05-18T14
18	1235	9511	18	226.0	260	293	2024-05-18T14
80	1235	9511	23	231.0	263	295	2024-05-18T14
23	1235	9511	44	227.0	258	293	2024-05-18T14
74	1235	9511	77	226.0	257	295	2024-05-18T14

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
62	1235	9511	24	231.0	259	294	2024-05-18T14
16	1235	9511	20	225.0	258	297	2024-05-18T14
50	1235	9511	14	229.0	259	289	2024-05-18T14

10 rows × 28 columns

Comparaison with driver at risk

In this section with the fastest lap done for each driver (laptimes deleted will not be taken into account to do this analysis) it will do a comparaison in order to see where the driver eliminated lost/gain time in their fastest lap.

In [165...]

```
#Reference
P15 = q1Data[14:15]
P15
```

Out[165...]

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
23	1235	9511	44	227.0	258	293	2024-05-18T14

1 rows × 28 columns

In [166...]

```
print(
"Driver:", P15.full_name.to_string(index=False),
"Sector 1: ", P15.duration_sector_1.to_string(index=False),
"Sector 2: ", P15.duration_sector_2.to_string(index=False),
"Sector 3: ", P15.duration_sector_3.to_string(index=False)
)
```

Driver: Lewis HAMILTON Sector 1: 24.078 Sector 2: 26.765 Sector 3: 25.76
1

In [167...]

```
q1Data[15::]
```

Out[167...]

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
74	1235	9511	77	226.0	257	295	2024-05-18T14
62	1235	9511	24	231.0	259	294	2024-05-18T14
16	1235	9511	20	225.0	258	297	2024-05-18T14
50	1235	9511	14	229.0	259	289	2024-05-18T14

4 rows × 28 columns

Analysis of each sector of the driver at risk compared to the drivers eliminated.

It was a close battle to pass to Q2 with less of 3 tenths among the driver at risk and

Magnussen. Until the third sector, P15 was disputed between Hamilton and Bottas being

Bottas 0.010 milliseconds better than Hamilton in the second sector

In [168...]

```
newdataset2 = pd.DataFrame()
for index, row in q1Data[15::].iterrows():
    newdataset2 = libraryDataF1.obtain_difference REGARD_REFERENCE(row, P15)

newdataset2
```

Out[168...]

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	n
0	77	0.022	0.147	-0.187	0.062	
1	24	0.230	0.124	-0.116	0.222	
2	20	0.250	0.099	-0.114	0.265	
3	14	0.313	0.113	-0.202	0.402	

Analysis with the drivers that finished better than the driver at risk

I bring this section in order to know where the driver at risk lost his chances to improve in the qualifying. As we can see in the last table, Hamilton had a good pace in the first sector but he suffered a lot in the second losing more than 1 tenth in this sector

In [169...]

```
newdataset2 = pd.DataFrame()
for index, row in q1Data[0:14].iterrows():
    newdataset2 = libraryDataF1.obtain_difference REGARD_REFERENCE(row, P15)

newdataset2
```

Out[169...]

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	n
0	1	-0.842	-0.332	-0.417	-0.093	
1	16	-0.781	-0.153	-0.407	-0.221	
2	27	-0.763	-0.130	-0.508	-0.125	
3	22	-0.710	-0.305	-0.347	-0.058	
4	4	-0.689	-0.240	-0.296	-0.153	
5	81	-0.664	-0.254	-0.405	-0.005	
6	10	-0.589	0.015	-0.504	-0.100	
7	55	-0.589	-0.064	-0.397	-0.128	
8	3	-0.544	-0.194	-0.270	-0.080	
9	63	-0.497	-0.262	-0.364	0.129	
10	31	-0.243	0.057	-0.475	0.175	
11	11	-0.200	0.072	-0.313	0.041	
12	18	-0.146	0.026	-0.399	0.227	
13	23	-0.080	0.027	-0.160	0.053	

Best sector per driver

In this section we can see the best sector of the session

```
In [170... pd.DataFrame(q1Data.groupby("name_acronym")['duration_sector_1'].min()).sort_index()
```

```
Out[170... duration_sector_1
```

name_acronym	duration_sector_1
VER	23.746
TSU	23.773
RUS	23.816
PIA	23.824
NOR	23.838
RIC	23.884
LEC	23.925
HUL	23.948
SAI	24.014
HAM	24.078
GAS	24.093
STR	24.104
ALB	24.105
OCO	24.135
PER	24.150
MAG	24.177
ALO	24.191
ZHO	24.202
BOT	24.225

```
In [171... pd.DataFrame(q1Data.groupby("name_acronym")['duration_sector_2'].min()).sort_index()
```

```
Out[171... duration_sector_2
```

name_acronym	duration_sector_2
HUL	26.257
GAS	26.261
OCO	26.290
VER	26.348
LEC	26.358
PIA	26.360
STR	26.366
SAI	26.368
RUS	26.401
TSU	26.418
PER	26.452

```
duration_sector_2
```

```
name_acronym
```

NOR	26.469
RIC	26.495
ALO	26.563
BOT	26.578
ALB	26.605
ZHO	26.649

```
In [172...]
```

```
pd.DataFrame(q1Data.groupby("name_acronym")['duration_sector_3'].min()).sort_values(
```

```
Out[172...]
```

```
duration_sector_3
```

```
name_acronym
```

LEC	25.540
NOR	25.608
SAI	25.633
HUL	25.636
GAS	25.661
VER	25.668
RIC	25.681
TSU	25.703
PIA	25.756
HAM	25.761
PER	25.802
ALB	25.814
BOT	25.823
RUS	25.890
OCO	25.936
ZHO	25.983
STR	25.988
MAG	26.026
ALO	26.163

Qualifying 2

In this session, both Alpine, Albon, Stroll and Perez knocked out. Perez was so close to make it through Q3 but his first sector was bad.

```
In [173...]
```

```
q2Data = libraryDataF1.obtainInfoAboutQualySession(mergequaly,maximumDateQ2)
q2Data
```

```
Out[173...]
```

```
meeting_key_x session_key_x driver_number i1_speed i2_speed st_speed
```

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
54	1235	9511	1	233.0	262	299	2024-05-18T14
37	1235	9511	16	231.0	261	293	2024-05-18T14
70	1235	9511	22	233.0	260	293	2024-05-18T14
44	1235	9511	4	231.0	262	298	2024-05-18T14
58	1235	9511	81	235.0	263	296	2024-05-18T14
31	1235	9511	55	228.0	260	295	2024-05-18T14
12	1235	9511	27	232.0	263	298	2024-05-18T14
65	1235	9511	63	232.0	261	294	2024-05-18T14
25	1235	9511	44	234.0	261	294	2024-05-18T14
78	1235	9511	3	231.0	261	294	2024-05-18T14
49	1235	9511	11	225.0	262	297	2024-05-18T14
7	1235	9511	31	227.0	258	292	2024-05-18T14
21	1235	9511	18	228.0	263	293	2024-05-18T14
82	1235	9511	23	232.0	260	296	2024-05-18T14
2	1235	9511	10	232.0	256	290	2024-05-18T14

Comparaison with driver at risk

In this section with the fastest lap done for each driver (laptimes deleted will not be taken into account to do this analysis) it will be a comparaison in order to see where the driver eliminated lost/gain time in their fastest lap.

In [174...]

```
#Reference
P10 = q2Data[9:10]
print(
"Driver:", P10.full_name.to_string(index=False),
"Sector 1: ", P10.duration_sector_1.to_string(index=False),
"Sector 2: ", P10.duration_sector_2.to_string(index=False),
"Sector 3: ", P10.duration_sector_3.to_string(index=False)
)
```

Driver: Daniel RICCIARDO Sector 1: 23.974 Sector 2: 26.232 Sector 3: 25.485

Analysis of each sector of the driver at risk compared to the drivers eliminated.

RB had a good pace being able to pass to Q3 eliminating Perez in Q2

```
In [175...]
newdataset2 = pd.DataFrame()
for index, row in q2Data[10::].iterrows():
    newdataset2 = libraryDataF1.obtain_difference REGARD_REFERENCE(row, P10)

newdataset2
```

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	na
0	11	0.015	-0.043	0.008	0.050	
1	31	0.215	0.114	-0.021	0.122	
2	18	0.301	-0.022	-0.032	0.355	
3	23	0.509	-0.004	0.257	0.256	
4	10	0.690	0.077	0.246	0.367	

Analysis with the drivers that finished better than the driver at risk

I bring this section in order to know where the driver at risk lost his chances to improve in the qualifying. Both Mercedes would have suffered for their third sector losing 1.5 tenths.

```
In [176...]
newdataset2 = pd.DataFrame()
for index, row in q2Data[0:9].iterrows():
    newdataset2 = libraryDataF1.obtain_difference REGARD_REFERENCE(row, P10)

newdataset2
```

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	na
0	1	-0.515	-0.381	-0.114	-0.020	
1	16	-0.363	-0.138	-0.256	0.031	
2	22	-0.333	-0.249	-0.169	0.085	
3	4	-0.320	-0.151	0.019	-0.188	
4	81	-0.284	-0.148	-0.177	0.041	
5	55	-0.179	0.010	-0.069	-0.120	
6	27	-0.122	-0.079	-0.145	0.102	
7	63	-0.020	-0.055	-0.131	0.166	
8	44	-0.014	-0.104	-0.083	0.173	

Best sector per driver

In this section we can see the best sector of the session

```
In [177...]
pd.DataFrame(q2Data.groupby("name_acronym")['duration_sector_1'].min().sort_values(ascending=False))
```

	duration_sector_1
name_acronym	
VER	23.593
TSU	23.725

duration_sector_1

name_acronym

NOR	23.823
PIA	23.826
LEC	23.836
HAM	23.870
HUL	23.895
RUS	23.919
PER	23.931
STR	23.952
ALB	23.970
RIC	23.974
SAI	23.984

In [178...]

```
pd.DataFrame(q2Data.groupby("name_acronym")['duration_sector_2'].min().sort_values(ascending=False))
```

Out[178...]

duration_sector_2

name_acronym

LEC	25.976
PIA	26.055
TSU	26.063
HUL	26.087
RUS	26.101
VER	26.118
HAM	26.149
SAI	26.163
STR	26.200
OCO	26.211
RIC	26.232
PER	26.240
NOR	26.251
GAS	26.478
ALB	26.489

In [179...]

```
pd.DataFrame(q2Data.groupby("name_acronym")['duration_sector_3'].min().sort_values(ascending=False))
```

Out[179...]

duration_sector_3

name_acronym

NOR	25.297
SAI	25.365

duration_sector_3	
name_acronym	
VER	25.465
RIC	25.485
LEC	25.516
PIA	25.526
PER	25.535
TSU	25.570
HUL	25.587
OCO	25.607
RUS	25.651
HAM	25.658
AID	25.711

Qualyfing 3

```
In [180...]: q3Data = libraryDataF1.obtainInfoAboutQualySession(mergequaly,maximumDateQ3)
q3Data
```

	meeting_key_x	session_key_x	driver_number	i1_speed	i2_speed	st_speed	
56	1235	9511	1	233.0	261	296	2024-05-18T14
60	1235	9511	81	236.0	263	296	2024-05-18T14
46	1235	9511	4	232.0	260	296	2024-05-18T14
40	1235	9511	16	228.0	260	294	2024-05-18T14
33	1235	9511	55	234.0	260	294	2024-05-18T14
67	1235	9511	63	234.0	260	294	2024-05-18T14
71	1235	9511	22	234.0	261	293	2024-05-18T14
27	1235	9511	44	226.0	260	294	2024-05-18T14
79	1235	9511	3	228.0	259	293	2024-05-18T14
14	1235	9511	27	230.0	260	298	2024-05-18T14

10 rows × 28 columns

Comparaison with poleman

In this section with the fastest lap done for each driver (laptimes deleted will not be taken into account to do this analysis) it will be a comparaison in order to see where the driver eliminated lost/gain time in their fastest lap.

In [181...]

```
#Reference
P1 = q3Data[:1]
print(
    "Driver:", P1.full_name.to_string(index=False),
    "Sector 1: ", P1.duration_sector_1.to_string(index=False),
    "Sector 2: ", P1.duration_sector_2.to_string(index=False),
    "Sector 3: ", P1.duration_sector_3.to_string(index=False)
)
```

Driver: Max VERSTAPPEN Sector 1: 23.408 Sector 2: 25.922 Sector 3: 25.416

Analysis of each sector of the driver at risk compared to the drivers eliminated.

As we saw in the free practices, pole position was going to be very close among Red Bull, Ferrari and McLaren. Verstappen took the pole but, as other grand prix, he suffered a lot to get it. His first sector, with two tenths of difference compared to his rivals, afforded to Verstappen to take the pole.

In [182...]

```
newdataset2 = pd.DataFrame()
for index, row in q3Data[1::].iterrows():
    newdataset2 = libraryDataF1.obtain_difference REGARD_REFERENCE(row, P1, i)
newdataset2
```

Out[182...]

	driver_number	lap_duration	difference_sector_1	difference_sector_2	difference_sector_3	na
0	81	0.074	0.200	-0.001	-0.125	
1	4	0.091	0.241	0.103	-0.253	
2	16	0.224	0.333	0.013	-0.122	
3	55	0.487	0.385	0.217	-0.115	
4	63	0.488	0.224	0.189	0.075	
5	22	0.719	0.377	0.269	0.073	
6	44	0.758	0.476	0.224	0.058	
7	3	0.928	0.641	0.292	-0.005	
8	27	1.234	0.687	0.398	0.149	

Best sector per driver

In this section we can see the best sector of the session

In [183...]

```
pd.DataFrame(q3Data.groupby("name_acronym")['duration_sector_1'].min().sort_values(ascending=True))
```

Out[183...]

name_acronym	duration_sector_1
VER	23.408
PIA	23.608
RUS	23.632
NOR	23.649
LEC	23.741

```
duration_sector_1  
name_acronym  
TSU      23.785  
SAI      23.793  
HAM      23.884
```

```
In [184... pd.DataFrame(q3Data.groupby("name_acronym")['duration_sector_2'].min()).sort_index()
```

```
Out[184... duration_sector_2  
name_acronym  
PIA      25.921  
VER      25.922  
LEC      25.935  
NOR      26.025  
RUS      26.111  
SAI      26.139  
HAM      26.146  
TSU      26.191  
RIC      26.214  
HUL      26.320
```

```
In [185... pd.DataFrame(q3Data.groupby("name_acronym")['duration_sector_1'].min()).sort_index()
```

```
Out[185... duration_sector_1  
name_acronym  
VER      23.408  
PIA      23.608  
RUS      23.632  
NOR      23.649  
LEC      23.741  
TSU      23.785  
SAI      23.793  
HAM      23.884  
RIC      24.049  
HUL      24.095
```

Best sector per driver of the session (in general)

```
In [186... pd.DataFrame(mergeQualy.groupby("name_acronym")['duration_sector_1'].min())
```

```
Out[186... duration_sector_1
```

name_acronym	
VER	23.408
PIA	23.608
RUS	23.632
NOR	23.649
TSU	23.663
LEC	23.725
SAI	23.793
HAM	23.870
RIC	23.884
HUL	23.895
PER	23.917
STR	23.952
ALB	23.970
GAS	24.051
OCO	24.088
MAG	24.177
ALO	24.191
ZHO	24.202
BOT	24.225

```
In [187]: pd.DataFrame(mergequaly.groupby("name_acronym")['duration_sector_2'].min())
```

name_acronym	duration_sector_2
PIA	25.921
VER	25.922
LEC	25.935
NOR	25.983
TSU	26.063
HUL	26.087
RUS	26.101
SAI	26.139
HAM	26.146
STR	26.200
OCO	26.211
RIC	26.214
PER	26.240
GAS	26.261

```
duration_sector_2
name_acronym
BOT      26.471
ALB      26.489
AIO      26.563
In [188... pd.DataFrame(mergeQualy.groupby("name_acronym")['duration_sector_3'].min())
Out[188... duration_sector_3
name_acronym
NOR      25.163
PIA      25.227
LEC      25.243
SAI      25.301
VER      25.390
RIC      25.411
RUS      25.451
HAM      25.474
TSU      25.489
PER      25.535
HUL      25.565
OCO      25.607
GAS      25.661
ALB      25.741
BOT      25.761
STR      25.840
MAG      25.901
ZHO      25.983
ALO      26.163
```

Race

Obtain setup

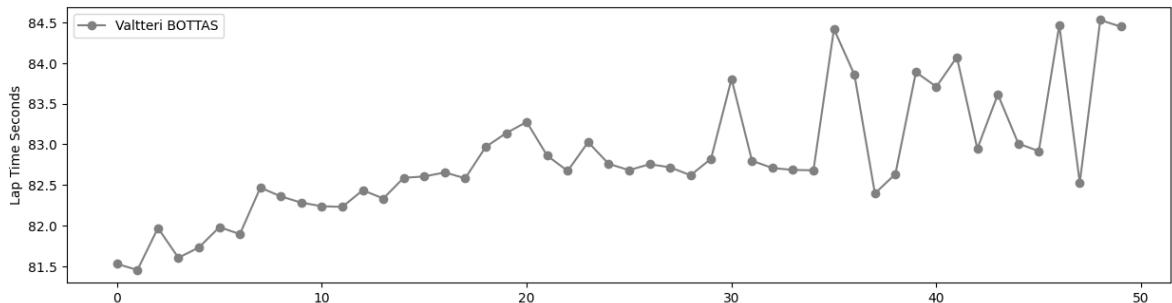
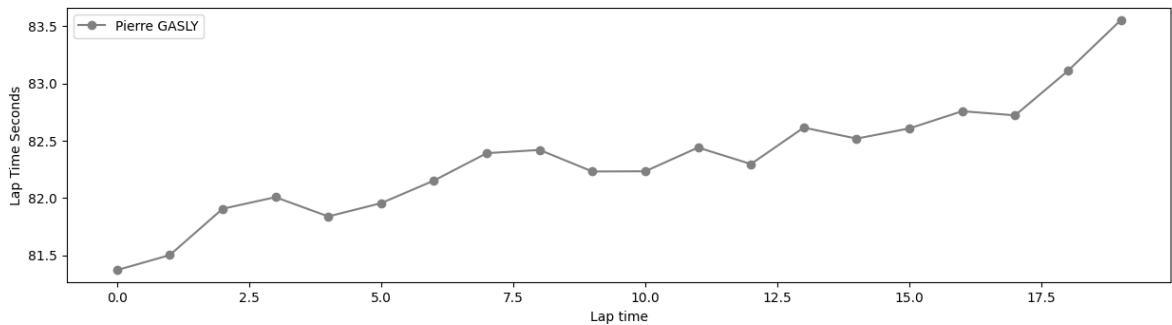
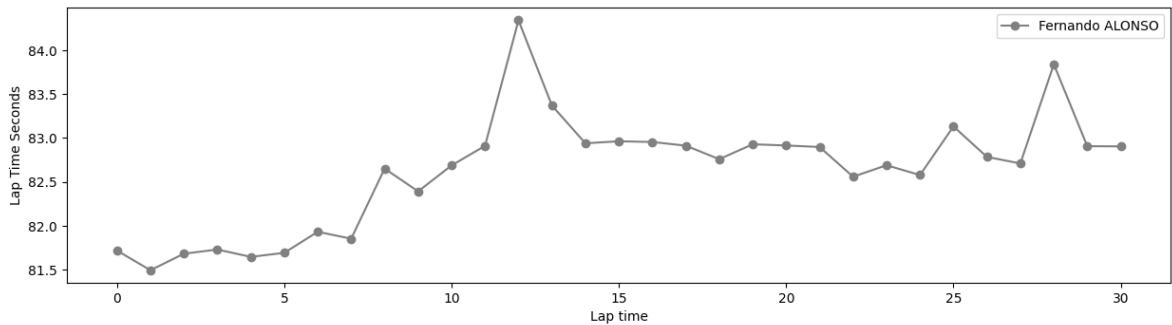
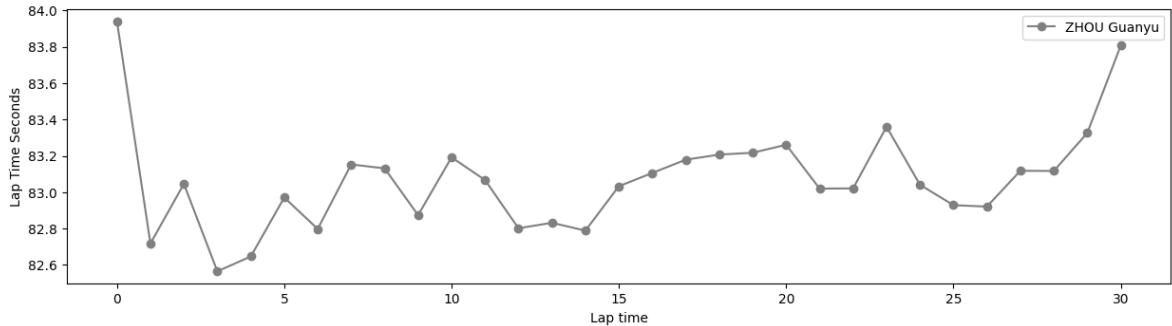
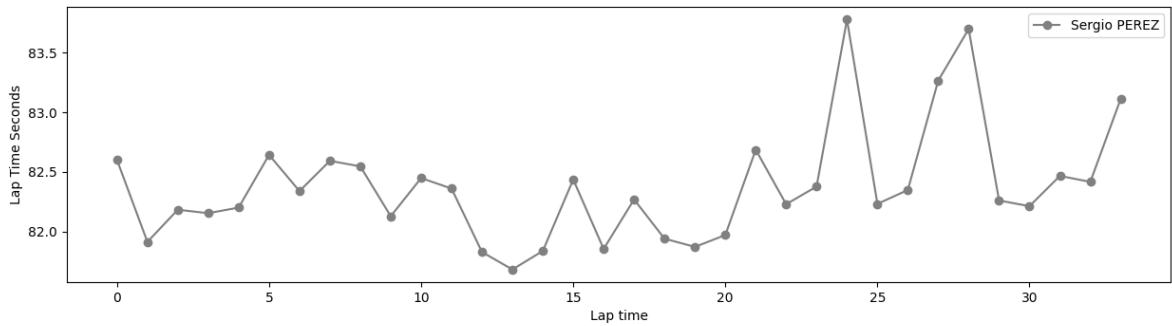
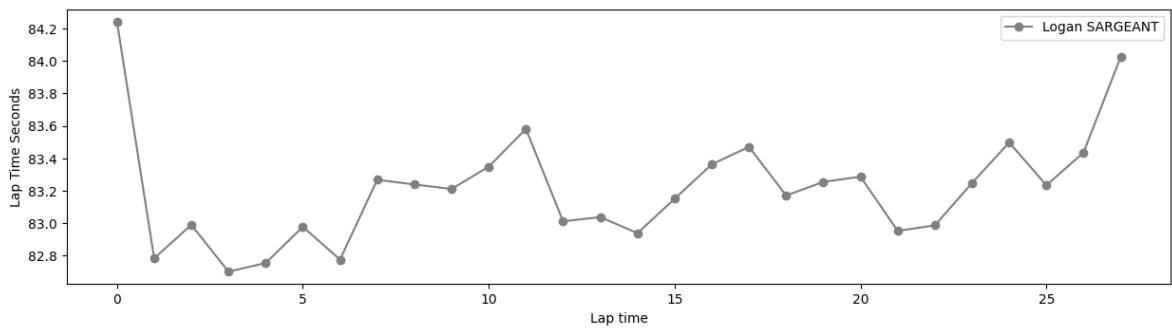
```
In [383... race = libraryDataF1.obtain_information('laps',session_key=9515)
stintInformation = libraryDataF1.obtain_information('stints',session_key=9515)
drivers = libraryDataF1.obtain_information('drivers',session_key=9515)
In [384... stintsDataFrame = libraryDataF1.stint_configuration(drivers,stintInformation)
```

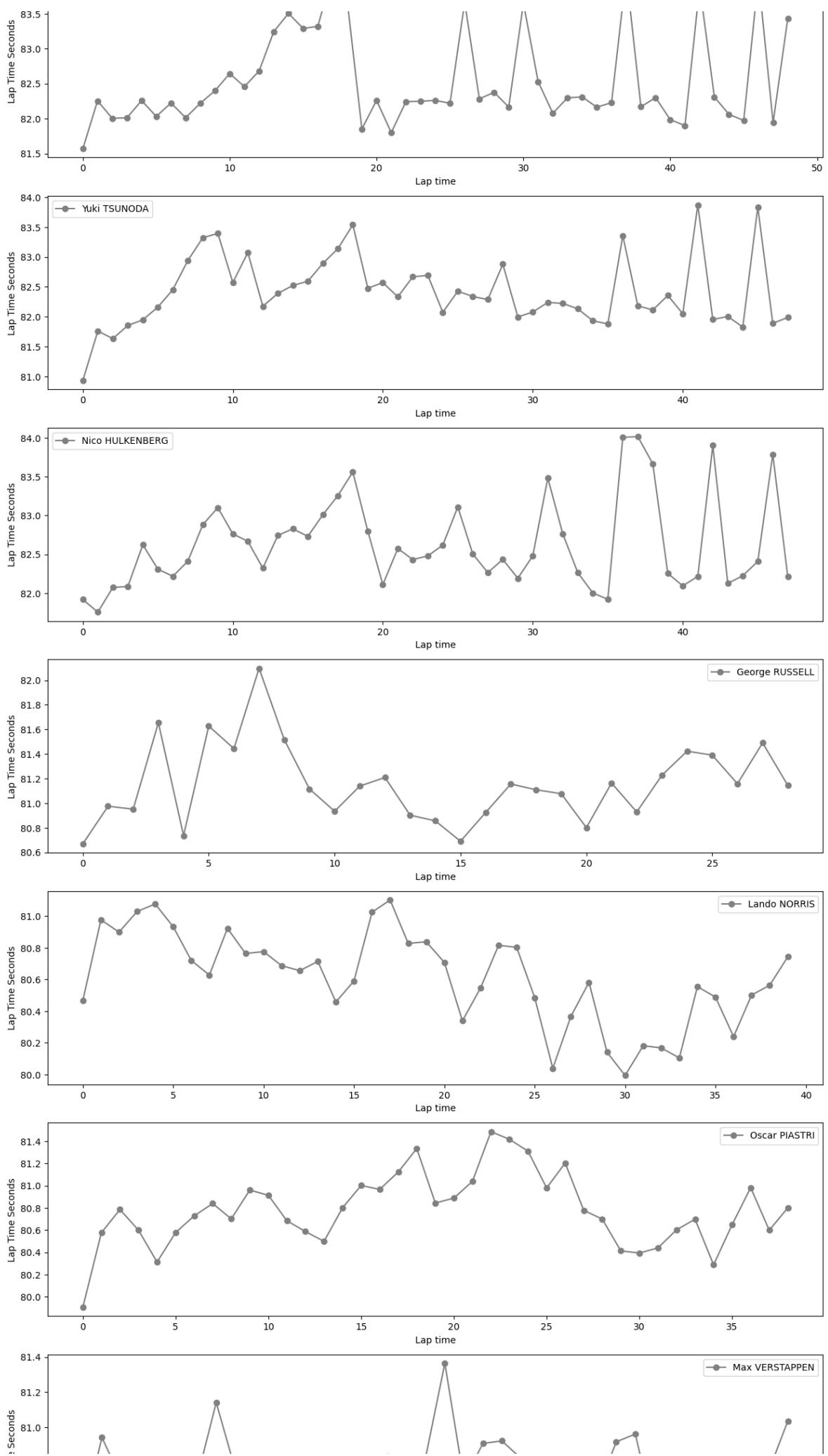
```
In [385...]: raceLaps = race.query("is_pit_out_lap == False")
jointables = pd.merge(raceLaps,stintsDataFrame,on=[ 'lap_number','driver_nur
```

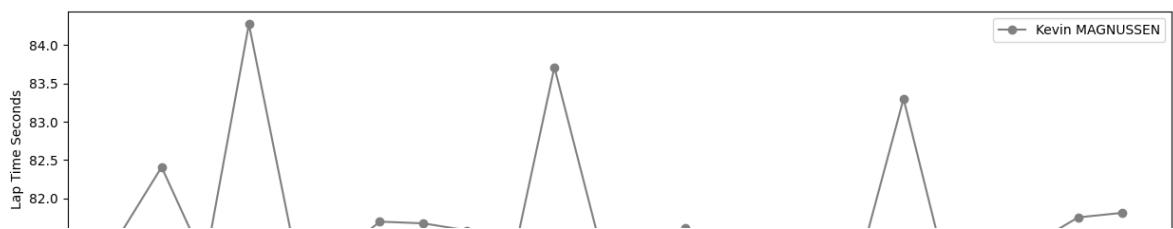
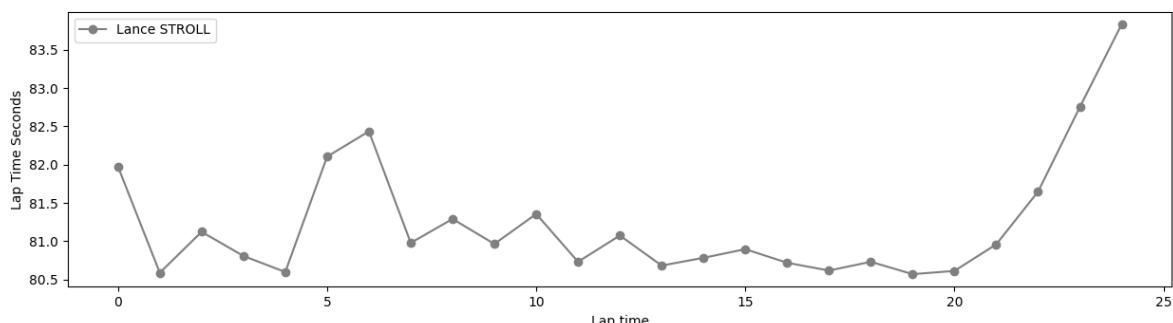
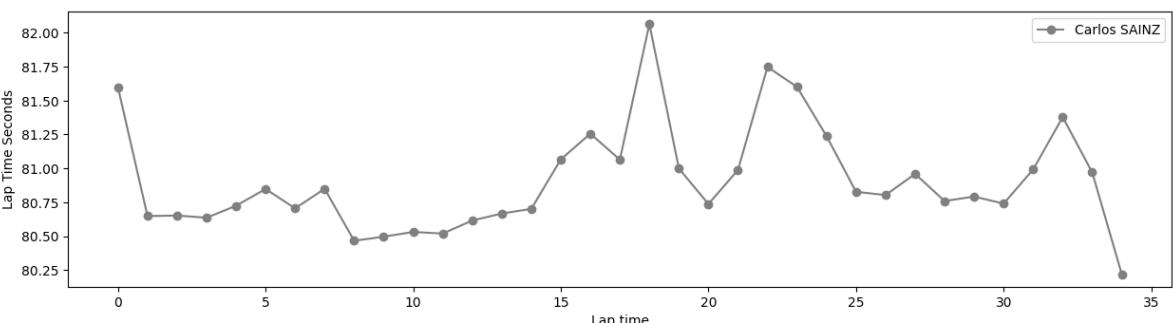
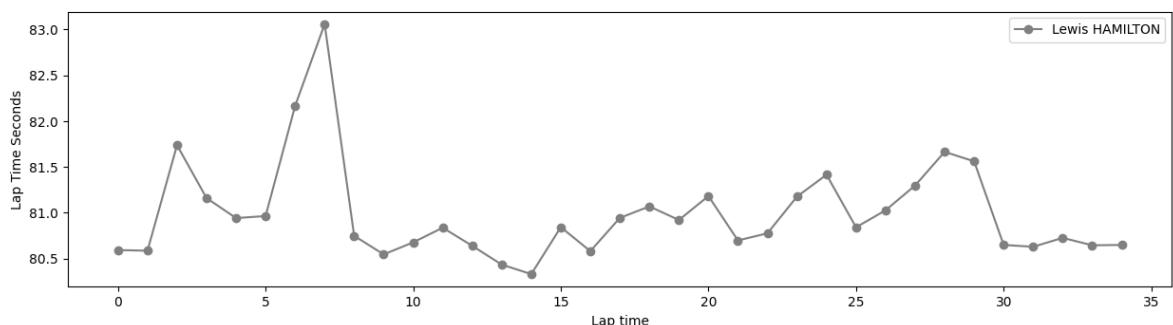
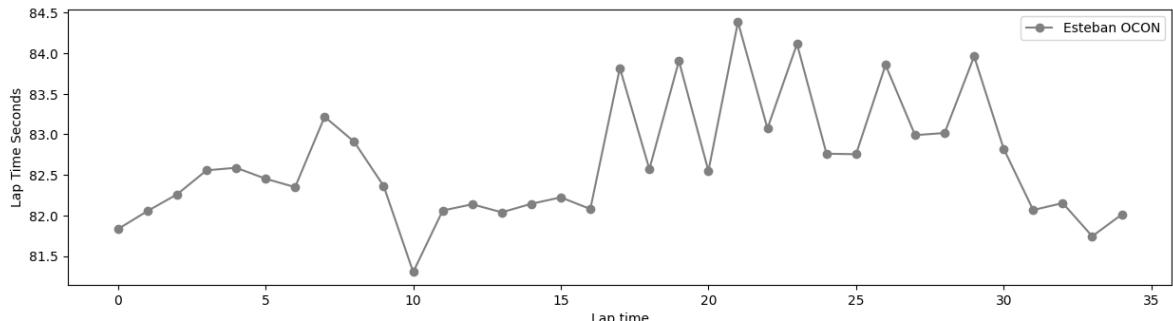
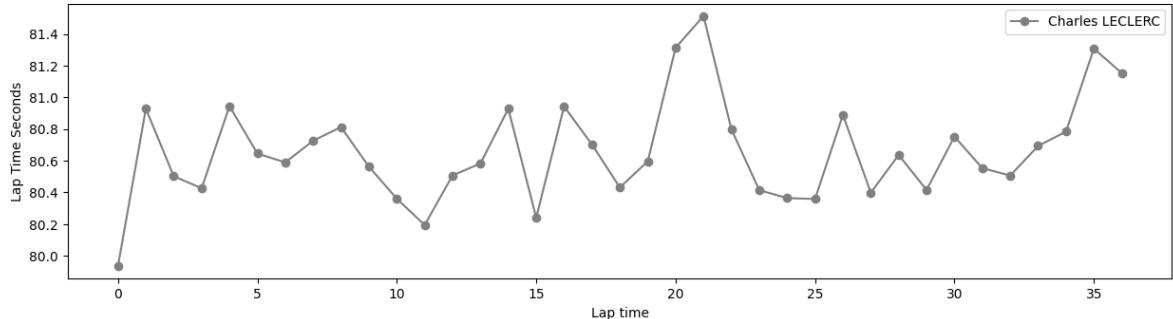
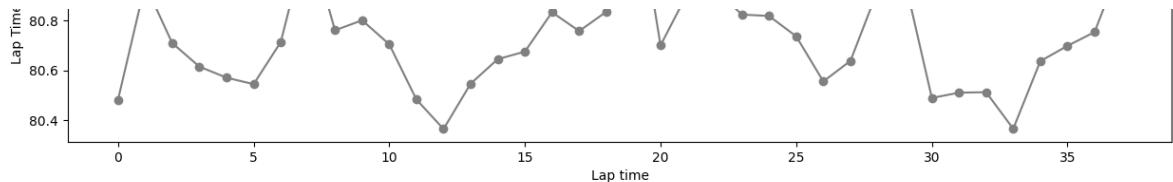
Obtain data tyres

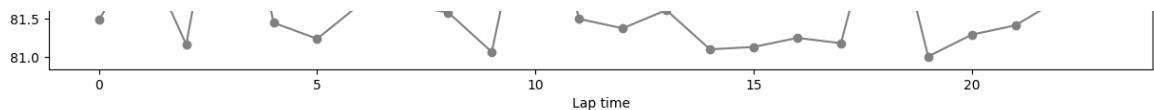
Hard tyres

```
In [386...]: libraryDataF1.obtain_data_tyres(jointables,'HARD',85)
```





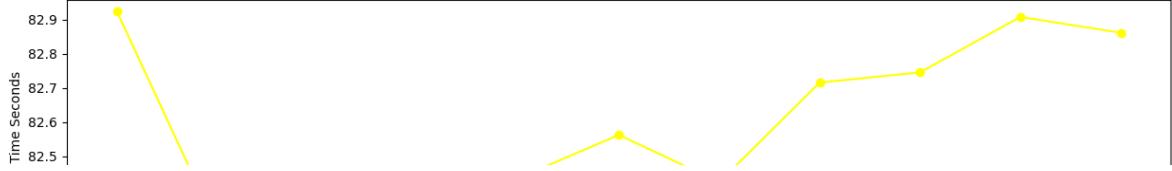
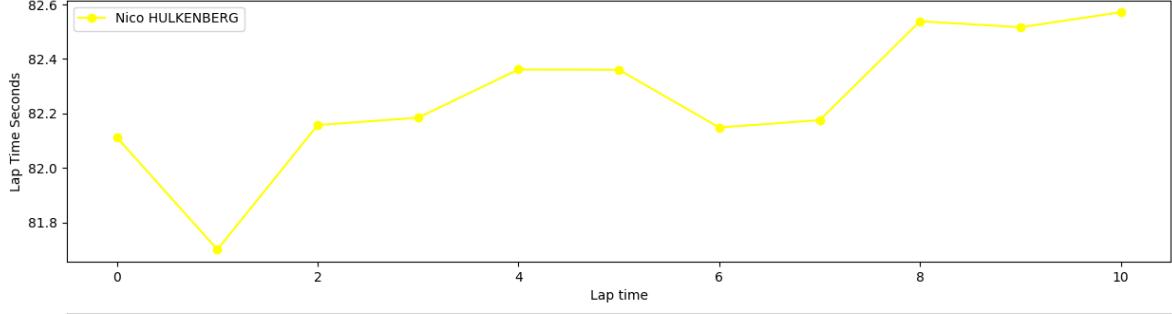
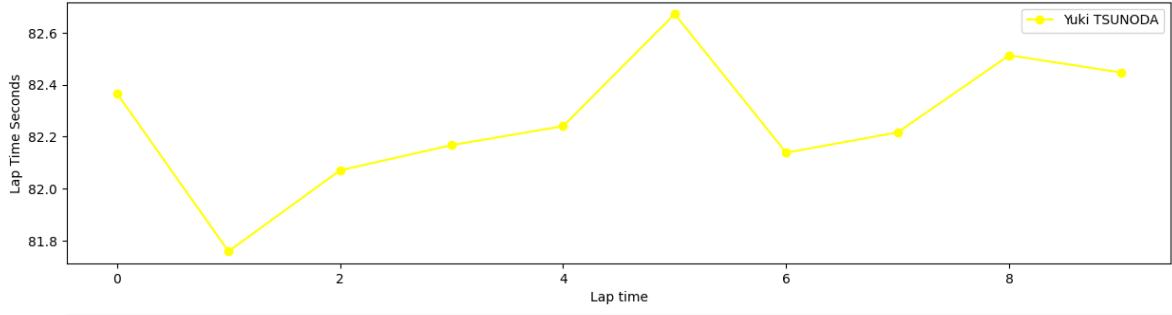
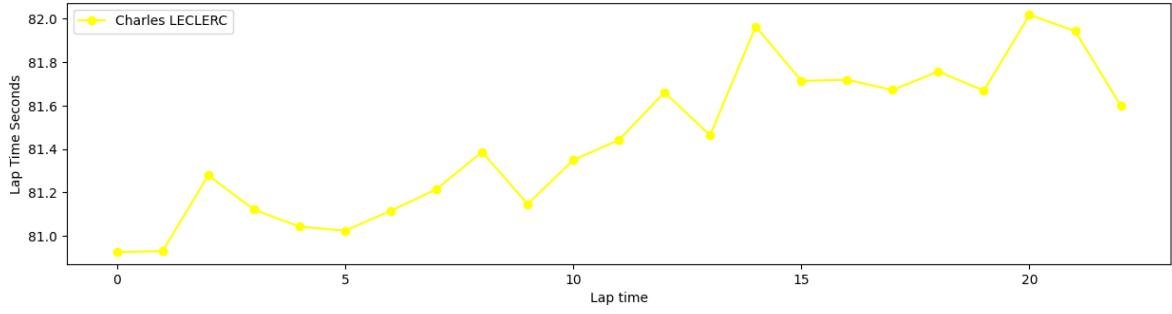
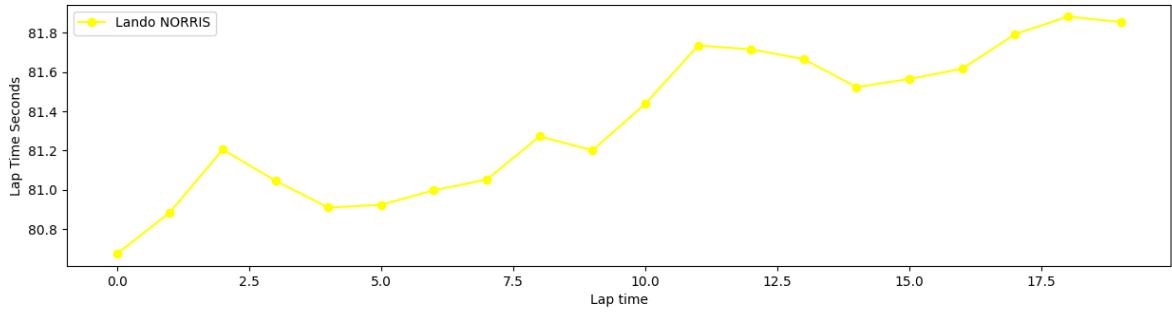
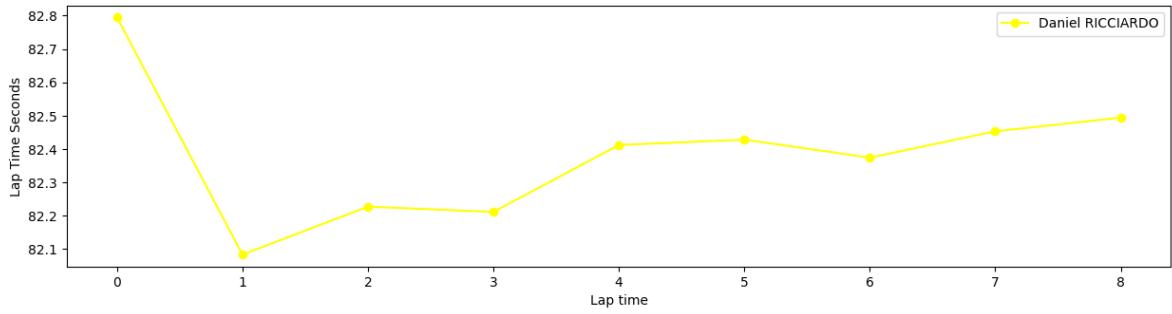
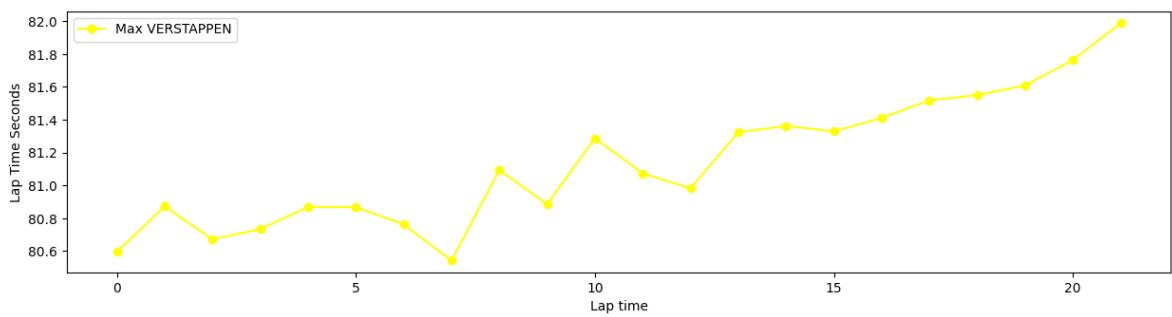


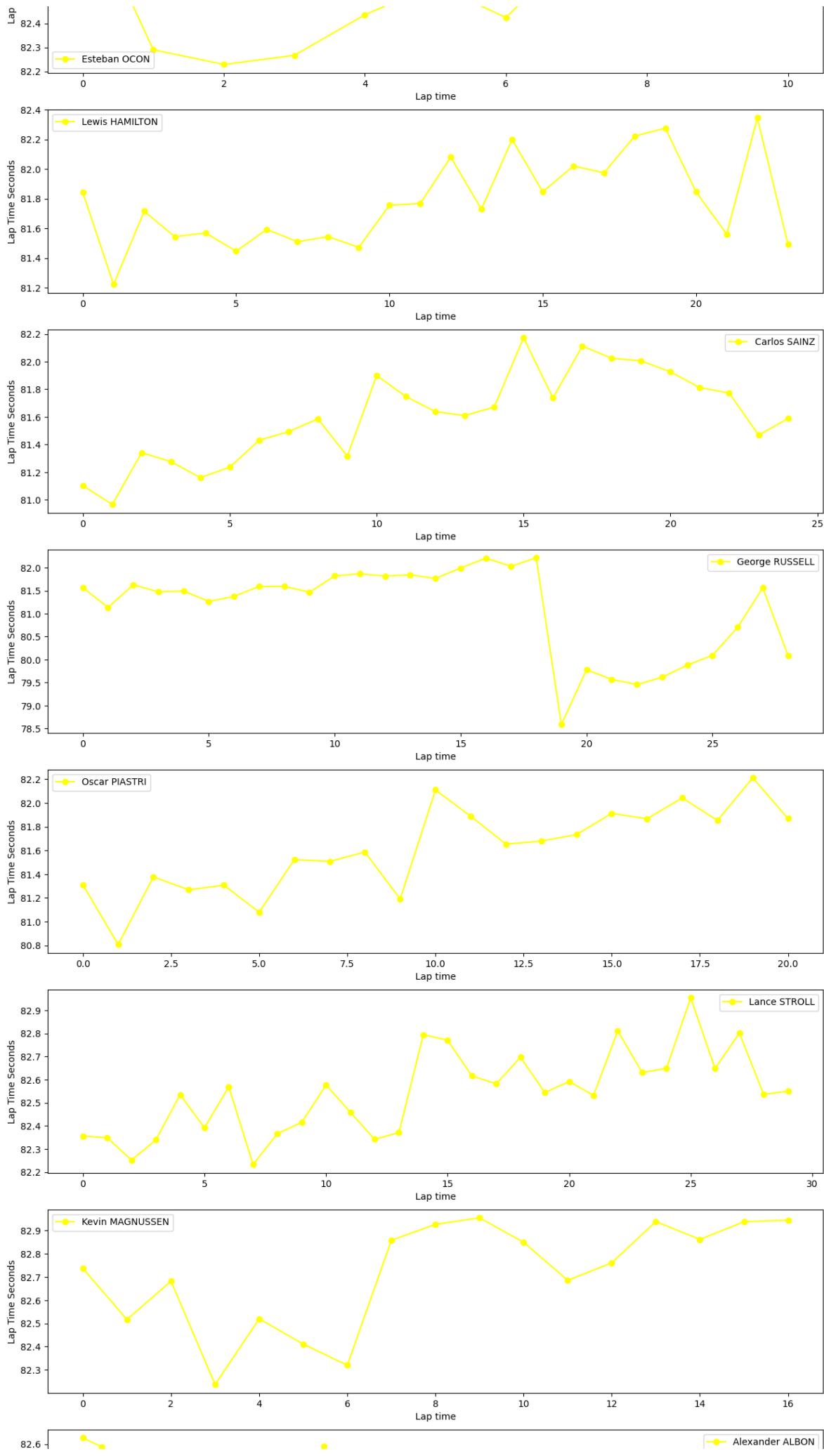


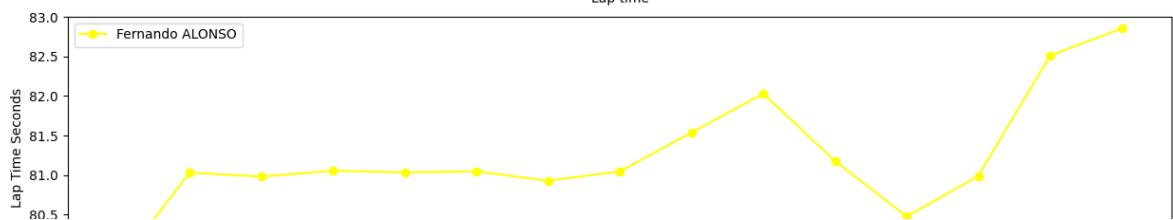
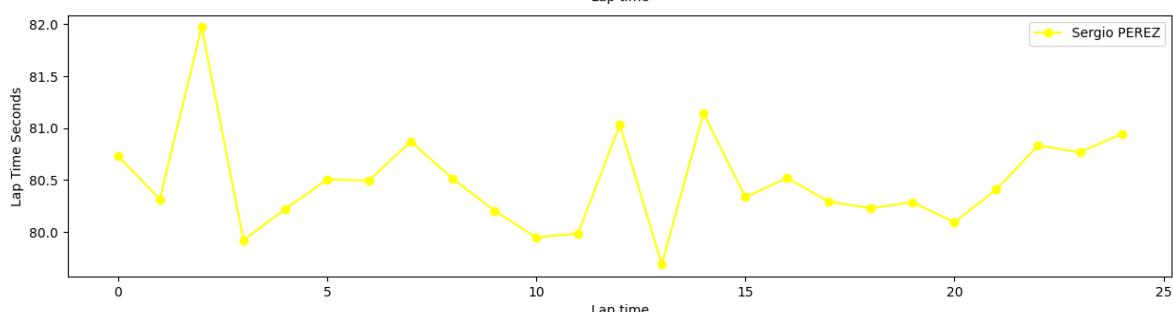
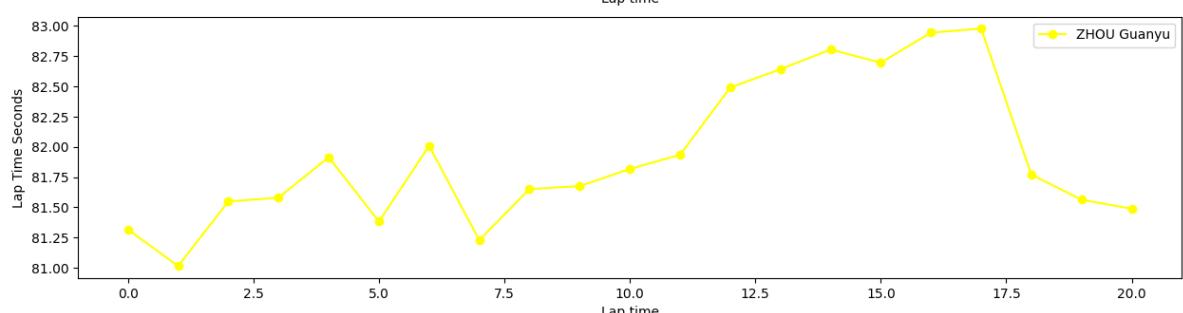
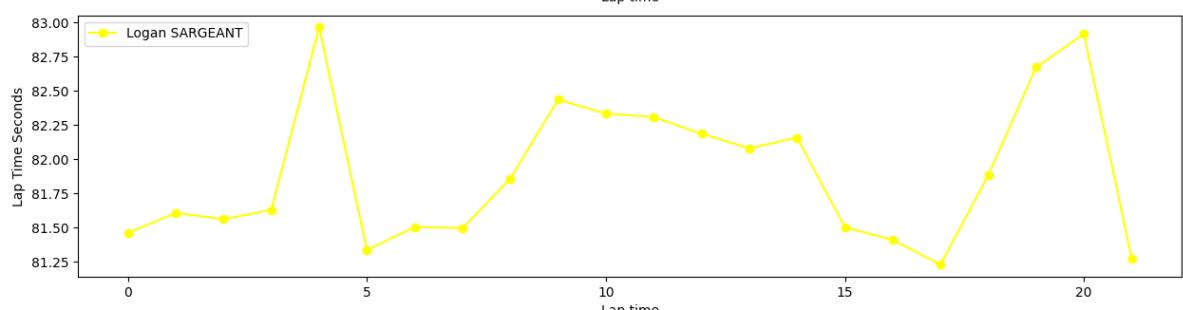
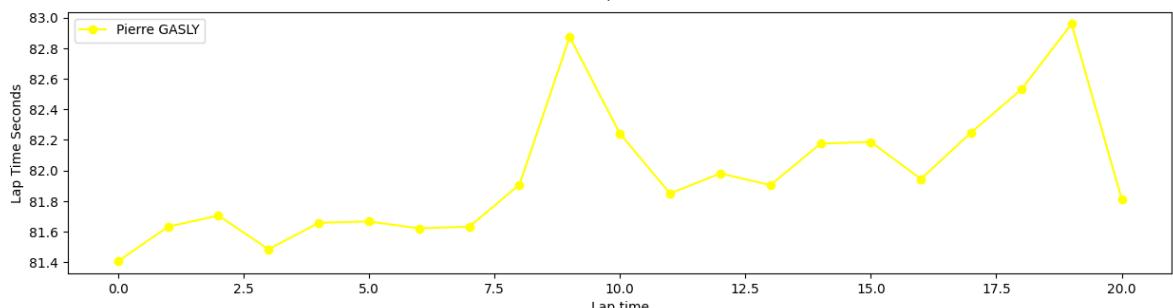
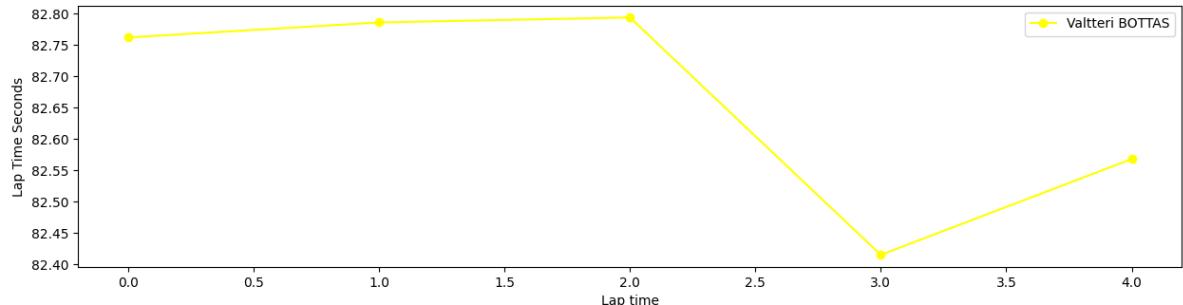
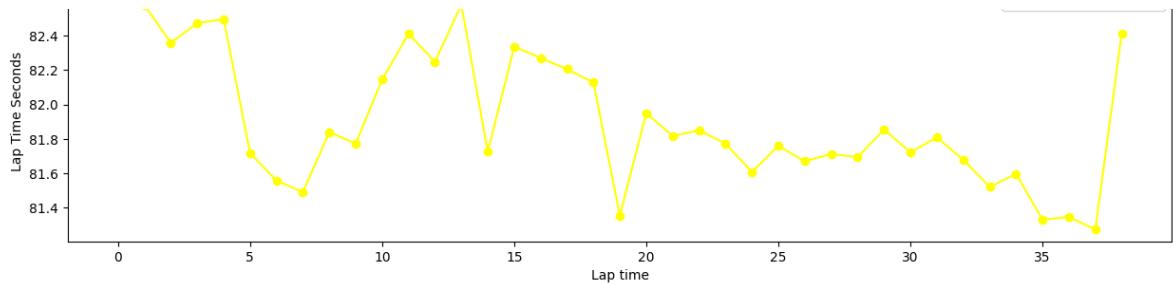
Medium tyres

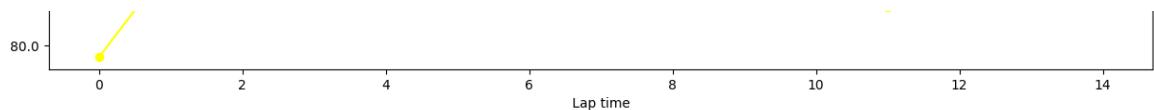
In [387]:

```
libraryDataF1.obtain_data_tyres(jointables, 'MEDIUM', 83)
```





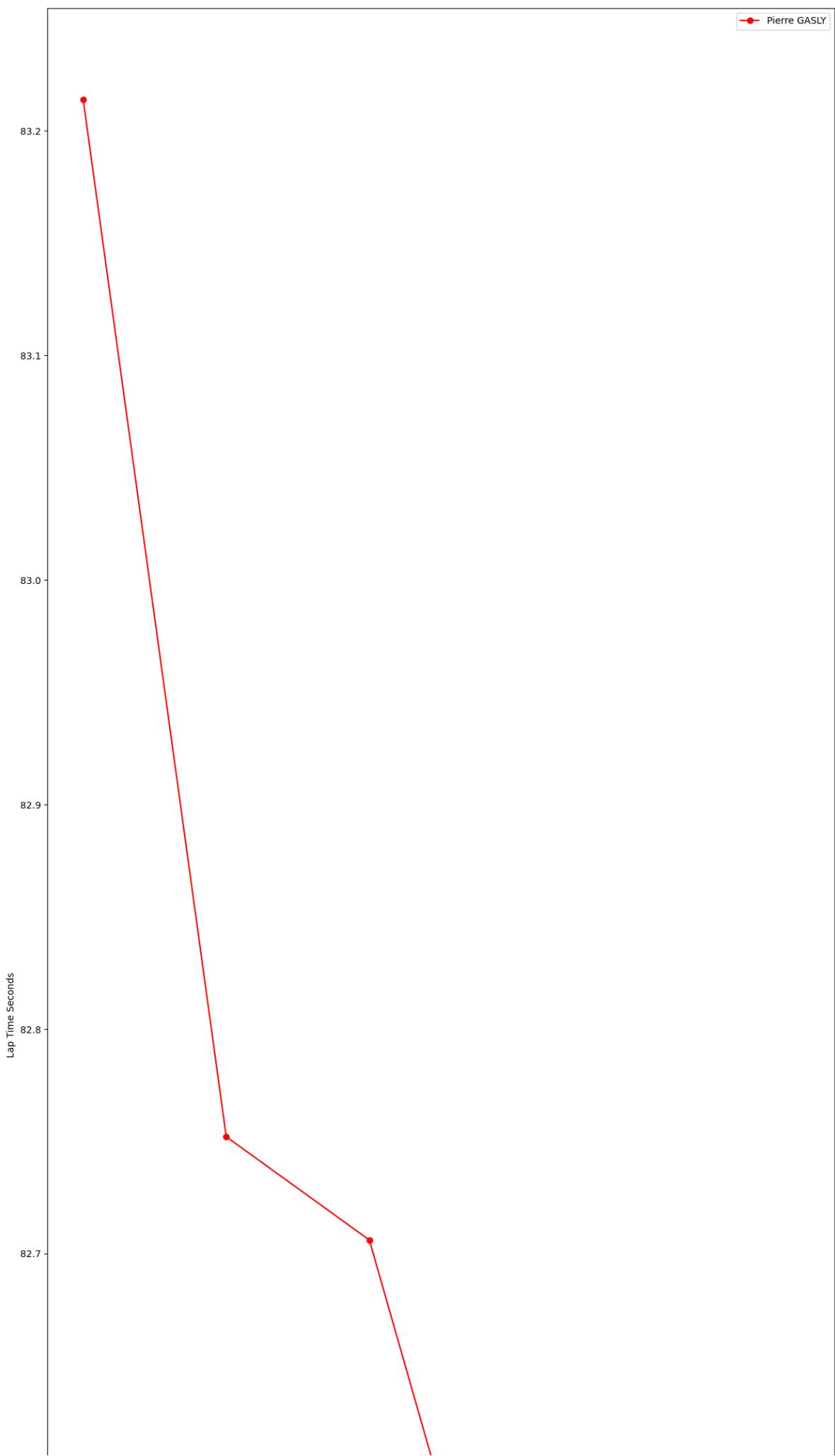


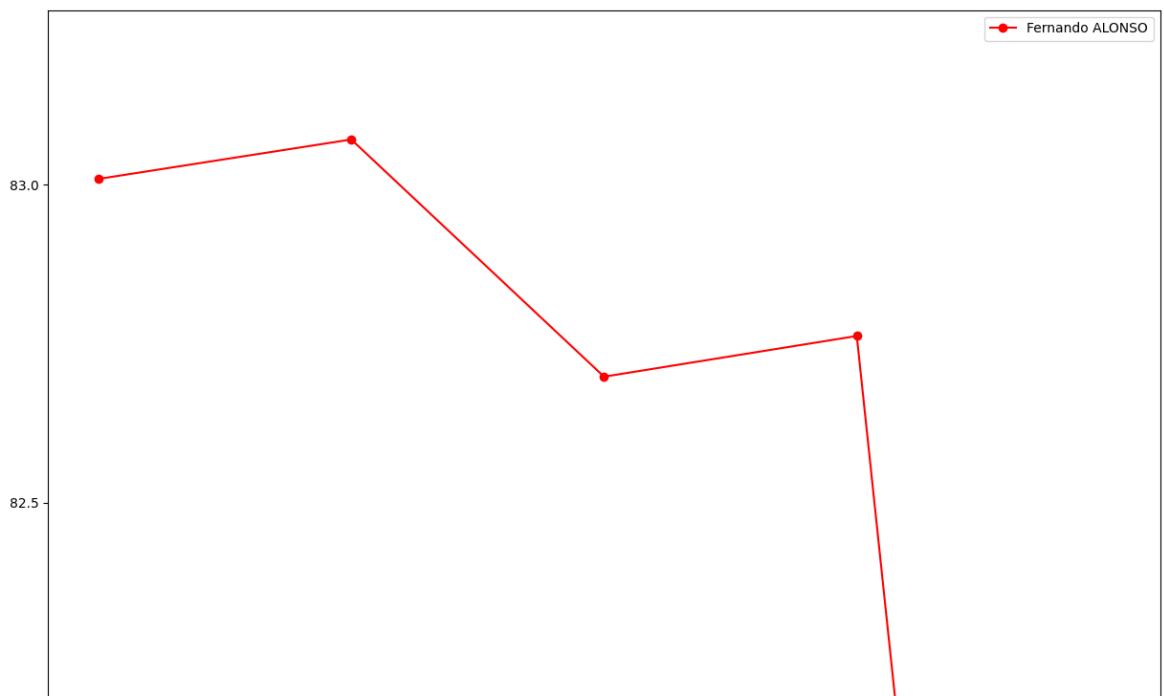
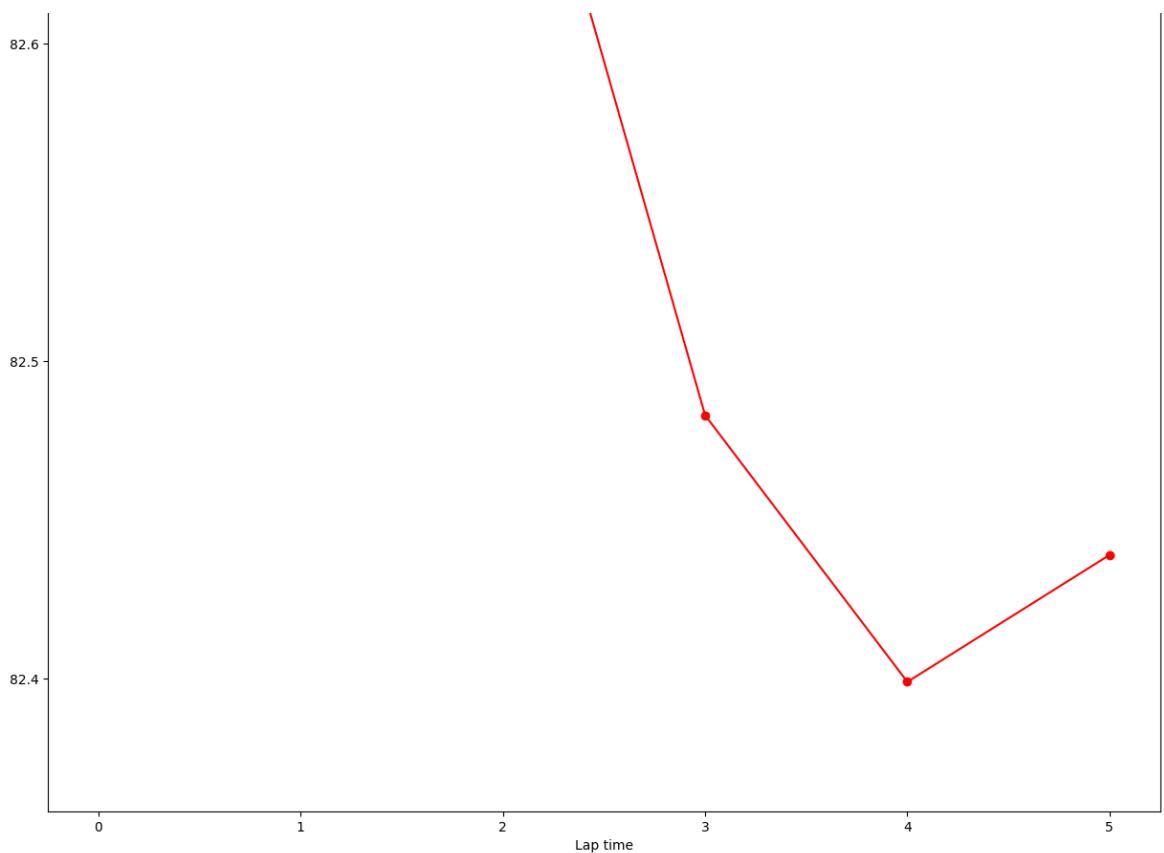


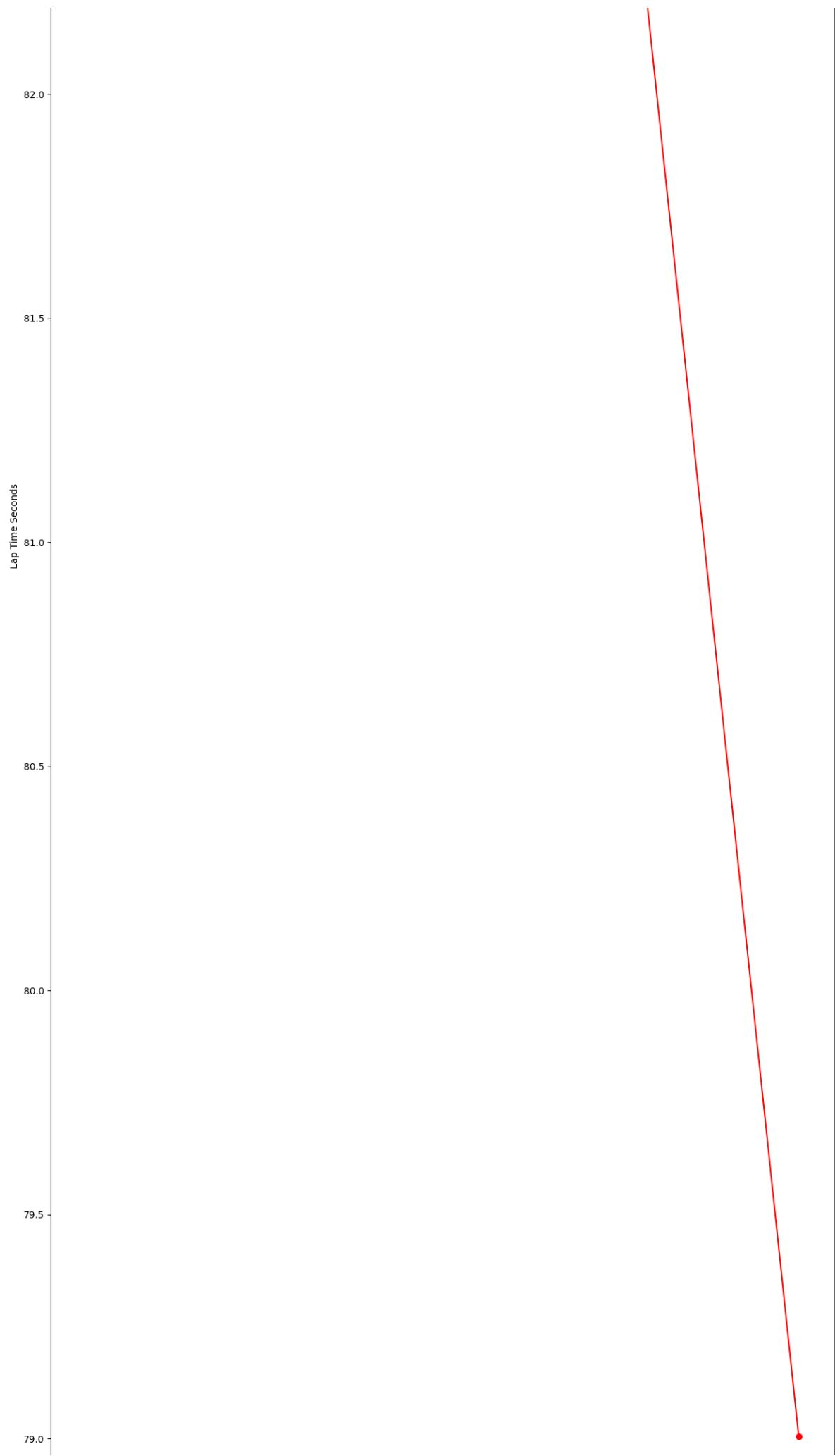
Soft tyres

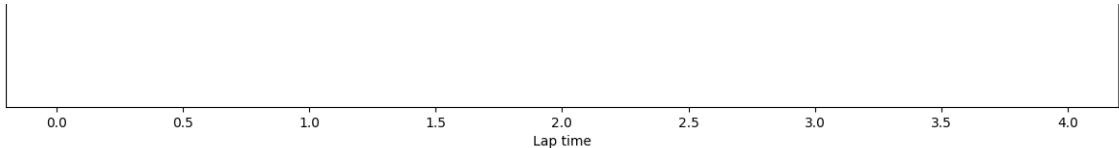
In [388]:

```
libraryDataF1.obtain_data_tyres(jointables, 'SOFT', 84)
```









Mean pace with the different compound used on the session

```
In [389...]: race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False and lap_index > 0").groupby("compound").mean())
race_pace
```

Out [389...]:

	lap_duration
compound	
HARD	81.829229
MEDIUM	81.940384
SOFT	82.412455

Race pace

General explanation Explanation per teams

```
In [390...]: race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False and lap_index > 0").groupby("team_name").mean())
race_pace
```

Out [390...]:

	lap_duration
team_name	
McLaren	81.010500
Ferrari	81.090873
Red Bull Racing	81.176500
Mercedes	81.179515
Aston Martin	82.087990
Williams	82.424093
RB	82.446000
Haas F1 Team	82.489935
Alpine	82.567371
Kick Sauber	82.658189

Mean race pace per sector

In this section, we can see the pace shown per each team in each sector sorted ascending.

Sector 1

General explanation

```
In [391...]: race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False and lap_index > 0").groupby(["team_name", "sector"]).mean())
race_pace
```

Out[391...]

duration_sector_1

team_name	duration_sector_1
McLaren	25.457990
Ferrari	25.651073
Mercedes	25.672168
Red Bull Racing	25.710367
Aston Martin	25.931660
Williams	25.990053
RB	26.041895
Haas F1 Team	26.069161
Alpine	26.082921
Kick Sauber	26.174263

Sector 2

General explanation

In [392...]

```
race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False and lap > 1"))
race_pace
```

Out[392...]

duration_sector_2

team_name	duration_sector_2
Red Bull Racing	28.224456
Mercedes	28.285614
Ferrari	28.320336
McLaren	28.353316
Aston Martin	28.573113
Alpine	28.738337
RB	28.746168
Haas F1 Team	28.782538
Williams	28.806933
Kick Sauber	28.821884

Sector 3

General explanation

In [393...]

```
race_pace = pd.DataFrame(jointables.query("is_pit_out_lap == False and lap > 2"))
race_pace
```

Out[393...]

duration_sector_3

team_name	duration_sector_3
Ferrari	27.119464

duration_sector_3	
team_name	
McLaren	27.199194
Mercedes	27.221733
Red Bull Racing	27.241678
Aston Martin	27.583216
Williams	27.627107
Haas F1 Team	27.638237
RB	27.657937

Comparaison beetween drivers

Red Bull Racing

```
In [394...]: race.query("driver_number== 1 and lap_duration <=84 and lap_duration>76")
```

```
Out[394...]: 80.87595
```



```
In [395...]: race.query("driver_number== 11 and lap_duration <=84 and lap_duration>76")
```

```
Out[395...]: 81.5776779661017
```

Ferrari

```
In [396...]: race.query("driver_number== 16 and lap_duration <=84 and lap_duration>76")
```

```
Out[396...]: 80.959316666666667
```



```
In [397...]: race.query("driver_number== 55 and lap_duration <=84 and lap_duration>76")
```

```
Out[397...]: 81.199166666666667
```

McLaren

```
In [398...]: race.query("driver_number== 4 and lap_duration <=84 and lap_duration>76")
```

```
Out[398...]: 80.856883333333334
```



```
In [399...]: race.query("driver_number== 81 and lap_duration <=84 and lap_duration>76")
```

```
Out[399...]: 81.069566666666669
```

Mercedes

```
In [400...]: race.query("driver_number== 44 and lap_duration <=84 and lap_duration>76")
```

```
Out[400...]: 81.3097966101695
```

```
In [401... race.query("driver_number== 63 and lap_duration <=84 and lap_duration>76")  
Out[401... 81.12074137931035
```

Aston Martin

```
In [402... race.query("driver_number== 14 and lap_duration <=84 and lap_duration>76")  
Out[402... 82.17292307692308
```

```
In [403... race.query("driver_number== 18 and lap_duration <=84 and lap_duration>76")  
Out[403... 82.06009999999999
```

Haas F1 Team

```
In [404... race.query("driver_number== 20 and lap_duration <=84 and lap_duration>76")  
Out[404... 82.4179649122807
```

```
In [405... race.query("driver_number== 27 and lap_duration <=84 and lap_duration>76")  
Out[405... 82.51615789473685
```

RB

```
In [406... race.query("driver_number== 3 and lap_duration <=84 and lap_duration>76")  
Out[406... 82.43470909090912
```

```
In [407... race.query("driver_number== 22 and lap_duration <=84 and lap_duration>76")  
Out[407... 82.38893103448275
```

Williams

```
In [408... race.query("driver_number== 2 and lap_duration <=84 and lap_duration>76")  
Out[408... 82.6789074074074
```

```
In [409... race.query("driver_number== 23 and lap_duration <=84 and lap_duration>76")  
Out[409... 81.9911463414634
```

Alpine

```
In [410... race.query("driver_number== 10 and lap_duration <=84 and lap_duration>76")  
Out[410... 82.4055
```

```
In [411... race.query("driver_number== 31 and lap_duration <=84 and lap_duration>76")  
Out[411... 82.70769642857142
```

Kick Sauber

```
In [412... race.query("driver_number== 24 and lap_duration <=84 and lap_duration>76")  
Out[412... 82.68153571428572
```

```
In [413... race.query("driver_number== 77 and lap_duration <=84 and lap_duration>76")  
Out[413... 82.67439215686275
```

Race pace

```
In [414... MINIMUM_SECONDS = 78  
MAXIMUM_SECONDS = 85
```

Red Bull Racing

```
In [415... stintInformation.query('driver_number == 1 or driver_number == 11')
```

```
Out[415... meeting_key session_key stint_number driver_number lap_start lap_end compound tyre  
10 1235 9515 1 1 1 24 MEDIUM  
17 1235 9515 1 11 1 37 HARD  
32 1235 9515 2 1 25 64 HARD  
42 1235 9515 2 11 38 64 MEDIUM
```

```
In [416... libraryDataF1.getinfolongruns(jointables,1,'Red Bull Racing',MINIMUM_SECONDS)
```

```
Out[416... full_name compound date_start lap_number duration_sector  
20 Max VERSTAPPEN MEDIUM 2024-05-19T13:04:39.907000+00:00 2 25.60  
40 Max VERSTAPPEN MEDIUM 2024-05-19T13:06:00.540000+00:00 3 25.74  
60 Max VERSTAPPEN MEDIUM 2024-05-19T13:07:21.413000+00:00 4 25.65  
80 Max VERSTAPPEN MEDIUM 2024-05-19T13:08:42.058000+00:00 5 25.60  
100 Max VERSTAPPEN MEDIUM 2024-05-19T13:10:02.807000+00:00 6 25.69  
120 Max VERSTAPPEN MEDIUM 2024-05-19T13:11:23.685000+00:00 7 25.73  
140 Max VERSTAPPEN MEDIUM 2024-05-19T13:12:44.566000+00:00 8 25.71
```

	full_name	compound	date_start	lap_number	duration_sector_
159	Max VERSTAPPEN	MEDIUM	2024-05-19T13:14:05.333000+00:00	9	25.62
176	Max VERSTAPPEN	MEDIUM	2024-05-19T13:15:25.870000+00:00	10	25.63
195	Max VERSTAPPEN	MEDIUM	2024-05-19T13:16:46.993000+00:00	11	25.70
215	Max VERSTAPPEN	MEDIUM	2024-05-19T13:18:07.866000+00:00	12	25.80
234	Max VERSTAPPEN	MEDIUM	2024-05-19T13:19:29.095000+00:00	13	25.69
253	Max VERSTAPPEN	MEDIUM	2024-05-19T13:20:50.190000+00:00	14	25.58
272	Max VERSTAPPEN	MEDIUM	2024-05-19T13:22:11.116000+00:00	15	25.74
292	Max VERSTAPPEN	MEDIUM	2024-05-19T13:23:32.505000+00:00	16	25.73
312	Max VERSTAPPEN	MEDIUM	2024-05-19T13:24:53.891000+00:00	17	25.73
332	Max VERSTAPPEN	MEDIUM	2024-05-19T13:26:15.105000+00:00	18	25.76
352	Max VERSTAPPEN	MEDIUM	2024-05-19T13:27:36.586000+00:00	19	25.82
372	Max VERSTAPPEN	MEDIUM	2024-05-19T13:28:58.124000+00:00	20	25.73
392	Max VERSTAPPEN	MEDIUM	2024-05-19T13:30:19.572000+00:00	21	25.88
412	Max VERSTAPPEN	MEDIUM	2024-05-19T13:31:41.223000+00:00	22	25.80
431	Max VERSTAPPEN	MEDIUM	2024-05-19T13:33:02.987000+00:00	23	25.77
487	Max VERSTAPPEN	HARD	2024-05-19T13:37:34.852000+00:00	26	25.44
505	Max VERSTAPPEN	HARD	2024-05-19T13:38:55.304000+00:00	27	25.56
525	Max VERSTAPPEN	HARD	2024-05-19T13:40:16.294000+00:00	28	25.59
543	Max VERSTAPPEN	HARD	2024-05-19T13:41:36.878000+00:00	29	25.52
562	Max VERSTAPPEN	HARD	2024-05-19T13:42:57.527000+00:00	30	25.52
582	Max VERSTAPPEN	HARD	2024-05-19T13:44:18.121000+00:00	31	25.42
601	Max VERSTAPPEN	HARD	2024-05-19T13:45:38.670000+00:00	32	25.45
620	Max VERSTAPPEN	HARD	2024-05-19T13:46:59.474000+00:00	33	25.78
640	Max VERSTAPPEN	HARD	2024-05-19T13:48:20.557000+00:00	34	25.49
659	Max VERSTAPPEN	HARD	2024-05-19T13:49:41.307000+00:00	35	25.53

	full_name	compound		date_start	lap_number	duration_sector_
679	Max VERSTAPPEN	HARD	2024-05-19T13:51:02.170000+00:00	36		25.50
699	Max VERSTAPPEN	HARD	2024-05-19T13:52:22.755000+00:00	37		25.38
719	Max VERSTAPPEN	HARD	2024-05-19T13:53:43.298000+00:00	38		25.30
736	Max VERSTAPPEN	HARD	2024-05-19T13:55:03.590000+00:00	39		25.55
756	Max VERSTAPPEN	HARD	2024-05-19T13:56:24.256000+00:00	40		25.47
776	Max VERSTAPPEN	HARD	2024-05-19T13:57:44.843000+00:00	41		25.48
795	Max VERSTAPPEN	HARD	2024-05-19T13:59:05.475000+00:00	42		25.65
815	Max VERSTAPPEN	HARD	2024-05-19T14:00:26.374000+00:00	43		25.58
835	Max VERSTAPPEN	HARD	2024-05-19T14:01:47.075000+00:00	44		25.44
855	Max VERSTAPPEN	HARD	2024-05-19T14:03:07.929000+00:00	45		25.62
875	Max VERSTAPPEN	HARD	2024-05-19T14:04:29.367000+00:00	46		25.32
895	Max VERSTAPPEN	HARD	2024-05-19T14:05:50.075000+00:00	47		25.65
915	Max VERSTAPPEN	HARD	2024-05-19T14:07:10.921000+00:00	48		25.61
935	Max VERSTAPPEN	HARD	2024-05-19T14:08:31.932000+00:00	49		25.52
955	Max VERSTAPPEN	HARD	2024-05-19T14:09:52.661000+00:00	50		25.45
975	Max VERSTAPPEN	HARD	2024-05-19T14:11:13.456000+00:00	51		25.54
995	Max VERSTAPPEN	HARD	2024-05-19T14:12:34.172000+00:00	52		25.53
1014	Max VERSTAPPEN	HARD	2024-05-19T14:13:54.756000+00:00	53		25.39
1032	Max VERSTAPPEN	HARD	2024-05-19T14:15:15.482000+00:00	54		25.42
1051	Max VERSTAPPEN	HARD	2024-05-19T14:16:36.303000+00:00	55		25.67
1070	Max VERSTAPPEN	HARD	2024-05-19T14:17:57.260000+00:00	56		25.43
1089	Max VERSTAPPEN	HARD	2024-05-19T14:19:17.762000+00:00	57		25.47
1108	Max VERSTAPPEN	HARD	2024-05-19T14:20:38.338000+00:00	58		25.43
1127	Max VERSTAPPEN	HARD	2024-05-19T14:21:58.784000+00:00	59		25.46
1146	Max VERSTAPPEN	HARD	2024-05-19T14:23:19.156000+00:00	60		25.54

	full_name	compound		date_start	lap_number	duration_sector_1
1164	Max VERSTAPPEN	HARD	2024-05-19T14:24:39.743000+00:00		61	25.45
In [417...]: libraryDataF1.getinfolongruns(jointables, 11, 'Red Bull Racing', MINIMUM_SECTOR_1)						
Out[417...]:	full_name	compound		date_start	lap_number	duration_sector_1
25	Sergio PEREZ	HARD	2024-05-19T13:04:45.876000+00:00		2	26.366
45	Sergio PEREZ	HARD	2024-05-19T13:06:08.460000+00:00		3	25.783
65	Sergio PEREZ	HARD	2024-05-19T13:07:30.294000+00:00		4	25.775
85	Sergio PEREZ	HARD	2024-05-19T13:08:52.546000+00:00		5	25.946
105	Sergio PEREZ	HARD	2024-05-19T13:10:14.653000+00:00		6	25.834
125	Sergio PEREZ	HARD	2024-05-19T13:11:36.924000+00:00		7	25.952
145	Sergio PEREZ	HARD	2024-05-19T13:12:59.426000+00:00		8	25.824
163	Sergio PEREZ	HARD	2024-05-19T13:14:21.749000+00:00		9	26.090
181	Sergio PEREZ	HARD	2024-05-19T13:15:44.440000+00:00		10	25.988
200	Sergio PEREZ	HARD	2024-05-19T13:17:06.900000+00:00		11	26.049
219	Sergio PEREZ	HARD	2024-05-19T13:18:29.085000+00:00		12	26.040
239	Sergio PEREZ	HARD	2024-05-19T13:19:51.513000+00:00		13	26.216
258	Sergio PEREZ	HARD	2024-05-19T13:21:13.820000+00:00		14	26.006
277	Sergio PEREZ	HARD	2024-05-19T13:22:35.699000+00:00		15	25.902
297	Sergio PEREZ	HARD	2024-05-19T13:23:57.403000+00:00		16	25.907
337	Sergio PEREZ	HARD	2024-05-19T13:26:46.014000+00:00		18	26.278
357	Sergio PEREZ	HARD	2024-05-19T13:28:08.599000+00:00		19	25.934
377	Sergio PEREZ	HARD	2024-05-19T13:29:30.321000+00:00		20	26.020
397	Sergio PEREZ	HARD	2024-05-19T13:30:52.658000+00:00		21	26.030
417	Sergio PEREZ	HARD	2024-05-19T13:32:14.484000+00:00		22	25.918
435	Sergio PEREZ	HARD	2024-05-19T13:33:36.393000+00:00		23	26.001

	full_name	compound	date_start	lap_number	duration_sector_1	sector_1_mph
455	Sergio PEREZ	HARD	2024-05-19T13:34:58.723000+00:00	24	26.427	59.000
472	Sergio PEREZ	HARD	2024-05-19T13:36:21.073000+00:00	25	25.919	59.000
492	Sergio PEREZ	HARD	2024-05-19T13:37:43.288000+00:00	26	25.904	59.000
510	Sergio PEREZ	HARD	2024-05-19T13:39:05.634000+00:00	27	27.142	57.000
530	Sergio PEREZ	HARD	2024-05-19T13:40:29.425000+00:00	28	25.983	59.000
548	Sergio PEREZ	HARD	2024-05-19T13:41:51.570000+00:00	29	25.976	59.000
567	Sergio PEREZ	HARD	2024-05-19T13:43:14.021000+00:00	30	26.782	57.000
586	Sergio PEREZ	HARD	2024-05-19T13:44:37.264000+00:00	31	26.888	57.000
605	Sergio PEREZ	HARD	2024-05-19T13:46:00.999000+00:00	32	25.998	59.000
625	Sergio PEREZ	HARD	2024-05-19T13:47:23.214000+00:00	33	26.011	57.000
645	Sergio PEREZ	HARD	2024-05-19T13:48:45.480000+00:00	34	25.997	59.000
664	Sergio PEREZ	HARD	2024-05-19T13:50:07.978000+00:00	35	25.964	59.000
684	Sergio PEREZ	HARD	2024-05-19T13:51:30.409000+00:00	36	26.690	57.000
741	Sergio PEREZ	MEDIUM	2024-05-19T13:56:04.813000+00:00	39	25.393	59.000
761	Sergio PEREZ	MEDIUM	2024-05-19T13:57:25.553000+00:00	40	25.215	59.000
781	Sergio PEREZ	MEDIUM	2024-05-19T13:58:45.780000+00:00	41	25.982	59.000
800	Sergio PEREZ	MEDIUM	2024-05-19T14:00:07.879000+00:00	42	25.177	59.000
820	Sergio PEREZ	MEDIUM	2024-05-19T14:01:27.640000+00:00	43	25.547	59.000
840	Sergio PEREZ	MEDIUM	2024-05-19T14:02:48.004000+00:00	44	25.592	59.000
860	Sergio PEREZ	MEDIUM	2024-05-19T14:04:08.530000+00:00	45	25.587	59.000
880	Sergio PEREZ	MEDIUM	2024-05-19T14:05:29.103000+00:00	46	25.633	59.000
900	Sergio PEREZ	MEDIUM	2024-05-19T14:06:49.855000+00:00	47	25.676	59.000
920	Sergio PEREZ	MEDIUM	2024-05-19T14:08:10.383000+00:00	48	25.448	59.000
940	Sergio PEREZ	MEDIUM	2024-05-19T14:09:30.572000+00:00	49	25.500	59.000
960	Sergio PEREZ	MEDIUM	2024-05-19T14:10:50.537000+00:00	50	25.389	59.000

	full_name	compound	date_start	lap_number	duration_sector_1	tyre
980	Sergio PEREZ	MEDIUM	2024-05-19T14:12:10.455000+00:00	51	25.631	
1000	Sergio PEREZ	MEDIUM	2024-05-19T14:13:31.582000+00:00	52	25.282	
1019	Sergio PEREZ	MEDIUM	2024-05-19T14:14:51.440000+00:00	53	25.813	
1037	Sergio PEREZ	MEDIUM	2024-05-19T14:16:12.403000+00:00	54	25.567	
1056	Sergio PEREZ	MEDIUM	2024-05-19T14:17:32.741000+00:00	55	25.673	
1075	Sergio PEREZ	MEDIUM	2024-05-19T14:18:53.204000+00:00	56	25.440	
1094	Sergio PEREZ	MEDIUM	2024-05-19T14:20:13.586000+00:00	57	25.438	
1113	Sergio PEREZ	MEDIUM	2024-05-19T14:21:33.834000+00:00	58	25.451	
1132	Sergio PEREZ	MEDIUM	2024-05-19T14:22:53.973000+00:00	59	25.360	
1151	Sergio PEREZ	MEDIUM	2024-05-19T14:24:14.116000+00:00	60	25.485	
1169	Sergio PEREZ	MEDIUM	2024-05-19T14:25:34.526000+00:00	61	25.675	

Ferrari

In [418...]

```
stintInformation.query('driver_number == 16 or driver_number == 55')
```

Out[418...]

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
11	1235	9515	1	16	1	25	MEDIUM	
14	1235	9515	1	55	1	27	MEDIUM	
34	1235	9515	2	16	26	64	HARD	
36	1235	9515	2	55	28	64	HARD	

In [419...]

```
libraryDataF1.getinfolongruns(jointables, 16, 'Ferrari', MINIMUM_SECONDS, MAXIMUM_SECONDS)
```

Out[419...]

	full_name	compound	date_start	lap_number	duration_sector_1	tyre
27	Charles LECLERC	MEDIUM	2024-05-19T13:04:41.695000+00:00	2	25.685	
47	Charles LECLERC	MEDIUM	2024-05-19T13:06:02.526000+00:00	3	25.573	
67	Charles LECLERC	MEDIUM	2024-05-19T13:07:23.419000+00:00	4	25.797	
87	Charles LECLERC	MEDIUM	2024-05-19T13:08:44.793000+00:00	5	25.717	
107	Charles LECLERC	MEDIUM	2024-05-19T13:10:05.820000+00:00	6	25.770	
127	Charles LECLERC	MEDIUM	2024-05-19T13:11:26.879000+00:00	7	25.716	

	full_name	compound	date_start	lap_number	duration_sector_1	sector_1
146	Charles LECLERC	MEDIUM	2024-05-19T13:12:47.905000+00:00	8	25.710	1
165	Charles LECLERC	MEDIUM	2024-05-19T13:14:08.991000+00:00	9	25.758	2
183	Charles LECLERC	MEDIUM	2024-05-19T13:15:30.351000+00:00	10	25.692	3
202	Charles LECLERC	MEDIUM	2024-05-19T13:16:51.656000+00:00	11	25.707	4
221	Charles LECLERC	MEDIUM	2024-05-19T13:18:12.803000+00:00	12	25.746	5
241	Charles LECLERC	MEDIUM	2024-05-19T13:19:34.137000+00:00	13	25.803	6
260	Charles LECLERC	MEDIUM	2024-05-19T13:20:55.591000+00:00	14	25.821	7
279	Charles LECLERC	MEDIUM	2024-05-19T13:22:17.167000+00:00	15	25.827	8
299	Charles LECLERC	MEDIUM	2024-05-19T13:23:38.790000+00:00	16	25.796	9
319	Charles LECLERC	MEDIUM	2024-05-19T13:25:00.643000+00:00	17	25.807	10
339	Charles LECLERC	MEDIUM	2024-05-19T13:26:22.398000+00:00	18	25.807	11
359	Charles LECLERC	MEDIUM	2024-05-19T13:27:44.093000+00:00	19	25.867	12
379	Charles LECLERC	MEDIUM	2024-05-19T13:29:05.777000+00:00	20	25.794	13
399	Charles LECLERC	MEDIUM	2024-05-19T13:30:27.698000+00:00	21	25.857	14
419	Charles LECLERC	MEDIUM	2024-05-19T13:31:49.179000+00:00	22	25.880	15
437	Charles LECLERC	MEDIUM	2024-05-19T13:33:11.201000+00:00	23	26.057	16
457	Charles LECLERC	MEDIUM	2024-05-19T13:34:33.221000+00:00	24	25.792	17
512	Charles LECLERC	HARD	2024-05-19T13:39:05.832000+00:00	27	25.221	18
532	Charles LECLERC	HARD	2024-05-19T13:40:25.733000+00:00	28	25.853	19
550	Charles LECLERC	HARD	2024-05-19T13:41:46.551000+00:00	29	25.598	20
569	Charles LECLERC	HARD	2024-05-19T13:43:07.148000+00:00	30	25.590	21
588	Charles LECLERC	HARD	2024-05-19T13:44:27.560000+00:00	31	25.705	22
607	Charles LECLERC	HARD	2024-05-19T13:45:48.563000+00:00	32	25.649	23
627	Charles LECLERC	HARD	2024-05-19T13:47:09.176000+00:00	33	25.646	24
647	Charles LECLERC	HARD	2024-05-19T13:48:29.744000+00:00	34	25.619	25

full_name	compound		date_start	lap_number	duration_sector_1
666 Charles LECLERC	HARD	2024-05-19T13:49:50.466000+00:00	35	25.666	
686 Charles LECLERC	HARD	2024-05-19T13:51:11.331000+00:00	36	25.563	
706 Charles LECLERC	HARD	2024-05-19T13:52:31.875000+00:00	37	25.378	
725 Charles LECLERC	HARD	2024-05-19T13:53:52.186000+00:00	38	25.351	
743 Charles LECLERC	HARD	2024-05-19T13:55:12.430000+00:00	39	25.483	
763 Charles LECLERC	HARD	2024-05-19T13:56:32.973000+00:00	40	25.464	
782 Charles LECLERC	HARD	2024-05-19T13:57:53.534000+00:00	41	25.484	
802 Charles LECLERC	HARD	2024-05-19T13:59:14.574000+00:00	42	25.149	
822 Charles LECLERC	HARD	2024-05-19T14:00:34.680000+00:00	43	25.404	
842 Charles LECLERC	HARD	2024-05-19T14:01:55.614000+00:00	44	25.218	
862 Charles LECLERC	HARD	2024-05-19T14:03:16.439000+00:00	45	25.276	
882 Charles LECLERC	HARD	2024-05-19T14:04:36.737000+00:00	46	25.252	
902 Charles LECLERC	HARD	2024-05-19T14:05:57.459000+00:00	47	25.256	
922 Charles LECLERC	HARD	2024-05-19T14:07:18.745000+00:00	48	25.890	
942 Charles LECLERC	HARD	2024-05-19T14:08:40.465000+00:00	49	25.538	
962 Charles LECLERC	HARD	2024-05-19T14:10:01.076000+00:00	50	25.529	
982 Charles LECLERC	HARD	2024-05-19T14:11:21.411000+00:00	51	25.492	
1002 Charles LECLERC	HARD	2024-05-19T14:12:41.771000+00:00	52	25.427	
1021 Charles LECLERC	HARD	2024-05-19T14:14:02.204000+00:00	53	25.526	
1039 Charles LECLERC	HARD	2024-05-19T14:15:23.072000+00:00	54	25.112	
1058 Charles LECLERC	HARD	2024-05-19T14:16:43.491000+00:00	55	25.635	
1077 Charles LECLERC	HARD	2024-05-19T14:18:04.012000+00:00	56	25.393	
1096 Charles LECLERC	HARD	2024-05-19T14:19:24.465000+00:00	57	25.591	
1115 Charles LECLERC	HARD	2024-05-19T14:20:45.288000+00:00	58	25.584	
1134 Charles LECLERC	HARD	2024-05-19T14:22:05.822000+00:00	59	25.505	

	full_name	compound	date_start	lap_number	duration_sector_1	duration_lap
1152	Charles LECLERC	HARD	2024-05-19T14:23:26.265000+00:00	60	25.513	25.513
1171	Charles LECLERC	HARD	2024-05-19T14:24:47.049000+00:00	61	25.603	25.603
	Charles LECLERC	MEDIUM	2024-05-19T14:25:09.250000+00:00	62	25.603	25.603
In [420...]	libraryDataF1.getinfolongruns(jointables,55,'Ferrari',MINIMUM_SECONDS,MAXIMUM_SECONDS)					
Out[420...]	full_name	compound	date_start	lap_number	duration_sector_1	duration_lap
36	Carlos SAINZ	MEDIUM	2024-05-19T13:04:42.124000+00:00	2	25.799	25.799
56	Carlos SAINZ	MEDIUM	2024-05-19T13:06:03.268000+00:00	3	25.426	25.426
76	Carlos SAINZ	MEDIUM	2024-05-19T13:07:24.286000+00:00	4	25.575	25.575
96	Carlos SAINZ	MEDIUM	2024-05-19T13:08:45.622000+00:00	5	25.581	25.581
116	Carlos SAINZ	MEDIUM	2024-05-19T13:10:06.834000+00:00	6	25.608	25.608
136	Carlos SAINZ	MEDIUM	2024-05-19T13:11:28.086000+00:00	7	25.720	25.720
155	Carlos SAINZ	MEDIUM	2024-05-19T13:12:49.289000+00:00	8	25.902	25.902
173	Carlos SAINZ	MEDIUM	2024-05-19T13:14:10.675000+00:00	9	25.757	25.757
191	Carlos SAINZ	MEDIUM	2024-05-19T13:15:32.193000+00:00	10	25.842	25.842
211	Carlos SAINZ	MEDIUM	2024-05-19T13:16:53.748000+00:00	11	25.753	25.753
230	Carlos SAINZ	MEDIUM	2024-05-19T13:18:15.177000+00:00	12	25.962	25.962
249	Carlos SAINZ	MEDIUM	2024-05-19T13:19:36.934000+00:00	13	25.908	25.908
268	Carlos SAINZ	MEDIUM	2024-05-19T13:20:58.732000+00:00	14	25.746	25.746
288	Carlos SAINZ	MEDIUM	2024-05-19T13:22:20.428000+00:00	15	25.825	25.825
308	Carlos SAINZ	MEDIUM	2024-05-19T13:23:42.063000+00:00	16	25.755	25.755
328	Carlos SAINZ	MEDIUM	2024-05-19T13:25:03.642000+00:00	17	25.919	25.919
348	Carlos SAINZ	MEDIUM	2024-05-19T13:26:25.870000+00:00	18	25.892	25.892
368	Carlos SAINZ	MEDIUM	2024-05-19T13:27:47.595000+00:00	19	25.943	25.943
388	Carlos SAINZ	MEDIUM	2024-05-19T13:29:09.718000+00:00	20	25.948	25.948
408	Carlos SAINZ	MEDIUM	2024-05-19T13:30:31.758000+00:00	21	25.989	25.989

	full_name	compound	date_start	lap_number	duration_sector_1	sector_1_mph
428	Carlos SAINZ	MEDIUM	2024-05-19T13:31:53.763000+00:00	22	25.842	56.70
446	Carlos SAINZ	MEDIUM	2024-05-19T13:33:15.688000+00:00	23	25.812	56.70
465	Carlos SAINZ	MEDIUM	2024-05-19T13:34:37.369000+00:00	24	25.847	56.70
483	Carlos SAINZ	MEDIUM	2024-05-19T13:35:59.174000+00:00	25	25.683	56.70
501	Carlos SAINZ	MEDIUM	2024-05-19T13:37:20.598000+00:00	26	25.685	56.70
558	Carlos SAINZ	HARD	2024-05-19T13:41:52.785000+00:00	29	25.625	56.70
578	Carlos SAINZ	HARD	2024-05-19T13:43:14.400000+00:00	30	25.592	56.70
597	Carlos SAINZ	HARD	2024-05-19T13:44:34.922000+00:00	31	25.536	56.70
616	Carlos SAINZ	HARD	2024-05-19T13:45:55.602000+00:00	32	25.582	56.70
636	Carlos SAINZ	HARD	2024-05-19T13:47:16.372000+00:00	33	25.664	56.70
655	Carlos SAINZ	HARD	2024-05-19T13:48:36.991000+00:00	34	25.813	56.70
675	Carlos SAINZ	HARD	2024-05-19T13:49:57.895000+00:00	35	25.599	56.70
695	Carlos SAINZ	HARD	2024-05-19T13:51:18.553000+00:00	36	25.587	56.70
715	Carlos SAINZ	HARD	2024-05-19T13:52:39.426000+00:00	37	25.463	56.70
732	Carlos SAINZ	HARD	2024-05-19T13:53:59.888000+00:00	38	25.430	56.70
752	Carlos SAINZ	HARD	2024-05-19T13:55:20.400000+00:00	39	25.623	56.70
772	Carlos SAINZ	HARD	2024-05-19T13:56:40.985000+00:00	40	25.478	56.70
791	Carlos SAINZ	HARD	2024-05-19T13:58:01.352000+00:00	41	25.452	56.70
811	Carlos SAINZ	HARD	2024-05-19T13:59:22.070000+00:00	42	25.415	56.70
831	Carlos SAINZ	HARD	2024-05-19T14:00:42.800000+00:00	43	25.498	56.70
851	Carlos SAINZ	HARD	2024-05-19T14:02:03.462000+00:00	44	25.409	56.70
871	Carlos SAINZ	HARD	2024-05-19T14:03:24.457000+00:00	45	25.883	56.70
891	Carlos SAINZ	HARD	2024-05-19T14:04:45.782000+00:00	46	25.563	56.70
911	Carlos SAINZ	HARD	2024-05-19T14:06:06.853000+00:00	47	26.583	56.70
931	Carlos SAINZ	HARD	2024-05-19T14:07:28.832000+00:00	48	25.668	56.70

	full_name	compound		date_start	lap_number	duration_sector_1	...
951	Carlos SAINZ	HARD		2024-05-19T14:08:49.893000+00:00	49	25.518	
971	Carlos SAINZ	HARD		2024-05-19T14:10:10.577000+00:00	50	25.561	
991	Carlos SAINZ	HARD		2024-05-19T14:11:31.594000+00:00	51	25.751	
1010	Carlos SAINZ	HARD		2024-05-19T14:12:53.396000+00:00	52	25.625	
1029	Carlos SAINZ	HARD		2024-05-19T14:14:15.066000+00:00	53	25.797	
1047	Carlos SAINZ	HARD		2024-05-19T14:15:36.230000+00:00	54	25.623	
1066	Carlos SAINZ	HARD		2024-05-19T14:16:56.974000+00:00	55	25.602	
1085	Carlos SAINZ	HARD		2024-05-19T14:18:17.734000+00:00	56	25.537	
1104	Carlos SAINZ	HARD		2024-05-19T14:19:38.732000+00:00	57	25.590	
1123	Carlos SAINZ	HARD		2024-05-19T14:20:59.544000+00:00	58	25.530	
1142	Carlos SAINZ	HARD		2024-05-19T14:22:20.340000+00:00	59	25.603	
1160	Carlos SAINZ	HARD		2024-05-19T14:23:41.059000+00:00	60	25.567	
1179	Carlos SAINZ	HARD		2024-05-19T14:25:02.104000+00:00	61	25.653	
	Carlos SAINZ	MEDIUM		2024-05-19T14:26:23.140000+00:00	62	25.620	

Mercedes

```
In [421]: stintInformation.query('driver number == 44 or driver number == 63')
```

Out[421...]	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
	7	1235	9515	1	63	1	21	MEDIUM
	13	1235	9515	1	44	1	27	MEDIUM
	28	1235	9515	2	63	22	52	HARD
	35	1235	9515	2	44	28	64	HARD
	45	1235	9515	3	63	53	64	MEDIUM

```
In [422]: libraryDataF1.getinfolongruns(jointables, 44, 'Mercedes', MINIMUM_SECONDS, MAX)
```

full_name	compound	date_start	lap_number	duration_sector_1
35 Lewis HAMILTON	MEDIUM	2024-05-19T13:04:44.162000+00:00	2	25.975
55 Lewis HAMILTON	MEDIUM	2024-05-19T13:06:05.998000+00:00	3	25.398

	full_name	compound	date_start	lap_number	duration_sector_1
75	Lewis HAMILTON	MEDIUM	2024-05-19T13:07:27.168000+00:00	4	25.826
95	Lewis HAMILTON	MEDIUM	2024-05-19T13:08:48.824000+00:00	5	25.532
115	Lewis HAMILTON	MEDIUM	2024-05-19T13:10:10.351000+00:00	6	25.783
135	Lewis HAMILTON	MEDIUM	2024-05-19T13:11:32.106000+00:00	7	25.820
154	Lewis HAMILTON	MEDIUM	2024-05-19T13:12:53.397000+00:00	8	25.803
172	Lewis HAMILTON	MEDIUM	2024-05-19T13:14:15.061000+00:00	9	25.861
190	Lewis HAMILTON	MEDIUM	2024-05-19T13:15:36.538000+00:00	10	25.769
210	Lewis HAMILTON	MEDIUM	2024-05-19T13:16:58.159000+00:00	11	25.435
229	Lewis HAMILTON	MEDIUM	2024-05-19T13:18:19.518000+00:00	12	25.880
248	Lewis HAMILTON	MEDIUM	2024-05-19T13:19:41.374000+00:00	13	25.890
267	Lewis HAMILTON	MEDIUM	2024-05-19T13:21:03.187000+00:00	14	25.910
287	Lewis HAMILTON	MEDIUM	2024-05-19T13:22:25.082000+00:00	15	25.736
307	Lewis HAMILTON	MEDIUM	2024-05-19T13:23:46.905000+00:00	16	25.837
327	Lewis HAMILTON	MEDIUM	2024-05-19T13:25:09.155000+00:00	17	25.745
347	Lewis HAMILTON	MEDIUM	2024-05-19T13:26:30.945000+00:00	18	25.940
367	Lewis HAMILTON	MEDIUM	2024-05-19T13:27:53.061000+00:00	19	25.799
387	Lewis HAMILTON	MEDIUM	2024-05-19T13:29:14.989000+00:00	20	25.837
407	Lewis HAMILTON	MEDIUM	2024-05-19T13:30:37.188000+00:00	21	25.983
427	Lewis HAMILTON	MEDIUM	2024-05-19T13:31:59.425000+00:00	22	25.746
445	Lewis HAMILTON	MEDIUM	2024-05-19T13:33:21.305000+00:00	23	25.730
464	Lewis HAMILTON	MEDIUM	2024-05-19T13:34:42.857000+00:00	24	25.735
482	Lewis HAMILTON	MEDIUM	2024-05-19T13:36:05.140000+00:00	25	25.732
557	Lewis HAMILTON	HARD	2024-05-19T13:42:02.618000+00:00	29	25.505
577	Lewis HAMILTON	HARD	2024-05-19T13:43:23.257000+00:00	30	25.537
596	Lewis HAMILTON	HARD	2024-05-19T13:44:43.863000+00:00	31	25.692

	full_name	compound		date_start	lap_number	duration_sector_1
615	Lewis HAMILTON	HARD	2024-05-19T13:46:05.599000+00:00		32	25.670
635	Lewis HAMILTON	HARD	2024-05-19T13:47:26.737000+00:00		33	25.705
654	Lewis HAMILTON	HARD	2024-05-19T13:48:47.658000+00:00		34	25.570
674	Lewis HAMILTON	HARD	2024-05-19T13:50:08.728000+00:00		35	25.728
694	Lewis HAMILTON	HARD	2024-05-19T13:51:30.921000+00:00		36	26.525
714	Lewis HAMILTON	HARD	2024-05-19T13:52:53.890000+00:00		37	25.191
731	Lewis HAMILTON	HARD	2024-05-19T13:54:14.589000+00:00		38	25.560
751	Lewis HAMILTON	HARD	2024-05-19T13:55:35.205000+00:00		39	25.642
771	Lewis HAMILTON	HARD	2024-05-19T13:56:55.920000+00:00		40	25.587
790	Lewis HAMILTON	HARD	2024-05-19T13:58:16.735000+00:00		41	25.484
810	Lewis HAMILTON	HARD	2024-05-19T13:59:37.340000+00:00		42	25.547
830	Lewis HAMILTON	HARD	2024-05-19T14:00:57.800000+00:00		43	25.443
850	Lewis HAMILTON	HARD	2024-05-19T14:02:18.083000+00:00		44	25.507
870	Lewis HAMILTON	HARD	2024-05-19T14:03:38.922000+00:00		45	25.454
890	Lewis HAMILTON	HARD	2024-05-19T14:04:59.489000+00:00		46	25.593
910	Lewis HAMILTON	HARD	2024-05-19T14:06:20.504000+00:00		47	25.578
930	Lewis HAMILTON	HARD	2024-05-19T14:07:41.625000+00:00		48	25.556
950	Lewis HAMILTON	HARD	2024-05-19T14:09:02.471000+00:00		49	25.576
970	Lewis HAMILTON	HARD	2024-05-19T14:10:23.665000+00:00		50	25.379
990	Lewis HAMILTON	HARD	2024-05-19T14:11:44.283000+00:00		51	25.481
1009	Lewis HAMILTON	HARD	2024-05-19T14:13:05.107000+00:00		52	25.580
1028	Lewis HAMILTON	HARD	2024-05-19T14:14:26.345000+00:00		53	25.781
1046	Lewis HAMILTON	HARD	2024-05-19T14:15:47.785000+00:00		54	25.607
1065	Lewis HAMILTON	HARD	2024-05-19T14:17:08.586000+00:00		55	25.617
1084	Lewis HAMILTON	HARD	2024-05-19T14:18:29.628000+00:00		56	25.576

	full_name	compound	date_start	lap_number	duration_sector_1
1103	Lewis HAMILTON	HARD	2024-05-19T14:19:50.862000+00:00	57	25.560
1122	Lewis HAMILTON	HARD	2024-05-19T14:21:12.554000+00:00	58	25.581
1141	Lewis HAMILTON	HARD	2024-05-19T14:22:34.186000+00:00	59	25.552
1159	Lewis HAMILTON	HARD	2024-05-19T14:23:54.682000+00:00	60	25.539

I think

In [423...]

```
libraryDataF1.getinfolongruns(jointables,63,'Mercedes',MINIMUM_SECONDS,MAX:
```

Out[423...]

	full_name	compound	date_start	lap_number	duration_sector_1
37	George RUSSELL	MEDIUM	2024-05-19T13:04:43.538000+00:00	2	25.920
57	George RUSSELL	MEDIUM	2024-05-19T13:06:05.061000+00:00	3	25.452
77	George RUSSELL	MEDIUM	2024-05-19T13:07:26.144000+00:00	4	25.851
97	George RUSSELL	MEDIUM	2024-05-19T13:08:47.833000+00:00	5	25.828
117	George RUSSELL	MEDIUM	2024-05-19T13:10:09.246000+00:00	6	25.892
137	George RUSSELL	MEDIUM	2024-05-19T13:11:30.800000+00:00	7	25.770
156	George RUSSELL	MEDIUM	2024-05-19T13:12:52.155000+00:00	8	25.836
174	George RUSSELL	MEDIUM	2024-05-19T13:14:13.518000+00:00	9	25.792
192	George RUSSELL	MEDIUM	2024-05-19T13:15:35.072000+00:00	10	25.817
212	George RUSSELL	MEDIUM	2024-05-19T13:16:56.673000+00:00	11	25.752
231	George RUSSELL	MEDIUM	2024-05-19T13:18:18.116000+00:00	12	25.955
250	George RUSSELL	MEDIUM	2024-05-19T13:19:39.944000+00:00	13	26.007
269	George RUSSELL	MEDIUM	2024-05-19T13:21:01.825000+00:00	14	25.882
289	George RUSSELL	MEDIUM	2024-05-19T13:22:23.627000+00:00	15	25.925
309	George RUSSELL	MEDIUM	2024-05-19T13:23:45.451000+00:00	16	25.841
329	George RUSSELL	MEDIUM	2024-05-19T13:25:07.244000+00:00	17	25.929
349	George RUSSELL	MEDIUM	2024-05-19T13:26:29.254000+00:00	18	26.004
369	George RUSSELL	MEDIUM	2024-05-19T13:27:51.456000+00:00	19	25.967

	full_name	compound		date_start	lap_number	duration_sector_1	sector_1
389	George RUSSELL	MEDIUM		2024-05-19T13:29:13.481000+00:00	20	25.983	25.983
447	George RUSSELL	HARD		2024-05-19T13:33:47.464000+00:00	23	25.533	25.533
466	George RUSSELL	HARD		2024-05-19T13:35:08.207000+00:00	24	25.727	25.727
484	George RUSSELL	HARD		2024-05-19T13:36:29.146000+00:00	25	25.662	25.662
502	George RUSSELL	HARD		2024-05-19T13:37:50.100000+00:00	26	25.757	25.757
522	George RUSSELL	HARD		2024-05-19T13:39:11.745000+00:00	27	25.311	25.311
540	George RUSSELL	HARD		2024-05-19T13:40:32.472000+00:00	28	25.973	25.973
559	George RUSSELL	HARD		2024-05-19T13:41:54.133000+00:00	29	25.612	25.612
579	George RUSSELL	HARD		2024-05-19T13:43:15.469000+00:00	30	25.987	25.987
598	George RUSSELL	HARD		2024-05-19T13:44:37.537000+00:00	31	25.855	25.855
617	George RUSSELL	HARD		2024-05-19T13:45:59.093000+00:00	32	25.808	25.808
637	George RUSSELL	HARD		2024-05-19T13:47:20.330000+00:00	33	25.749	25.749
656	George RUSSELL	HARD		2024-05-19T13:48:41.186000+00:00	34	25.791	25.791
676	George RUSSELL	HARD		2024-05-19T13:50:02.482000+00:00	35	25.748	25.748
696	George RUSSELL	HARD		2024-05-19T13:51:23.493000+00:00	36	25.732	25.732
716	George RUSSELL	HARD		2024-05-19T13:52:44.393000+00:00	37	25.584	25.584
733	George RUSSELL	HARD		2024-05-19T13:54:05.314000+00:00	38	25.582	25.582
753	George RUSSELL	HARD		2024-05-19T13:55:25.955000+00:00	39	25.732	25.732
773	George RUSSELL	HARD		2024-05-19T13:56:46.879000+00:00	40	25.644	25.644
792	George RUSSELL	HARD		2024-05-19T13:58:08.072000+00:00	41	25.640	25.640
812	George RUSSELL	HARD		2024-05-19T13:59:29.215000+00:00	42	25.714	25.714
832	George RUSSELL	HARD		2024-05-19T14:00:50.263000+00:00	43	25.591	25.591
852	George RUSSELL	HARD		2024-05-19T14:02:11.071000+00:00	44	25.723	25.723
872	George RUSSELL	HARD		2024-05-19T14:03:32.323000+00:00	45	25.647	25.647
892	George RUSSELL	HARD		2024-05-19T14:04:53.203000+00:00	46	25.711	25.711

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
912	George RUSSELL	HARD	2024-05-19T14:06:14.400000+00:00	47	25.750		
932	George RUSSELL	HARD	2024-05-19T14:07:35.823000+00:00	48	25.772		
952	George RUSSELL	HARD	2024-05-19T14:08:57.242000+00:00	49	25.747		
972	George RUSSELL	HARD	2024-05-19T14:10:18.417000+00:00	50	25.701		
992	George RUSSELL	HARD	2024-05-19T14:11:39.791000+00:00	51	25.445		
1048	George RUSSELL	MEDIUM	2024-05-19T14:16:10.132000+00:00	54	25.137		
1067	George RUSSELL	MEDIUM	2024-05-19T14:17:28.893000+00:00	55	25.580		
1086	George RUSSELL	MEDIUM	2024-05-19T14:18:48.419000+00:00	56	25.189		
1105	George RUSSELL	MEDIUM	2024-05-19T14:20:08.043000+00:00	57	25.209		
1124	George RUSSELL	MEDIUM	2024-05-19T14:21:27.554000+00:00	58	25.221		
1143	George RUSSELL	MEDIUM	2024-05-19T14:22:47.131000+00:00	59	25.320		
1161	George RUSSELL	MEDIUM	2024-05-19T14:24:06.947000+00:00	60	25.341		
1180	George RUSSELL	MEDIUM	2024-05-19T14:25:27.072000+00:00	61	25.375		
1182	George RUSSELL	MEDIUM	2024-05-19T14:26:47.075000+00:00	62	25.316		

Aston Martin

In [424...]

```
stintInformation.query('driver_number == 14 or driver_number == 18')
```

Out[424...]

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
0	1235	9515	1	14	1	7	SOFT	
18	1235	9515	1	18	1	37	MEDIUM	
20	1235	9515	2	14	8	40	HARD	
43	1235	9515	2	18	38	64	HARD	
44	1235	9515	3	14	41	59	MEDIUM	
46	1235	9515	4	14	60	63	SOFT	

In [425...]

```
libraryDataF1.getinfolongruns(jointables, 14, 'Aston Martin', MINIMUM_SECONDS)
```

Out[425...]

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
26	Fernando ALONSO	SOFT	2024-05-19T13:04:50.684000+00:00	2	26.789		
46	Fernando ALONSO	SOFT	2024-05-19T13:06:14.796000+00:00	3	25.836		

	full_name	compound	date_start	lap_number	duration_sector_1	...
66	Fernando ALONSO	SOFT	2024-05-19T13:07:37.776000+00:00	4	25.836	
86	Fernando ALONSO	SOFT	2024-05-19T13:09:00.913000+00:00	5	25.688	
106	Fernando ALONSO	SOFT	2024-05-19T13:10:23.617000+00:00	6	25.732	
164	Fernando ALONSO	HARD	2024-05-19T13:14:59.761000+00:00	9	26.001	
182	Fernando ALONSO	HARD	2024-05-19T13:16:21.376000+00:00	10	25.770	
201	Fernando ALONSO	HARD	2024-05-19T13:17:42.977000+00:00	11	25.918	
220	Fernando ALONSO	HARD	2024-05-19T13:19:04.591000+00:00	12	25.915	
240	Fernando ALONSO	HARD	2024-05-19T13:20:26.393000+00:00	13	25.759	
259	Fernando ALONSO	HARD	2024-05-19T13:21:47.977000+00:00	14	25.773	
278	Fernando ALONSO	HARD	2024-05-19T13:23:09.689000+00:00	15	25.759	
298	Fernando ALONSO	HARD	2024-05-19T13:24:31.610000+00:00	16	25.814	
318	Fernando ALONSO	HARD	2024-05-19T13:25:53.465000+00:00	17	26.236	
338	Fernando ALONSO	HARD	2024-05-19T13:27:16.126000+00:00	18	25.951	
358	Fernando ALONSO	HARD	2024-05-19T13:28:38.482000+00:00	19	26.131	
378	Fernando ALONSO	HARD	2024-05-19T13:30:01.216000+00:00	20	26.094	
398	Fernando ALONSO	HARD	2024-05-19T13:31:24.095000+00:00	21	27.376	
418	Fernando ALONSO	HARD	2024-05-19T13:32:48.490000+00:00	22	26.141	
436	Fernando ALONSO	HARD	2024-05-19T13:34:11.757000+00:00	23	26.086	
456	Fernando ALONSO	HARD	2024-05-19T13:35:34.855000+00:00	24	26.121	
473	Fernando ALONSO	HARD	2024-05-19T13:36:57.766000+00:00	25	26.099	
493	Fernando ALONSO	HARD	2024-05-19T13:38:20.674000+00:00	26	26.170	
511	Fernando ALONSO	HARD	2024-05-19T13:39:43.516000+00:00	27	26.106	
531	Fernando ALONSO	HARD	2024-05-19T13:41:06.336000+00:00	28	26.172	
549	Fernando ALONSO	HARD	2024-05-19T13:42:29.215000+00:00	29	26.220	
568	Fernando ALONSO	HARD	2024-05-19T13:43:52.122000+00:00	30	26.138	

	full_name	compound		date_start	lap_number	duration_sector_1	duration_lap
1114	Fernando ALONSO	MEDIUM	2024-05-19T14:22:36.618000+00:00		58	26.114	

In [426]:

```
libraryDataF1.getinfolongruns(jointables,18,'Aston Martin',MINIMUM_SECONDS)
```

Out[426]:

	full_name	compound		date_start	lap_number	duration_sector_1	duration_lap
28	Lance STROLL	MEDIUM	2024-05-19T13:04:47.565000+00:00		2	26.263	
48	Lance STROLL	MEDIUM	2024-05-19T13:06:10.639000+00:00		3	25.790	
68	Lance STROLL	MEDIUM	2024-05-19T13:07:32.869000+00:00		4	25.788	
88	Lance STROLL	MEDIUM	2024-05-19T13:08:55.268000+00:00		5	25.887	
108	Lance STROLL	MEDIUM	2024-05-19T13:10:17.584000+00:00		6	25.924	
128	Lance STROLL	MEDIUM	2024-05-19T13:11:39.812000+00:00		7	25.964	
147	Lance STROLL	MEDIUM	2024-05-19T13:13:02.418000+00:00		8	26.021	
166	Lance STROLL	MEDIUM	2024-05-19T13:14:24.767000+00:00		9	26.056	
184	Lance STROLL	MEDIUM	2024-05-19T13:15:47.479000+00:00		10	25.802	
203	Lance STROLL	MEDIUM	2024-05-19T13:17:09.600000+00:00		11	26.060	
222	Lance STROLL	MEDIUM	2024-05-19T13:18:31.817000+00:00		12	26.153	
242	Lance STROLL	MEDIUM	2024-05-19T13:19:54.376000+00:00		13	26.172	
261	Lance STROLL	MEDIUM	2024-05-19T13:21:17.013000+00:00		14	26.079	
280	Lance STROLL	MEDIUM	2024-05-19T13:22:39.351000+00:00		15	26.047	
300	Lance STROLL	MEDIUM	2024-05-19T13:24:01.714000+00:00		16	26.023	
320	Lance STROLL	MEDIUM	2024-05-19T13:25:24.170000+00:00		17	26.096	
340	Lance STROLL	MEDIUM	2024-05-19T13:26:46.887000+00:00		18	26.473	
360	Lance STROLL	MEDIUM	2024-05-19T13:28:10.066000+00:00		19	26.235	
380	Lance STROLL	MEDIUM	2024-05-19T13:29:32.765000+00:00		20	26.109	
400	Lance STROLL	MEDIUM	2024-05-19T13:30:55.410000+00:00		21	26.117	
420	Lance STROLL	MEDIUM	2024-05-19T13:32:17.901000+00:00		22	26.057	

	full_name	compound	date_start	lap_number	duration_sector_1	sector_1
438	Lance STROLL	MEDIUM	2024-05-19T13:33:40.605000+00:00	23	26.150	1
458	Lance STROLL	MEDIUM	2024-05-19T13:35:03.297000+00:00	24	26.084	2
475	Lance STROLL	MEDIUM	2024-05-19T13:36:25.816000+00:00	25	26.340	3
494	Lance STROLL	MEDIUM	2024-05-19T13:37:48.780000+00:00	26	26.041	4
513	Lance STROLL	MEDIUM	2024-05-19T13:39:11.365000+00:00	27	26.478	5
533	Lance STROLL	MEDIUM	2024-05-19T13:40:34.880000+00:00	28	26.092	6
551	Lance STROLL	MEDIUM	2024-05-19T13:41:57.537000+00:00	29	26.126	7
570	Lance STROLL	MEDIUM	2024-05-19T13:43:20.233000+00:00	30	26.180	8
589	Lance STROLL	MEDIUM	2024-05-19T13:44:42.964000+00:00	31	26.107	9
608	Lance STROLL	MEDIUM	2024-05-19T13:46:06.852000+00:00	32	26.063	10
628	Lance STROLL	MEDIUM	2024-05-19T13:47:29.772000+00:00	33	26.159	11
648	Lance STROLL	MEDIUM	2024-05-19T13:48:52.462000+00:00	34	26.114	12
667	Lance STROLL	MEDIUM	2024-05-19T13:50:15.181000+00:00	35	25.987	13
687	Lance STROLL	MEDIUM	2024-05-19T13:51:37.723000+00:00	36	25.978	14
744	Lance STROLL	HARD	2024-05-19T13:56:10.997000+00:00	39	25.685	15
764	Lance STROLL	HARD	2024-05-19T13:57:33.111000+00:00	40	25.300	16
783	Lance STROLL	HARD	2024-05-19T13:58:53.649000+00:00	41	25.801	17
803	Lance STROLL	HARD	2024-05-19T14:00:14.696000+00:00	42	25.701	18
823	Lance STROLL	HARD	2024-05-19T14:01:35.470000+00:00	43	25.216	19
843	Lance STROLL	HARD	2024-05-19T14:02:56.084000+00:00	44	25.942	20
863	Lance STROLL	HARD	2024-05-19T14:04:18.269000+00:00	45	26.277	21
883	Lance STROLL	HARD	2024-05-19T14:05:40.642000+00:00	46	25.296	22
903	Lance STROLL	HARD	2024-05-19T14:07:01.542000+00:00	47	25.791	23
923	Lance STROLL	HARD	2024-05-19T14:08:23.048000+00:00	48	25.624	24
943	Lance STROLL	HARD	2024-05-19T14:09:43.880000+00:00	49	25.726	25

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
963	Lance STROLL	HARD	2024-05-19T14:11:05.265000+00:00		50	25.154		
983	Lance STROLL	HARD	2024-05-19T14:12:26.002000+00:00		51	25.652		
1003	Lance STROLL	HARD	2024-05-19T14:13:47.090000+00:00		52	25.568		
1022	Lance STROLL	HARD	2024-05-19T14:15:07.790000+00:00		53	25.655		
1040	Lance STROLL	HARD	2024-05-19T14:16:28.509000+00:00		54	25.768		
1059	Lance STROLL	HARD	2024-05-19T14:17:49.402000+00:00		55	25.678		
1078	Lance STROLL	HARD	2024-05-19T14:19:10.105000+00:00		56	25.611		
1097	Lance STROLL	HARD	2024-05-19T14:20:30.831000+00:00		57	25.708		
1116	Lance STROLL	HARD	2024-05-19T14:21:51.436000+00:00		58	25.583		
1135	Lance STROLL	HARD	2024-05-19T14:23:12.120000+00:00		59	25.689		
1153	Lance STROLL	HARD	2024-05-19T14:24:32.653000+00:00		60	25.716		
1172	Lance STROLL	HARD	2024-05-19T14:25:53.643000+00:00		61	25.975		

McLaren

In [427...]

```
stintInformation.query('driver_number == 4 or driver_number == 81')
```

Out[427...]

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
8	1235	9515	1	4	1	22	MEDIUM	
9	1235	9515	1	81	1	23	MEDIUM	
29	1235	9515	2	4	23	64	HARD	
31	1235	9515	2	81	24	64	HARD	

In [428...]

```
libraryDataF1.getinfolongruns(jointables, 4, 'McLaren', MINIMUN_SECONDS, MAXIMUN_SECONDS)
```

Out[428...]

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3
23	Lando NORRIS	MEDIUM	2024-05-19T13:04:40.796000+00:00		2	25.691		
43	Lando NORRIS	MEDIUM	2024-05-19T13:06:01.505000+00:00		3	25.817		
63	Lando NORRIS	MEDIUM	2024-05-19T13:07:22.387000+00:00		4	25.779		
83	Lando NORRIS	MEDIUM	2024-05-19T13:08:43.507000+00:00		5	25.638		

	full_name	compound	date_start	lap_number	duration_sector_1	sector_1
103	Lando NORRIS	MEDIUM	2024-05-19T13:10:04.516000+00:00	6	25.690	1
123	Lando NORRIS	MEDIUM	2024-05-19T13:11:25.465000+00:00	7	25.621	2
143	Lando NORRIS	MEDIUM	2024-05-19T13:12:46.404000+00:00	8	25.599	3
162	Lando NORRIS	MEDIUM	2024-05-19T13:14:07.365000+00:00	9	25.644	4
179	Lando NORRIS	MEDIUM	2024-05-19T13:15:28.514000+00:00	10	25.606	5
198	Lando NORRIS	MEDIUM	2024-05-19T13:16:49.791000+00:00	11	25.604	6
217	Lando NORRIS	MEDIUM	2024-05-19T13:18:10.886000+00:00	12	25.632	7
237	Lando NORRIS	MEDIUM	2024-05-19T13:19:32.447000+00:00	13	25.755	8
256	Lando NORRIS	MEDIUM	2024-05-19T13:20:54.157000+00:00	14	25.665	9
275	Lando NORRIS	MEDIUM	2024-05-19T13:22:15.826000+00:00	15	25.774	10
295	Lando NORRIS	MEDIUM	2024-05-19T13:23:37.472000+00:00	16	25.487	11
315	Lando NORRIS	MEDIUM	2024-05-19T13:24:59.001000+00:00	17	25.588	12
335	Lando NORRIS	MEDIUM	2024-05-19T13:26:20.675000+00:00	18	25.562	13
355	Lando NORRIS	MEDIUM	2024-05-19T13:27:42.220000+00:00	19	25.683	14
375	Lando NORRIS	MEDIUM	2024-05-19T13:29:04.068000+00:00	20	25.693	15
395	Lando NORRIS	MEDIUM	2024-05-19T13:30:25.946000+00:00	21	25.722	16
453	Lando NORRIS	HARD	2024-05-19T13:34:58.956000+00:00	24	25.153	17
470	Lando NORRIS	HARD	2024-05-19T13:36:19.027000+00:00	25	25.708	18
490	Lando NORRIS	HARD	2024-05-19T13:37:40.084000+00:00	26	25.465	19
508	Lando NORRIS	HARD	2024-05-19T13:39:00.860000+00:00	27	25.492	20
528	Lando NORRIS	HARD	2024-05-19T13:40:21.889000+00:00	28	25.455	21
546	Lando NORRIS	HARD	2024-05-19T13:41:42.909000+00:00	29	25.427	22
565	Lando NORRIS	HARD	2024-05-19T13:43:04.061000+00:00	30	25.371	23
585	Lando NORRIS	HARD	2024-05-19T13:44:24.687000+00:00	31	25.300	24
603	Lando NORRIS	HARD	2024-05-19T13:45:45.344000+00:00	32	25.444	25

	full_name	compound		date_start	lap_number	duration_sector_1	sector_1
623	Lando NORRIS	HARD		2024-05-19T13:47:06.254000+00:00	33	25.471	25.471
643	Lando NORRIS	HARD		2024-05-19T13:48:27.065000+00:00	34	25.436	25.436
662	Lando NORRIS	HARD		2024-05-19T13:49:47.754000+00:00	35	25.264	25.264
682	Lando NORRIS	HARD		2024-05-19T13:51:08.529000+00:00	36	25.258	25.258
702	Lando NORRIS	HARD		2024-05-19T13:52:29.128000+00:00	37	25.333	25.333
722	Lando NORRIS	HARD		2024-05-19T13:53:49.761000+00:00	38	25.110	25.110
739	Lando NORRIS	HARD		2024-05-19T13:55:10.328000+00:00	39	25.357	25.357
759	Lando NORRIS	HARD		2024-05-19T13:56:30.882000+00:00	40	25.255	25.255
779	Lando NORRIS	HARD		2024-05-19T13:57:51.927000+00:00	41	25.407	25.407
798	Lando NORRIS	HARD		2024-05-19T13:59:13.066000+00:00	42	25.245	25.245
818	Lando NORRIS	HARD		2024-05-19T14:00:33.832000+00:00	43	25.317	25.317
838	Lando NORRIS	HARD		2024-05-19T14:01:54.722000+00:00	44	25.487	25.487
858	Lando NORRIS	HARD		2024-05-19T14:03:15.360000+00:00	45	25.291	25.291
878	Lando NORRIS	HARD		2024-05-19T14:04:35.710000+00:00	46	25.221	25.221
898	Lando NORRIS	HARD		2024-05-19T14:05:56.233000+00:00	47	25.346	25.346
918	Lando NORRIS	HARD		2024-05-19T14:07:17.109000+00:00	48	25.477	25.477
938	Lando NORRIS	HARD		2024-05-19T14:08:37.901000+00:00	49	25.274	25.274
958	Lando NORRIS	HARD		2024-05-19T14:09:58.380000+00:00	50	25.144	25.144
978	Lando NORRIS	HARD		2024-05-19T14:11:18.426000+00:00	51	25.252	25.252
998	Lando NORRIS	HARD		2024-05-19T14:12:38.853000+00:00	52	25.297	25.297
1017	Lando NORRIS	HARD		2024-05-19T14:13:59.281000+00:00	53	25.070	25.070
1035	Lando NORRIS	HARD		2024-05-19T14:15:19.509000+00:00	54	25.143	25.143
1054	Lando NORRIS	HARD		2024-05-19T14:16:39.527000+00:00	55	25.190	25.190
1073	Lando NORRIS	HARD		2024-05-19T14:17:59.650000+00:00	56	25.239	25.239
1092	Lando NORRIS	HARD		2024-05-19T14:19:19.813000+00:00	57	25.231	25.231

	full_name	compound		date_start	lap_number	duration_sector_1	duration_lap
1111	Lando NORRIS	HARD		2024-05-19T14:20:39.913000+00:00	58	25.315	05.315
1130	Lando NORRIS	HARD		2024-05-19T14:22:00.422000+00:00	59	25.314	05.314
1149	Lando NORRIS	HARD		2024-05-19T14:23:20.972000+00:00	60	25.214	05.214
1167	Lando NORRIS	HARD		2024-05-19T14:24:44.000000+00:00	61	25.260	05.260

In [429]: libraryDataF1.getinfolongruns(jointables, 81, 'McLaren', MINIMUM_SECONDS, MAXIMUM_SECONDS)

	full_name	compound		date_start	lap_number	duration_sector_1	duration_lap
39	Oscar PIASTRI	MEDIUM		2024-05-19T13:04:42.813000+00:00	2	25.851	05.851
59	Oscar PIASTRI	MEDIUM		2024-05-19T13:06:04.024000+00:00	3	25.315	05.315
79	Oscar PIASTRI	MEDIUM		2024-05-19T13:07:24.814000+00:00	4	25.500	05.500
99	Oscar PIASTRI	MEDIUM		2024-05-19T13:08:46.245000+00:00	5	25.488	05.488
119	Oscar PIASTRI	MEDIUM		2024-05-19T13:10:07.533000+00:00	6	25.554	05.554
139	Oscar PIASTRI	MEDIUM		2024-05-19T13:11:28.865000+00:00	7	25.441	05.441
158	Oscar PIASTRI	MEDIUM		2024-05-19T13:12:49.947000+00:00	8	25.824	05.824
175	Oscar PIASTRI	MEDIUM		2024-05-19T13:14:11.459000+00:00	9	25.524	05.524
194	Oscar PIASTRI	MEDIUM		2024-05-19T13:15:32.915000+00:00	10	25.560	05.560
214	Oscar PIASTRI	MEDIUM		2024-05-19T13:16:54.566000+00:00	11	25.407	05.407
233	Oscar PIASTRI	MEDIUM		2024-05-19T13:18:15.790000+00:00	12	25.818	05.818
252	Oscar PIASTRI	MEDIUM		2024-05-19T13:19:37.908000+00:00	13	25.761	05.761
271	Oscar PIASTRI	MEDIUM		2024-05-19T13:20:59.790000+00:00	14	25.474	05.474
291	Oscar PIASTRI	MEDIUM		2024-05-19T13:22:21.479000+00:00	15	25.512	05.512
311	Oscar PIASTRI	MEDIUM		2024-05-19T13:23:42.992000+00:00	16	25.528	05.528
331	Oscar PIASTRI	MEDIUM		2024-05-19T13:25:04.793000+00:00	17	25.605	05.605
351	Oscar PIASTRI	MEDIUM		2024-05-19T13:26:26.612000+00:00	18	25.580	05.580
371	Oscar PIASTRI	MEDIUM		2024-05-19T13:27:48.524000+00:00	19	25.623	05.623
391	Oscar PIASTRI	MEDIUM		2024-05-19T13:29:10.592000+00:00	20	25.589	05.589

	full_name	compound	date_start	lap_number	duration_sector_1	sector_1
411	Oscar PIASTRI	MEDIUM	2024-05-19T13:30:32.471000+00:00	21	25.744	1
430	Oscar PIASTRI	MEDIUM	2024-05-19T13:31:54.705000+00:00	22	25.554	1
486	Oscar PIASTRI	HARD	2024-05-19T13:36:26.073000+00:00	25	24.926	1
504	Oscar PIASTRI	HARD	2024-05-19T13:37:45.984000+00:00	26	25.391	1
524	Oscar PIASTRI	HARD	2024-05-19T13:39:06.465000+00:00	27	25.525	1
542	Oscar PIASTRI	HARD	2024-05-19T13:40:27.242000+00:00	28	25.477	1
561	Oscar PIASTRI	HARD	2024-05-19T13:41:47.919000+00:00	29	25.351	1
581	Oscar PIASTRI	HARD	2024-05-19T13:43:08.200000+00:00	30	25.212	1
600	Oscar PIASTRI	HARD	2024-05-19T13:44:28.852000+00:00	31	25.478	1
619	Oscar PIASTRI	HARD	2024-05-19T13:45:49.567000+00:00	32	25.386	1
639	Oscar PIASTRI	HARD	2024-05-19T13:47:10.403000+00:00	33	25.478	1
658	Oscar PIASTRI	HARD	2024-05-19T13:48:31.123000+00:00	34	25.528	1
678	Oscar PIASTRI	HARD	2024-05-19T13:49:52.063000+00:00	35	25.551	1
698	Oscar PIASTRI	HARD	2024-05-19T13:51:13.052000+00:00	36	25.495	1
718	Oscar PIASTRI	HARD	2024-05-19T13:52:33.674000+00:00	37	25.371	1
735	Oscar PIASTRI	HARD	2024-05-19T13:53:54.275000+00:00	38	25.338	1
755	Oscar PIASTRI	HARD	2024-05-19T13:55:14.629000+00:00	39	25.396	1
775	Oscar PIASTRI	HARD	2024-05-19T13:56:35.563000+00:00	40	25.402	1
794	Oscar PIASTRI	HARD	2024-05-19T13:57:56.416000+00:00	41	25.341	1
814	Oscar PIASTRI	HARD	2024-05-19T13:59:17.511000+00:00	42	25.491	1
834	Oscar PIASTRI	HARD	2024-05-19T14:00:38.662000+00:00	43	25.566	1
854	Oscar PIASTRI	HARD	2024-05-19T14:01:59.880000+00:00	44	25.351	1
874	Oscar PIASTRI	HARD	2024-05-19T14:03:20.796000+00:00	45	25.448	1
894	Oscar PIASTRI	HARD	2024-05-19T14:04:41.600000+00:00	46	25.329	1
914	Oscar PIASTRI	HARD	2024-05-19T14:06:02.658000+00:00	47	25.512	1

	full_name	compound		date_start	lap_number	duration_sector_1	sector_1
934	Oscar PIASTRI	HARD		2024-05-19T14:07:24.287000+00:00	48	25.545	25.545
954	Oscar PIASTRI	HARD		2024-05-19T14:08:45.706000+00:00	49	25.508	25.508
974	Oscar PIASTRI	HARD		2024-05-19T14:10:06.974000+00:00	50	25.300	25.300
994	Oscar PIASTRI	HARD		2024-05-19T14:11:27.869000+00:00	51	25.443	25.443
1013	Oscar PIASTRI	HARD		2024-05-19T14:12:49.206000+00:00	52	25.364	25.364
1031	Oscar PIASTRI	HARD		2024-05-19T14:14:09.835000+00:00	53	25.374	25.374
1050	Oscar PIASTRI	HARD		2024-05-19T14:15:30.637000+00:00	54	25.296	25.296
1069	Oscar PIASTRI	HARD		2024-05-19T14:16:50.919000+00:00	55	25.319	25.319
1088	Oscar PIASTRI	HARD		2024-05-19T14:18:11.374000+00:00	56	25.336	25.336
1107	Oscar PIASTRI	HARD		2024-05-19T14:19:31.877000+00:00	57	25.438	25.438
1126	Oscar PIASTRI	HARD		2024-05-19T14:20:52.424000+00:00	58	25.338	25.338
1145	Oscar PIASTRI	HARD		2024-05-19T14:22:13.124000+00:00	59	25.328	25.328
1163	Oscar PIASTRI	HARD		2024-05-19T14:23:33.497000+00:00	60	25.357	25.357
1182	Oscar PIASTRI	HARD		2024-05-19T14:24:54.074000+00:00	61	25.424	25.424
1201	Oscar PIASTRI	HARD		2024-05-19T14:26:15.106000+00:00	62	25.376	25.376

RE

In [430...]

```
stintInformation.query('driver number == 3 or driver number == 22')
```

Out[430]

meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
4	1235	9515	1	3	1	11	MEDIUM
5	1235	9515	1	22	1	12	MEDIUM
25	1235	9515	2	3	12	63	HARD
26	1235	9515	2	22	13	63	HARD

In [431...]

```
libraryDataF1.getinfologinruns(jointables, 3, 'RB', MINIMUM_SECONDS, MAXIMUM_SECONDS)
```

Out[431]

	full_name	compound		date_start	lap_number	duration_sector_1
22	Daniel RICCIARDO	MEDIUM		2024-05-19T13:04:46.397000+00:00	2	26.259
42	Daniel RICCIARDO	MEDIUM		2024-05-19T13:06:09.200000+00:00	3	25.745

	full_name	compound		date_start	lap_number	duration_sector_1
62	Daniel RICCIARDO	MEDIUM		2024-05-19T13:07:31.329000+00:00	4	25.738
82	Daniel RICCIARDO	MEDIUM		2024-05-19T13:08:53.499000+00:00	5	25.727
102	Daniel RICCIARDO	MEDIUM		2024-05-19T13:10:15.668000+00:00	6	25.796
122	Daniel RICCIARDO	MEDIUM		2024-05-19T13:11:38.071000+00:00	7	25.967
142	Daniel RICCIARDO	MEDIUM		2024-05-19T13:13:00.483000+00:00	8	25.925
161	Daniel RICCIARDO	MEDIUM		2024-05-19T13:14:22.859000+00:00	9	26.078
178	Daniel RICCIARDO	MEDIUM		2024-05-19T13:15:45.429000+00:00	10	25.910
236	Daniel RICCIARDO	HARD		2024-05-19T13:20:19.748000+00:00	13	26.125
255	Daniel RICCIARDO	HARD		2024-05-19T13:21:41.328000+00:00	14	26.191
274	Daniel RICCIARDO	HARD		2024-05-19T13:23:03.520000+00:00	15	25.948
294	Daniel RICCIARDO	HARD		2024-05-19T13:24:25.531000+00:00	16	25.976
314	Daniel RICCIARDO	HARD		2024-05-19T13:25:47.615000+00:00	17	26.088
334	Daniel RICCIARDO	HARD		2024-05-19T13:27:09.791000+00:00	18	25.924
354	Daniel RICCIARDO	HARD		2024-05-19T13:28:31.914000+00:00	19	26.040
374	Daniel RICCIARDO	HARD		2024-05-19T13:29:54.121000+00:00	20	25.918
394	Daniel RICCIARDO	HARD		2024-05-19T13:31:16.152000+00:00	21	25.926
414	Daniel RICCIARDO	HARD		2024-05-19T13:32:38.231000+00:00	22	25.974
433	Daniel RICCIARDO	HARD		2024-05-19T13:34:00.681000+00:00	23	26.087
452	Daniel RICCIARDO	HARD		2024-05-19T13:35:23.356000+00:00	24	25.911
469	Daniel RICCIARDO	HARD		2024-05-19T13:36:45.799000+00:00	25	25.916
489	Daniel RICCIARDO	HARD		2024-05-19T13:38:08.475000+00:00	26	26.046
507	Daniel RICCIARDO	HARD		2024-05-19T13:39:31.771000+00:00	27	26.388
527	Daniel RICCIARDO	HARD		2024-05-19T13:40:55.269000+00:00	28	26.330
545	Daniel RICCIARDO	HARD		2024-05-19T13:42:18.566000+00:00	29	26.346
564	Daniel RICCIARDO	HARD		2024-05-19T13:43:41.848000+00:00	30	26.437

	full_name	compound		date_start	lap_number	duration_sector_1
584	Daniel RICCIARDO	HARD		2024-05-19T13:45:05.994000+00:00	31	26.300
602	Daniel RICCIARDO	HARD		2024-05-19T13:46:29.567000+00:00	32	25.614
622	Daniel RICCIARDO	HARD		2024-05-19T13:47:51.461000+00:00	33	26.089
642	Daniel RICCIARDO	HARD		2024-05-19T13:49:13.628000+00:00	34	25.893
661	Daniel RICCIARDO	HARD		2024-05-19T13:50:35.535000+00:00	35	26.001
681	Daniel RICCIARDO	HARD		2024-05-19T13:51:57.741000+00:00	36	26.061
701	Daniel RICCIARDO	HARD		2024-05-19T13:53:20.058000+00:00	37	26.014
721	Daniel RICCIARDO	HARD		2024-05-19T13:54:42.270000+00:00	38	25.990
738	Daniel RICCIARDO	HARD		2024-05-19T13:56:04.448000+00:00	39	26.851
758	Daniel RICCIARDO	HARD		2024-05-19T13:57:28.135000+00:00	40	25.963
778	Daniel RICCIARDO	HARD		2024-05-19T13:58:50.489000+00:00	41	26.015
797	Daniel RICCIARDO	HARD		2024-05-19T14:00:12.991000+00:00	42	26.028
817	Daniel RICCIARDO	HARD		2024-05-19T14:01:35.050000+00:00	43	26.763
837	Daniel RICCIARDO	HARD		2024-05-19T14:02:58.641000+00:00	44	25.930
857	Daniel RICCIARDO	HARD		2024-05-19T14:04:21.180000+00:00	45	25.936
877	Daniel RICCIARDO	HARD		2024-05-19T14:05:43.193000+00:00	46	25.964
897	Daniel RICCIARDO	HARD		2024-05-19T14:07:05.549000+00:00	47	25.910
917	Daniel RICCIARDO	HARD		2024-05-19T14:08:27.836000+00:00	48	25.914
937	Daniel RICCIARDO	HARD		2024-05-19T14:09:50.067000+00:00	49	25.949
957	Daniel RICCIARDO	HARD		2024-05-19T14:11:12.313000+00:00	50	27.498
977	Daniel RICCIARDO	HARD		2024-05-19T14:12:36.352000+00:00	51	25.867
1016	Daniel RICCIARDO	HARD		2024-05-19T14:15:24.091000+00:00	53	25.973
1034	Daniel RICCIARDO	HARD		2024-05-19T14:16:46.446000+00:00	54	25.992
1053	Daniel RICCIARDO	HARD		2024-05-19T14:18:08.303000+00:00	55	25.906
1072	Daniel RICCIARDO	HARD		2024-05-19T14:19:30.280000+00:00	56	25.914

	full_name	compound		date_start	lap_number	duration_sector_1
1091	Daniel RICCIARDO	HARD	2024-05-19T14:20:54.195000+00:00		57	26.010
1110	Daniel RICCIARDO	HARD	2024-05-19T14:22:16.521000+00:00		58	25.912
1129	Daniel RICCIARDO	HARD	2024-05-19T14:23:38.702000+00:00		59	25.902
1148	Daniel RICCIARDO	HARD	2024-05-19T14:25:00.606000+00:00		60	25.982

In [432...]

```
libraryDataF1.getinfolongruns(jointables, 22, 'RB', MINIMUM_SECONDS, MAXIMUM_SI
```

Out[432...]

	full_name	compound		date_start	lap_number	duration_sector_1
30	Yuki TSUNODA	MEDIUM	2024-05-19T13:04:45.348000+00:00		2	26.192
50	Yuki TSUNODA	MEDIUM	2024-05-19T13:06:07.683000+00:00		3	25.648
70	Yuki TSUNODA	MEDIUM	2024-05-19T13:07:29.448000+00:00		4	25.937
90	Yuki TSUNODA	MEDIUM	2024-05-19T13:08:51.563000+00:00		5	25.935
110	Yuki TSUNODA	MEDIUM	2024-05-19T13:10:13.665000+00:00		6	26.015
130	Yuki TSUNODA	MEDIUM	2024-05-19T13:11:35.860000+00:00		7	26.142
149	Yuki TSUNODA	MEDIUM	2024-05-19T13:12:58.562000+00:00		8	25.965
168	Yuki TSUNODA	MEDIUM	2024-05-19T13:14:20.612000+00:00		9	25.848
186	Yuki TSUNODA	MEDIUM	2024-05-19T13:15:42.804000+00:00		10	26.040
205	Yuki TSUNODA	MEDIUM	2024-05-19T13:17:05.402000+00:00		11	26.043
263	Yuki TSUNODA	HARD	2024-05-19T13:21:38.406000+00:00		14	25.722
282	Yuki TSUNODA	HARD	2024-05-19T13:22:59.143000+00:00		15	25.840
302	Yuki TSUNODA	HARD	2024-05-19T13:24:20.892000+00:00		16	25.937
322	Yuki TSUNODA	HARD	2024-05-19T13:25:42.540000+00:00		17	26.020
342	Yuki TSUNODA	HARD	2024-05-19T13:27:04.480000+00:00		18	26.020
362	Yuki TSUNODA	HARD	2024-05-19T13:28:26.400000+00:00		19	25.993
382	Yuki TSUNODA	HARD	2024-05-19T13:29:48.631000+00:00		20	26.146
402	Yuki TSUNODA	HARD	2024-05-19T13:31:10.942000+00:00		21	25.936
422	Yuki TSUNODA	HARD	2024-05-19T13:32:33.927000+00:00		22	26.253

	full_name	compound		date_start	lap_number	duration_sector_1
440	Yuki TSUNODA	HARD		2024-05-19T13:33:57.339000+00:00	23	26.010
460	Yuki TSUNODA	HARD		2024-05-19T13:35:20.610000+00:00	24	25.885
477	Yuki TSUNODA	HARD		2024-05-19T13:36:43.124000+00:00	25	26.164
496	Yuki TSUNODA	HARD		2024-05-19T13:38:06.233000+00:00	26	26.030
515	Yuki TSUNODA	HARD		2024-05-19T13:39:28.466000+00:00	27	26.112
535	Yuki TSUNODA	HARD		2024-05-19T13:40:50.832000+00:00	28	26.037
553	Yuki TSUNODA	HARD		2024-05-19T13:42:13.318000+00:00	29	26.118
572	Yuki TSUNODA	HARD		2024-05-19T13:43:35.928000+00:00	30	26.149
591	Yuki TSUNODA	HARD		2024-05-19T13:44:58.913000+00:00	31	26.248
610	Yuki TSUNODA	HARD		2024-05-19T13:46:22.064000+00:00	32	26.312
630	Yuki TSUNODA	HARD		2024-05-19T13:47:45.627000+00:00	33	26.010
650	Yuki TSUNODA	HARD		2024-05-19T13:49:07.961000+00:00	34	26.141
669	Yuki TSUNODA	HARD		2024-05-19T13:50:30.627000+00:00	35	26.032
689	Yuki TSUNODA	HARD		2024-05-19T13:51:52.948000+00:00	36	26.093
709	Yuki TSUNODA	HARD		2024-05-19T13:53:15.603000+00:00	37	26.188
726	Yuki TSUNODA	HARD		2024-05-19T13:54:38.204000+00:00	38	25.987
746	Yuki TSUNODA	HARD		2024-05-19T13:56:00.272000+00:00	39	26.143
766	Yuki TSUNODA	HARD		2024-05-19T13:57:22.864000+00:00	40	26.163
785	Yuki TSUNODA	HARD		2024-05-19T13:58:45.119000+00:00	41	26.111
805	Yuki TSUNODA	HARD		2024-05-19T14:00:07.564000+00:00	42	26.665
825	Yuki TSUNODA	HARD		2024-05-19T14:01:30.337000+00:00	43	25.992
845	Yuki TSUNODA	HARD		2024-05-19T14:02:52.306000+00:00	44	26.090
865	Yuki TSUNODA	HARD		2024-05-19T14:04:14.431000+00:00	45	26.038
885	Yuki TSUNODA	HARD		2024-05-19T14:05:36.650000+00:00	46	26.001
905	Yuki TSUNODA	HARD		2024-05-19T14:06:58.885000+00:00	47	26.006

	full_name	compound	date_start	lap_number	duration_sector_1
925	Yuki TSUNODA	HARD	2024-05-19T14:08:20.937000+00:00	48	26.010
945	Yuki TSUNODA	HARD	2024-05-19T14:09:42.880000+00:00	49	26.007
965	Yuki TSUNODA	HARD	2024-05-19T14:11:04.738000+00:00	50	26.868
985	Yuki TSUNODA	HARD	2024-05-19T14:12:28.135000+00:00	51	26.007
1005	Yuki TSUNODA	HARD	2024-05-19T14:13:50.305000+00:00	52	26.023
1024	Yuki TSUNODA	HARD	2024-05-19T14:15:12.378000+00:00	53	26.056
1061	Yuki TSUNODA	HARD	2024-05-19T14:18:00.639000+00:00	55	25.999
1080	Yuki TSUNODA	HARD	2024-05-19T14:19:22.864000+00:00	56	25.985
1099	Yuki TSUNODA	HARD	2024-05-19T14:20:46.633000+00:00	57	25.904
1118	Yuki TSUNODA	HARD	2024-05-19T14:22:08.650000+00:00	58	26.000
1137	Yuki TSUNODA	HARD	2024-05-19T14:23:30.589000+00:00	59	26.014
1155	Yuki TSUNODA	HARD	2024-05-19T14:24:52.519000+00:00	60	25.978
1174	Yuki TSUNODA	HARD	2024-05-19T14:26:16.322000+00:00	61	25.875

Haas F1 Team

In [433...]

```
stintInformation.query('driver_number == 20 or driver_number == 27')
```

Out[433...]

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
6	1235	9515	1	27	1	13	MEDIUM	
19	1235	9515	1	20	1	37	MEDIUM	
27	1235	9515	2	27	14	63	HARD	
41	1235	9515	2	20	38	63	HARD	

In [434...]

```
libraryDataF1.getinfolongruns(jointables, 20, 'Haas F1 Team', MINIMUM_SECONDS)
```

Out[434...]

	full_name	compound	date_start	lap_number	duration_sector_1
29	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:04:48.922000+00:00	2	26.62
49	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:06:12.229000+00:00	3	25.86
69	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:07:34.896000+00:00	4	25.89
89	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:08:57.414000+00:00	5	26.20

	full_name	compound	date_start	lap_number	duration_sector_1
109	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:10:20.219000+00:00	6	25.83
129	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:11:42.420000+00:00	7	25.90
148	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:13:04.949000+00:00	8	25.96
167	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:14:27.265000+00:00	9	25.80
185	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:15:49.695000+00:00	10	26.18
204	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:17:12.713000+00:00	11	26.22
223	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:18:35.510000+00:00	12	26.33
243	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:19:58.422000+00:00	13	26.42
262	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:21:21.308000+00:00	14	26.37
281	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:22:44.460000+00:00	15	26.31
301	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:24:07.761000+00:00	16	26.37
321	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:25:30.885000+00:00	17	26.52
341	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:26:54.499000+00:00	18	26.50
361	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:28:17.743000+00:00	19	26.35
381	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:29:41.079000+00:00	20	26.31
401	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:31:03.921000+00:00	21	26.20
421	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:32:26.626000+00:00	22	26.26
439	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:33:49.594000+00:00	23	26.05
459	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:35:12.347000+00:00	24	26.08
476	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:36:35.368000+00:00	25	26.25
495	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:37:58.527000+00:00	26	26.19
514	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:39:21.481000+00:00	27	26.19
534	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:40:44.343000+00:00	28	26.35
552	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:42:07.539000+00:00	29	26.30
571	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:43:30.672000+00:00	30	26.27

	full_name	compound		date_start	lap_number	duration_sector_1
590	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:44:53.934000+00:00		31	26.36
609	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:46:17.104000+00:00		32	26.84
629	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:47:41.127000+00:00		33	26.36
649	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:49:04.243000+00:00		34	26.22
668	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:50:27.434000+00:00		35	26.21
688	Kevin MAGNUSEN	MEDIUM	2024-05-19T13:51:50.352000+00:00		36	26.32
745	Kevin MAGNUSEN	HARD	2024-05-19T13:56:27.222000+00:00		39	25.78
765	Kevin MAGNUSEN	HARD	2024-05-19T13:57:48.705000+00:00		40	26.20
784	Kevin MAGNUSEN	HARD	2024-05-19T13:59:11.216000+00:00		41	25.48
804	Kevin MAGNUSEN	HARD	2024-05-19T14:00:32.295000+00:00		42	25.88
824	Kevin MAGNUSEN	HARD	2024-05-19T14:01:56.649000+00:00		43	25.38
844	Kevin MAGNUSEN	HARD	2024-05-19T14:03:18.105000+00:00		44	25.40
864	Kevin MAGNUSEN	HARD	2024-05-19T14:04:39.274000+00:00		45	25.60
884	Kevin MAGNUSEN	HARD	2024-05-19T14:06:00.948000+00:00		46	25.66
904	Kevin MAGNUSEN	HARD	2024-05-19T14:07:22.722000+00:00		47	25.73
924	Kevin MAGNUSEN	HARD	2024-05-19T14:08:44.313000+00:00		48	25.49
944	Kevin MAGNUSEN	HARD	2024-05-19T14:10:05.219000+00:00		49	25.86
964	Kevin MAGNUSEN	HARD	2024-05-19T14:11:29.223000+00:00		50	25.60
984	Kevin MAGNUSEN	HARD	2024-05-19T14:12:50.339000+00:00		51	25.46
1004	Kevin MAGNUSEN	HARD	2024-05-19T14:14:11.786000+00:00		52	25.96
1023	Kevin MAGNUSEN	HARD	2024-05-19T14:15:33.573000+00:00		53	25.68
1041	Kevin MAGNUSEN	HARD	2024-05-19T14:16:54.603000+00:00		54	25.75
1060	Kevin MAGNUSEN	HARD	2024-05-19T14:18:15.726000+00:00		55	25.70
1079	Kevin MAGNUSEN	HARD	2024-05-19T14:19:37.049000+00:00		56	25.82
1098	Kevin MAGNUSEN	HARD	2024-05-19T14:20:58.279000+00:00		57	25.76

	full_name	compound		date_start	lap_number	duration_sector
1117	Kevin MAGNUSEN	HARD	2024-05-19T14:22:21.436000+00:00		58	25.45
1136	Kevin MAGNUSEN	HARD	2024-05-19T14:23:42.425000+00:00		59	25.81
1154	Kevin MAGNUSEN	HARD	2024-05-19T14:25:03.893000+00:00		60	25.75

In [435...]

libraryDataF1.getinfolongruns(jointables, 27, 'Haas F1 Team', MINIMUM_SECONDS)

Out[435...]

	full_name	compound		date_start	lap_number	duration_sector
33	Nico HULKENBERG	MEDIUM	2024-05-19T13:04:44.869000+00:00		2	26.09
53	Nico HULKENBERG	MEDIUM	2024-05-19T13:06:06.846000+00:00		3	25.62
73	Nico HULKENBERG	MEDIUM	2024-05-19T13:07:28.592000+00:00		4	26.00
93	Nico HULKENBERG	MEDIUM	2024-05-19T13:08:50.728000+00:00		5	25.94
113	Nico HULKENBERG	MEDIUM	2024-05-19T13:10:12.907000+00:00		6	26.18
133	Nico HULKENBERG	MEDIUM	2024-05-19T13:11:35.232000+00:00		7	26.13
152	Nico HULKENBERG	MEDIUM	2024-05-19T13:12:57.631000+00:00		8	26.12
170	Nico HULKENBERG	MEDIUM	2024-05-19T13:14:19.827000+00:00		9	26.04
188	Nico HULKENBERG	MEDIUM	2024-05-19T13:15:42.058000+00:00		10	26.01
208	Nico HULKENBERG	MEDIUM	2024-05-19T13:17:04.599000+00:00		11	26.14
227	Nico HULKENBERG	MEDIUM	2024-05-19T13:18:27.003000+00:00		12	26.21
285	Nico HULKENBERG	HARD	2024-05-19T13:23:00.961000+00:00		15	25.98
305	Nico HULKENBERG	HARD	2024-05-19T13:24:22.893000+00:00		16	26.03
325	Nico HULKENBERG	HARD	2024-05-19T13:25:44.607000+00:00		17	26.11
345	Nico HULKENBERG	HARD	2024-05-19T13:27:06.692000+00:00		18	26.15
365	Nico HULKENBERG	HARD	2024-05-19T13:28:28.754000+00:00		19	26.34
385	Nico HULKENBERG	HARD	2024-05-19T13:29:51.358000+00:00		20	26.18
405	Nico HULKENBERG	HARD	2024-05-19T13:31:13.735000+00:00		21	26.02
425	Nico HULKENBERG	HARD	2024-05-19T13:32:35.932000+00:00		22	26.06

		full_name	compound	date_start	lap_number	duration_sector
443		Nico HULKENBERG	HARD	2024-05-19T13:33:58.335000+00:00	23	26.2:
462		Nico HULKENBERG	HARD	2024-05-19T13:35:21.188000+00:00	24	26.1:
480		Nico HULKENBERG	HARD	2024-05-19T13:36:44.278000+00:00	25	25.8:
499		Nico HULKENBERG	HARD	2024-05-19T13:38:07.125000+00:00	26	26.2:
518		Nico HULKENBERG	HARD	2024-05-19T13:39:29.659000+00:00	27	26.1:
538		Nico HULKENBERG	HARD	2024-05-19T13:40:52.132000+00:00	28	26.2:
555		Nico HULKENBERG	HARD	2024-05-19T13:42:14.761000+00:00	29	26.2:
575		Nico HULKENBERG	HARD	2024-05-19T13:43:37.726000+00:00	30	26.2:
594		Nico HULKENBERG	HARD	2024-05-19T13:45:00.300000+00:00	31	26.3:
613		Nico HULKENBERG	HARD	2024-05-19T13:46:23.378000+00:00	32	26.3:
633		Nico HULKENBERG	HARD	2024-05-19T13:47:46.578000+00:00	33	26.4:
652		Nico HULKENBERG	HARD	2024-05-19T13:49:10.319000+00:00	34	25.9:
672		Nico HULKENBERG	HARD	2024-05-19T13:50:32.949000+00:00	35	25.9:
692		Nico HULKENBERG	HARD	2024-05-19T13:51:55.214000+00:00	36	26.1:
712		Nico HULKENBERG	HARD	2024-05-19T13:53:17.779000+00:00	37	26.1:
729		Nico HULKENBERG	HARD	2024-05-19T13:54:40.070000+00:00	38	26.2:
749		Nico HULKENBERG	HARD	2024-05-19T13:56:02.627000+00:00	39	26.1:
769		Nico HULKENBERG	HARD	2024-05-19T13:57:25.188000+00:00	40	26.6:
788		Nico HULKENBERG	HARD	2024-05-19T13:58:48.326000+00:00	41	26.1:
808		Nico HULKENBERG	HARD	2024-05-19T14:00:10.784000+00:00	42	26.0:
828		Nico HULKENBERG	HARD	2024-05-19T14:01:33.168000+00:00	43	26.1:
848		Nico HULKENBERG	HARD	2024-05-19T14:02:55.584000+00:00	44	26.1:
868		Nico HULKENBERG	HARD	2024-05-19T14:04:17.829000+00:00	45	26.2:
888		Nico HULKENBERG	HARD	2024-05-19T14:05:40.166000+00:00	46	26.7:
908		Nico HULKENBERG	HARD	2024-05-19T14:07:03.672000+00:00	47	26.1:

	full_name	compound		date_start	lap_number	duration_sector_1
928	Nico HULKENBERG	HARD	2024-05-19T14:08:26.476000+00:00		48	26.1:
948	Nico HULKENBERG	HARD	2024-05-19T14:09:48.723000+00:00		49	25.98
968	Nico HULKENBERG	HARD	2024-05-19T14:11:10.662000+00:00		50	25.9:
988	Nico HULKENBERG	HARD	2024-05-19T14:12:32.710000+00:00		51	26.10
1007	Nico HULKENBERG	HARD	2024-05-19T14:13:56.729000+00:00		52	25.98
1026	Nico HULKENBERG	HARD	2024-05-19T14:15:20.738000+00:00		53	25.90
1044	Nico HULKENBERG	HARD	2024-05-19T14:16:44.356000+00:00		54	26.0:
1063	Nico HULKENBERG	HARD	2024-05-19T14:18:06.647000+00:00		55	26.0:
1082	Nico HULKENBERG	HARD	2024-05-19T14:19:28.727000+00:00		56	26.0:
1101	Nico HULKENBERG	HARD	2024-05-19T14:20:50.879000+00:00		57	26.1:
1120	Nico HULKENBERG	HARD	2024-05-19T14:22:14.843000+00:00		58	26.0:
1139	Nico HULKENBERG	HARD	2024-05-19T14:23:36.914000+00:00		59	26.10
1157	Nico HULKENBERG	HARD	2024-05-19T14:24:59.126000+00:00		60	25.90
	Nico					

Kick Sauber

In [436...]

```
stintInformation.query('driver_number == 24 or driver_number == 77')
```

Out[436...]

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
3	1235	9515	1	77	1	8	MEDIUM	
16	1235	9515	1	24	1	33	HARD	
23	1235	9515	2	77	9	63	HARD	
40	1235	9515	2	24	34	63	MEDIUM	

In [437...]

```
libraryDataF1.getinfolongruns(jointables, 24, 'Kick Sauber', MINIMUN_SECONDS, 1)
```

Out[437...]

	full_name	compound		date_start	lap_number	duration_sector_1	duration_sector_2
32	ZHOU Guanyu	HARD	2024-05-19T13:04:49.781000+00:00		2	26.857	
52	ZHOU Guanyu	HARD	2024-05-19T13:06:13.687000+00:00		3	26.019	
72	ZHOU Guanyu	HARD	2024-05-19T13:07:36.452000+00:00		4	25.947	

	full_name	compound		date_start	lap_number	duration_sector_1	sector_1
92	ZHOU Guanyu	HARD		2024-05-19T13:08:59.490000+00:00	5	25.962	1
112	ZHOU Guanyu	HARD		2024-05-19T13:10:22.131000+00:00	6	26.014	1
132	ZHOU Guanyu	HARD		2024-05-19T13:11:44.742000+00:00	7	26.214	1
151	ZHOU Guanyu	HARD		2024-05-19T13:13:07.669000+00:00	8	26.220	1
169	ZHOU Guanyu	HARD		2024-05-19T13:14:30.420000+00:00	9	26.248	1
187	ZHOU Guanyu	HARD		2024-05-19T13:15:53.595000+00:00	10	26.258	1
207	ZHOU Guanyu	HARD		2024-05-19T13:17:16.766000+00:00	11	26.265	1
226	ZHOU Guanyu	HARD		2024-05-19T13:18:39.602000+00:00	12	26.403	1
245	ZHOU Guanyu	HARD		2024-05-19T13:20:02.746000+00:00	13	26.276	1
265	ZHOU Guanyu	HARD		2024-05-19T13:21:25.780000+00:00	14	26.115	1
284	ZHOU Guanyu	HARD		2024-05-19T13:22:48.733000+00:00	15	26.116	1
304	ZHOU Guanyu	HARD		2024-05-19T13:24:11.458000+00:00	16	26.115	1
324	ZHOU Guanyu	HARD		2024-05-19T13:25:34.362000+00:00	17	26.218	1
344	ZHOU Guanyu	HARD		2024-05-19T13:26:57.307000+00:00	18	26.333	1
364	ZHOU Guanyu	HARD		2024-05-19T13:28:20.401000+00:00	19	26.341	1
384	ZHOU Guanyu	HARD		2024-05-19T13:29:43.560000+00:00	20	26.311	1
404	ZHOU Guanyu	HARD		2024-05-19T13:31:06.864000+00:00	21	26.320	1
424	ZHOU Guanyu	HARD		2024-05-19T13:32:30.115000+00:00	22	26.299	1
442	ZHOU Guanyu	HARD		2024-05-19T13:33:53.328000+00:00	23	26.226	1
461	ZHOU Guanyu	HARD		2024-05-19T13:35:16.362000+00:00	24	26.226	1
479	ZHOU Guanyu	HARD		2024-05-19T13:36:39.386000+00:00	25	26.483	1
498	ZHOU Guanyu	HARD		2024-05-19T13:38:02.729000+00:00	26	26.252	1
517	ZHOU Guanyu	HARD		2024-05-19T13:39:25.753000+00:00	27	26.217	1
537	ZHOU Guanyu	HARD		2024-05-19T13:40:48.700000+00:00	28	26.277	1
554	ZHOU Guanyu	HARD		2024-05-19T13:42:11.576000+00:00	29	26.417	1

	full_name	compound	date_start	lap_number	duration_sector_1	sector_1_meaning
574	ZHOU Guanyu	HARD	2024-05-19T13:43:34.779000+00:00	30	26.297	DRY
593	ZHOU Guanyu	HARD	2024-05-19T13:44:57.918000+00:00	31	26.299	DRY
612	ZHOU Guanyu	HARD	2024-05-19T13:46:21.173000+00:00	32	26.411	DRY
671	ZHOU Guanyu	MEDIUM	2024-05-19T13:50:59.699000+00:00	35	25.887	DRY
691	ZHOU Guanyu	MEDIUM	2024-05-19T13:52:20.960000+00:00	36	25.892	DRY
711	ZHOU Guanyu	MEDIUM	2024-05-19T13:53:43.962000+00:00	37	25.633	DRY
728	ZHOU Guanyu	MEDIUM	2024-05-19T13:55:04.959000+00:00	38	26.010	DRY
748	ZHOU Guanyu	MEDIUM	2024-05-19T13:56:26.448000+00:00	39	25.957	DRY
768	ZHOU Guanyu	MEDIUM	2024-05-19T13:57:48.189000+00:00	40	26.404	DRY
787	ZHOU Guanyu	MEDIUM	2024-05-19T13:59:10.005000+00:00	41	26.087	DRY
807	ZHOU Guanyu	MEDIUM	2024-05-19T14:00:31.374000+00:00	42	26.373	DRY
827	ZHOU Guanyu	MEDIUM	2024-05-19T14:01:53.435000+00:00	43	26.412	DRY
847	ZHOU Guanyu	MEDIUM	2024-05-19T14:03:17.280000+00:00	44	25.495	DRY
867	ZHOU Guanyu	MEDIUM	2024-05-19T14:04:38.579000+00:00	45	25.850	DRY
887	ZHOU Guanyu	MEDIUM	2024-05-19T14:06:00.145000+00:00	46	25.925	DRY
907	ZHOU Guanyu	MEDIUM	2024-05-19T14:07:21.860000+00:00	47	25.961	DRY
927	ZHOU Guanyu	MEDIUM	2024-05-19T14:08:43.710000+00:00	48	26.696	DRY
947	ZHOU Guanyu	MEDIUM	2024-05-19T14:10:07.978000+00:00	49	25.682	DRY
967	ZHOU Guanyu	MEDIUM	2024-05-19T14:11:29.958000+00:00	50	25.868	DRY
987	ZHOU Guanyu	MEDIUM	2024-05-19T14:12:52.425000+00:00	51	27.080	DRY
1006	ZHOU Guanyu	MEDIUM	2024-05-19T14:14:16.552000+00:00	52	25.876	DRY
1025	ZHOU Guanyu	MEDIUM	2024-05-19T14:15:39.400000+00:00	53	25.779	DRY
1043	ZHOU Guanyu	MEDIUM	2024-05-19T14:17:02.089000+00:00	54	26.169	DRY
1062	ZHOU Guanyu	MEDIUM	2024-05-19T14:18:26.130000+00:00	55	25.848	DRY
1081	ZHOU Guanyu	MEDIUM	2024-05-19T14:19:48.904000+00:00	56	26.193	DRY

	full_name	compound		date_start	lap_number	duration_sector_1	duration_lap
1100	ZHOU Guanyu	MEDIUM		2024-05-19T14:21:11.820000+00:00	57	26.761	
1119	ZHOU Guanyu	MEDIUM		2024-05-19T14:22:35.686000+00:00	58	26.250	
1138	ZHOU Guanyu	MEDIUM		2024-05-19T14:23:58.717000+00:00	59	26.008	
1156	ZHOU Guanyu	MEDIUM		2024-05-19T14:25:22.395000+00:00	60	25.701	

In [438...]

```
libraryDataF1.getinfolongruns(jointables, 77, 'Kick Sauber', MINIMUM_SECONDS, 1)
```

Out[438...]

	full_name	compound		date_start	lap_number	duration_sector_1	duration_lap
38	Valtteri BOTTAS	MEDIUM		2024-05-19T13:04:49.192000+00:00	2	26.730	
58	Valtteri BOTTAS	MEDIUM		2024-05-19T13:06:12.956000+00:00	3	25.891	
78	Valtteri BOTTAS	MEDIUM		2024-05-19T13:07:35.648000+00:00	4	25.954	
98	Valtteri BOTTAS	MEDIUM		2024-05-19T13:08:58.424000+00:00	5	26.095	
118	Valtteri BOTTAS	MEDIUM		2024-05-19T13:10:21.175000+00:00	6	26.033	
138	Valtteri BOTTAS	MEDIUM		2024-05-19T13:11:43.672000+00:00	7	26.077	
193	Valtteri BOTTAS	HARD		2024-05-19T13:16:19.278000+00:00	10	26.004	
213	Valtteri BOTTAS	HARD		2024-05-19T13:17:40.922000+00:00	11	25.989	
232	Valtteri BOTTAS	HARD		2024-05-19T13:19:02.251000+00:00	12	26.090	
251	Valtteri BOTTAS	HARD		2024-05-19T13:20:24.313000+00:00	13	25.944	
270	Valtteri BOTTAS	HARD		2024-05-19T13:21:45.820000+00:00	14	25.899	
290	Valtteri BOTTAS	HARD		2024-05-19T13:23:07.673000+00:00	15	25.936	
310	Valtteri BOTTAS	HARD		2024-05-19T13:24:29.584000+00:00	16	26.004	
330	Valtteri BOTTAS	HARD		2024-05-19T13:25:51.438000+00:00	17	26.239	
350	Valtteri BOTTAS	HARD		2024-05-19T13:27:14.065000+00:00	18	26.284	
370	Valtteri BOTTAS	HARD		2024-05-19T13:28:36.296000+00:00	19	26.156	
390	Valtteri BOTTAS	HARD		2024-05-19T13:29:58.586000+00:00	20	26.131	
410	Valtteri BOTTAS	HARD		2024-05-19T13:31:20.875000+00:00	21	26.051	
429	Valtteri BOTTAS	HARD		2024-05-19T13:32:43.072000+00:00	22	26.097	

	full_name	compound		date_start	lap_number	duration_sector_1	c
448	Valtteri BOTTAS	HARD		2024-05-19T13:34:05.487000+00:00	23	26.097	
467	Valtteri BOTTAS	HARD		2024-05-19T13:35:27.802000+00:00	24	26.136	
485	Valtteri BOTTAS	HARD		2024-05-19T13:36:50.573000+00:00	25	26.058	
503	Valtteri BOTTAS	HARD		2024-05-19T13:38:13.066000+00:00	26	26.235	
523	Valtteri BOTTAS	HARD		2024-05-19T13:39:35.688000+00:00	27	26.139	
541	Valtteri BOTTAS	HARD		2024-05-19T13:40:58.307000+00:00	28	26.235	
560	Valtteri BOTTAS	HARD		2024-05-19T13:42:21.299000+00:00	29	26.330	
580	Valtteri BOTTAS	HARD		2024-05-19T13:43:44.388000+00:00	30	26.198	
599	Valtteri BOTTAS	HARD		2024-05-19T13:45:07.700000+00:00	31	26.034	
618	Valtteri BOTTAS	HARD		2024-05-19T13:46:30.562000+00:00	32	25.980	
638	Valtteri BOTTAS	HARD		2024-05-19T13:47:53.235000+00:00	33	26.326	
657	Valtteri BOTTAS	HARD		2024-05-19T13:49:16.293000+00:00	34	26.286	
677	Valtteri BOTTAS	HARD		2024-05-19T13:50:38.966000+00:00	35	26.154	
697	Valtteri BOTTAS	HARD		2024-05-19T13:52:01.791000+00:00	36	26.229	
717	Valtteri BOTTAS	HARD		2024-05-19T13:53:24.527000+00:00	37	26.239	
734	Valtteri BOTTAS	HARD		2024-05-19T13:54:47.164000+00:00	38	26.276	
754	Valtteri BOTTAS	HARD		2024-05-19T13:56:09.660000+00:00	39	26.266	
774	Valtteri BOTTAS	HARD		2024-05-19T13:57:32.626000+00:00	40	27.269	
793	Valtteri BOTTAS	HARD		2024-05-19T13:58:56.373000+00:00	41	26.324	
813	Valtteri BOTTAS	HARD		2024-05-19T14:00:19.306000+00:00	42	26.319	
833	Valtteri BOTTAS	HARD		2024-05-19T14:01:41.997000+00:00	43	26.170	
853	Valtteri BOTTAS	HARD		2024-05-19T14:03:04.525000+00:00	44	26.105	
873	Valtteri BOTTAS	HARD		2024-05-19T14:04:27.358000+00:00	45	26.324	
893	Valtteri BOTTAS	HARD		2024-05-19T14:05:51.692000+00:00	46	26.727	
933	Valtteri BOTTAS	HARD		2024-05-19T14:08:41.284000+00:00	48	25.995	

	full_name	compound		date_start	lap_number	duration_sector_1	...
953	Valtteri BOTTAS	HARD		2024-05-19T14:10:03.665000+00:00	49	26.257	
973	Valtteri BOTTAS	HARD		2024-05-19T14:11:26.388000+00:00	50	26.193	
993	Valtteri BOTTAS	HARD		2024-05-19T14:12:50.150000+00:00	51	26.741	
1012	Valtteri BOTTAS	HARD		2024-05-19T14:14:14.049000+00:00	52	27.484	
1030	Valtteri BOTTAS	HARD		2024-05-19T14:15:38.103000+00:00	53	26.187	
1049	Valtteri BOTTAS	HARD		2024-05-19T14:17:00.952000+00:00	54	26.859	
1068	Valtteri BOTTAS	HARD		2024-05-19T14:18:24.564000+00:00	55	26.451	
1087	Valtteri BOTTAS	HARD		2024-05-19T14:19:47.542000+00:00	56	26.465	
1106	Valtteri BOTTAS	HARD		2024-05-19T14:21:10.525000+00:00	57	26.359	
1125	Valtteri BOTTAS	HARD		2024-05-19T14:22:34.921000+00:00	58	26.113	
1144	Valtteri BOTTAS	HARD		2024-05-19T14:23:57.483000+00:00	59	26.541	

Williams

In [439...]

```
stintInformation.query('driver number == 23 or driver number == 21')
```

Out[439...]

meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyre
2	1235	9515	1	23	1	8	MEDIUM
15	1235	9515	1	2	1	31	HARD
21	1235	9515	2	23	9	9	HARD
24	1235	9515	3	23	10	23	MEDIUM
30	1235	9515	4	23	24	28	MEDIUM
37	1235	9515	5	23	29	52	MEDIUM
39	1235	9515	2	2	32	63	MEDIUM

In [440...]

```
libraryDataEl.getinfolongruns(jointables.23.'Williams'.MINIMUM_SECONDS,MAX)
```

Out[440...]

	full_name	compound	date_start	lap_number	duration_sector_1	dt
111	Alexander ALBON	MEDIUM	2024-05-19T13:10:18.752000+00:00	6	26.056	
131	Alexander ALBON	MEDIUM	2024-05-19T13:11:41.142000+00:00	7	25.951	
206	Alexander ALBON	MEDIUM	2024-05-19T13:19:06.755000+00:00	11	25.889	
225	Alexander ALBON	MEDIUM	2024-05-19T13:20:28.513000+00:00	12	25.749	
244	Alexander ALBON	MEDIUM	2024-05-19T13:21:50.057000+00:00	13	25.706	
264	Alexander ALBON	MEDIUM	2024-05-19T13:23:11.506000+00:00	14	25.759	
283	Alexander ALBON	MEDIUM	2024-05-19T13:24:33.404000+00:00	15	25.750	
303	Alexander ALBON	MEDIUM	2024-05-19T13:25:55.173000+00:00	16	25.938	
323	Alexander ALBON	MEDIUM	2024-05-19T13:27:17.244000+00:00	17	25.986	
343	Alexander ALBON	MEDIUM	2024-05-19T13:28:39.703000+00:00	18	25.874	
363	Alexander ALBON	MEDIUM	2024-05-19T13:30:01.965000+00:00	19	25.928	
383	Alexander ALBON	MEDIUM	2024-05-19T13:31:24.557000+00:00	20	25.599	
403	Alexander ALBON	MEDIUM	2024-05-19T13:32:46.241000+00:00	21	25.866	
423	Alexander ALBON	MEDIUM	2024-05-19T13:34:08.562000+00:00	22	25.889	
497	Alexander ALBON	MEDIUM	2024-05-19T13:40:17.818000+00:00	26	25.986	
516	Alexander ALBON	MEDIUM	2024-05-19T13:41:40.016000+00:00	27	26.008	
573	Alexander ALBON	MEDIUM	2024-05-19T13:46:17.389000+00:00	30	25.384	
592	Alexander ALBON	MEDIUM	2024-05-19T13:47:38.857000+00:00	31	25.887	
611	Alexander ALBON	MEDIUM	2024-05-19T13:49:00.805000+00:00	32	25.845	
631	Alexander ALBON	MEDIUM	2024-05-19T13:50:22.609000+00:00	33	25.923	
651	Alexander ALBON	MEDIUM	2024-05-19T13:51:44.467000+00:00	34	25.815	
670	Alexander ALBON	MEDIUM	2024-05-19T13:53:06.165000+00:00	35	25.843	
690	Alexander ALBON	MEDIUM	2024-05-19T13:54:27.784000+00:00	36	25.831	
710	Alexander ALBON	MEDIUM	2024-05-19T13:55:49.480000+00:00	37	25.817	
727	Alexander ALBON	MEDIUM	2024-05-19T13:57:11.241000+00:00	38	25.828	

	full_name	compound		date_start	lap_number	duration_sector_1	dt
747	Alexander ALBON	MEDIUM	2024-05-19T13:58:32.934000+00:00		39	25.790	
767	Alexander ALBON	MEDIUM	2024-05-19T13:59:54.659000+00:00		40	25.877	
786	Alexander ALBON	MEDIUM	2024-05-19T14:01:16.468000+00:00		41	25.801	
806	Alexander ALBON	MEDIUM	2024-05-19T14:02:38.156000+00:00		42	25.799	
826	Alexander ALBON	MEDIUM	2024-05-19T14:04:00+00:00		43	25.770	
846	Alexander ALBON	MEDIUM	2024-05-19T14:05:21.755000+00:00		44	25.704	
866	Alexander ALBON	MEDIUM	2024-05-19T14:06:43.217000+00:00		45	25.719	
886	Alexander ALBON	MEDIUM	2024-05-19T14:08:04.856000+00:00		46	25.685	
906	Alexander ALBON	MEDIUM	2024-05-19T14:09:26.117000+00:00		47	25.652	
926	Alexander ALBON	MEDIUM	2024-05-19T14:10:47.471000+00:00		48	25.553	
946	Alexander ALBON	MEDIUM	2024-05-19T14:12:08.755000+00:00		49	25.724	

In [441...]

```
libraryDataF1.getinfolongruns(jointables,2,'Williams',MINIMUM_SECONDS,MAXIMUM_SECONDS)
```

Out[441...]

	full_name	compound		date_start	lap_number	duration_sector_1	
21	Logan SARGEANT	HARD	2024-05-19T13:04:50.057000+00:00		2	27.116	
41	Logan SARGEANT	HARD	2024-05-19T13:06:14.385000+00:00		3	26.056	
61	Logan SARGEANT	HARD	2024-05-19T13:07:37.158000+00:00		4	25.946	
81	Logan SARGEANT	HARD	2024-05-19T13:09:00.142000+00:00		5	25.954	
101	Logan SARGEANT	HARD	2024-05-19T13:10:22.768000+00:00		6	25.964	
121	Logan SARGEANT	HARD	2024-05-19T13:11:45.558000+00:00		7	26.067	
141	Logan SARGEANT	HARD	2024-05-19T13:13:08.555000+00:00		8	26.113	
160	Logan SARGEANT	HARD	2024-05-19T13:14:31.285000+00:00		9	26.199	
177	Logan SARGEANT	HARD	2024-05-19T13:15:54.448000+00:00		10	26.280	
196	Logan SARGEANT	HARD	2024-05-19T13:17:17.889000+00:00		11	26.394	
216	Logan SARGEANT	HARD	2024-05-19T13:18:41.064000+00:00		12	26.379	
235	Logan SARGEANT	HARD	2024-05-19T13:20:04.368000+00:00		13	26.654	

	full_name	compound		date_start	lap_number	duration_sector_1
254	Logan SARGEANT	HARD	2024-05-19T13:21:27.878000+00:00		14	26.255
273	Logan SARGEANT	HARD	2024-05-19T13:22:50.931000+00:00		15	26.276
293	Logan SARGEANT	HARD	2024-05-19T13:24:14.006000+00:00		16	26.267
313	Logan SARGEANT	HARD	2024-05-19T13:25:36.923000+00:00		17	26.204
333	Logan SARGEANT	HARD	2024-05-19T13:27:00.132000+00:00		18	26.261
353	Logan SARGEANT	HARD	2024-05-19T13:28:23.440000+00:00		19	26.456
373	Logan SARGEANT	HARD	2024-05-19T13:29:46.972000+00:00		20	26.277
393	Logan SARGEANT	HARD	2024-05-19T13:31:10.100000+00:00		21	26.373
413	Logan SARGEANT	HARD	2024-05-19T13:32:33.311000+00:00		22	26.402
432	Logan SARGEANT	HARD	2024-05-19T13:33:56.695000+00:00		23	26.254
451	Logan SARGEANT	HARD	2024-05-19T13:35:19.666000+00:00		24	26.231
468	Logan SARGEANT	HARD	2024-05-19T13:36:42.572000+00:00		25	26.359
506	Logan SARGEANT	HARD	2024-05-19T13:39:31.143000+00:00		27	26.353
526	Logan SARGEANT	HARD	2024-05-19T13:40:54.769000+00:00		28	26.351
544	Logan SARGEANT	HARD	2024-05-19T13:42:17.912000+00:00		29	26.419
563	Logan SARGEANT	HARD	2024-05-19T13:43:41.418000+00:00		30	26.493
621	Logan SARGEANT	MEDIUM	2024-05-19T13:48:21.814000+00:00		33	26.012
641	Logan SARGEANT	MEDIUM	2024-05-19T13:49:43.269000+00:00		34	25.846
660	Logan SARGEANT	MEDIUM	2024-05-19T13:51:04.923000+00:00		35	25.854
680	Logan SARGEANT	MEDIUM	2024-05-19T13:52:26.429000+00:00		36	25.825
700	Logan SARGEANT	MEDIUM	2024-05-19T13:53:48.073000+00:00		37	25.690
720	Logan SARGEANT	MEDIUM	2024-05-19T13:55:11.073000+00:00		38	25.765
737	Logan SARGEANT	MEDIUM	2024-05-19T13:56:34.139000+00:00		39	25.623
757	Logan SARGEANT	MEDIUM	2024-05-19T13:57:57.234000+00:00		40	25.530
777	Logan SARGEANT	MEDIUM	2024-05-19T13:59:18.623000+00:00		41	25.536

	full_name	compound		date_start	lap_number	duration_sector_1
796	Logan SARGEANT	MEDIUM	2024-05-19T14:00:40.096000+00:00		42	25.647
816	Logan SARGEANT	MEDIUM	2024-05-19T14:02:01.616000+00:00		43	25.726
836	Logan SARGEANT	MEDIUM	2024-05-19T14:03:23.386000+00:00		44	27.797
856	Logan SARGEANT	MEDIUM	2024-05-19T14:04:47.305000+00:00		45	25.893
876	Logan SARGEANT	MEDIUM	2024-05-19T14:06:09.750000+00:00		46	26.032
896	Logan SARGEANT	MEDIUM	2024-05-19T14:07:32.145000+00:00		47	26.085
916	Logan SARGEANT	MEDIUM	2024-05-19T14:08:54.473000+00:00		48	25.971
936	Logan SARGEANT	MEDIUM	2024-05-19T14:10:16.668000+00:00		49	25.945
956	Logan SARGEANT	MEDIUM	2024-05-19T14:11:40.474000+00:00		50	25.900
976	Logan SARGEANT	MEDIUM	2024-05-19T14:13:02.441000+00:00		51	25.943
996	Logan SARGEANT	MEDIUM	2024-05-19T14:14:24.749000+00:00		52	26.663
1015	Logan SARGEANT	MEDIUM	2024-05-19T14:15:48.823000+00:00		53	25.691
1033	Logan SARGEANT	MEDIUM	2024-05-19T14:17:10.341000+00:00		54	25.773
1052	Logan SARGEANT	MEDIUM	2024-05-19T14:18:31.696000+00:00		55	25.647
1071	Logan SARGEANT	MEDIUM	2024-05-19T14:19:52.948000+00:00		56	25.840
1090	Logan SARGEANT	MEDIUM	2024-05-19T14:21:14.795000+00:00		57	26.016
1109	Logan SARGEANT	MEDIUM	2024-05-19T14:22:37.385000+00:00		58	25.979
1128	Logan SARGEANT	MEDIUM	2024-05-19T14:24:00.338000+00:00		59	25.930
1147	Logan SARGEANT	MEDIUM	2024-05-19T14:25:23.884000+00:00		60	25.975
1165	Logan SARGEANT	MEDIUM	2024-05-19T14:26:47.792000+00:00		61	27.145

Alpine

In [442...]

```
stintInformation.query('driver_number == 10 or driver_number == 31')
```

Out[442...]

	meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tyr
1	1235	9515	1	10	1	8	SOFT	
12	1235	9515	1	31	1	25	MEDIUM	
22	1235	9515	2	10	9	30	HARD	

meeting_key	session_key	stint_number	driver_number	lap_start	lap_end	compound	tire
33	1235	9515	2	31	26	63	HARD

```
In [443]: libraryDataF1.getinfoalongruns(jointables, 31, 'Alpine', MINIMUM_SECONDS, MAXIMUM_SECONDS)
```

full_name	compound	date_start	lap_number	duration_sector_1
34 Esteban OCON	MEDIUM	2024-05-19T13:04:46.901000+00:00	2	26.310
54 Esteban OCON	MEDIUM	2024-05-19T13:06:09.945000+00:00	3	25.858
74 Esteban OCON	MEDIUM	2024-05-19T13:07:32.255000+00:00	4	25.762
94 Esteban OCON	MEDIUM	2024-05-19T13:08:54.522000+00:00	5	25.993
114 Esteban OCON	MEDIUM	2024-05-19T13:10:16.630000+00:00	6	26.119
134 Esteban OCON	MEDIUM	2024-05-19T13:11:39.095000+00:00	7	26.188
153 Esteban OCON	MEDIUM	2024-05-19T13:13:01.681000+00:00	8	26.174
171 Esteban OCON	MEDIUM	2024-05-19T13:14:24.120000+00:00	9	26.237
189 Esteban OCON	MEDIUM	2024-05-19T13:15:46.867000+00:00	10	26.969
209 Esteban OCON	MEDIUM	2024-05-19T13:17:10.730000+00:00	11	25.938
228 Esteban OCON	MEDIUM	2024-05-19T13:18:33.302000+00:00	12	26.272
247 Esteban OCON	MEDIUM	2024-05-19T13:19:56.424000+00:00	13	26.375
266 Esteban OCON	MEDIUM	2024-05-19T13:21:19.208000+00:00	14	26.188
286 Esteban OCON	MEDIUM	2024-05-19T13:22:42.219000+00:00	15	26.152
306 Esteban OCON	MEDIUM	2024-05-19T13:24:05.178000+00:00	16	26.292
326 Esteban OCON	MEDIUM	2024-05-19T13:25:28.297000+00:00	17	26.173
346 Esteban OCON	MEDIUM	2024-05-19T13:26:51.262000+00:00	18	26.267
366 Esteban OCON	MEDIUM	2024-05-19T13:28:14.441000+00:00	19	26.265
386 Esteban OCON	MEDIUM	2024-05-19T13:29:37.556000+00:00	20	26.322
406 Esteban OCON	MEDIUM	2024-05-19T13:31:00.661000+00:00	21	26.348
426 Esteban OCON	MEDIUM	2024-05-19T13:32:23.981000+00:00	22	26.298
444 Esteban OCON	MEDIUM	2024-05-19T13:33:47.279000+00:00	23	26.687

	full_name	compound	date_start	lap_number	duration_sector_1	sector_1
463	Esteban OCON	MEDIUM	2024-05-19T13:35:10.867000+00:00	24	26.188	1
519	Esteban OCON	HARD	2024-05-19T13:39:47.374000+00:00	27	25.998	1
539	Esteban OCON	HARD	2024-05-19T13:41:09.197000+00:00	28	26.095	1
556	Esteban OCON	HARD	2024-05-19T13:42:31.254000+00:00	29	26.094	1
576	Esteban OCON	HARD	2024-05-19T13:43:53.499000+00:00	30	26.048	1
595	Esteban OCON	HARD	2024-05-19T13:45:16.095000+00:00	31	26.075	1
614	Esteban OCON	HARD	2024-05-19T13:46:38.628000+00:00	32	26.091	1
634	Esteban OCON	HARD	2024-05-19T13:48:01.128000+00:00	33	25.935	1
653	Esteban OCON	HARD	2024-05-19T13:49:23.453000+00:00	34	26.438	1
673	Esteban OCON	HARD	2024-05-19T13:50:46.652000+00:00	35	26.210	1
693	Esteban OCON	HARD	2024-05-19T13:52:09.529000+00:00	36	25.958	1
713	Esteban OCON	HARD	2024-05-19T13:53:32.073000+00:00	37	25.460	1
730	Esteban OCON	HARD	2024-05-19T13:54:53.201000+00:00	38	26.035	1
750	Esteban OCON	HARD	2024-05-19T13:56:15.236000+00:00	39	26.086	1
770	Esteban OCON	HARD	2024-05-19T13:57:37.471000+00:00	40	26.009	1
789	Esteban OCON	HARD	2024-05-19T13:58:59.500000+00:00	41	26.013	1
809	Esteban OCON	HARD	2024-05-19T14:00:21.628000+00:00	42	26.106	1
829	Esteban OCON	HARD	2024-05-19T14:01:43.865000+00:00	43	25.921	1
849	Esteban OCON	HARD	2024-05-19T14:03:06.023000+00:00	44	26.026	1
869	Esteban OCON	HARD	2024-05-19T14:04:29.865000+00:00	45	25.865	1
889	Esteban OCON	HARD	2024-05-19T14:05:52.379000+00:00	46	26.494	1
929	Esteban OCON	HARD	2024-05-19T14:08:42.004000+00:00	48	26.054	1
949	Esteban OCON	HARD	2024-05-19T14:10:04.455000+00:00	49	26.000	1
969	Esteban OCON	HARD	2024-05-19T14:11:29.077000+00:00	50	26.423	1
989	Esteban OCON	HARD	2024-05-19T14:12:51.910000+00:00	51	26.422	1

		full_name	compound	date_start	lap_number	duration_sector_1	duration_lap
1008		Esteban OCON	HARD	2024-05-19T14:14:16.104000+00:00	52	25.824	25.824
1027		Esteban OCON	HARD	2024-05-19T14:15:38.870000+00:00	53	25.913	25.913
1045		Esteban OCON	HARD	2024-05-19T14:17:01.631000+00:00	54	26.545	26.545
1064		Esteban OCON	HARD	2024-05-19T14:18:25.462000+00:00	55	26.074	26.074
1083		Esteban OCON	HARD	2024-05-19T14:19:48.449000+00:00	56	26.096	26.096
1102		Esteban OCON	HARD	2024-05-19T14:21:11.446000+00:00	57	26.221	26.221
1121		Esteban OCON	HARD	2024-05-19T14:22:35.400000+00:00	58	26.101	26.101
1140		Esteban OCON	HARD	2024-05-19T14:23:58.403000+00:00	59	26.124	26.124
1158		Esteban OCON	HARD	2024-05-19T14:25:20.267000+00:00	60	26.050	26.050
1177		Esteban OCON	HARD	2024-05-19T14:26:42.414000+00:00	61	25.924	25.924

In [444...]

```
libraryDataF1.getinfolongruns(jointables, 10, 'Alpine', MINIMUN_SECONDS, MAXIMUN_SECONDS)
```

Out[444...]

		full_name	compound	date_start	lap_number	duration_sector_1	duration_lap
24		Pierre GASLY	SOFT	2024-05-19T13:04:48.306000+00:00	2	26.415	26.415
44		Pierre GASLY	SOFT	2024-05-19T13:06:11.652000+00:00	3	25.987	25.987
64		Pierre GASLY	SOFT	2024-05-19T13:07:34.423000+00:00	4	25.878	25.878
84		Pierre GASLY	SOFT	2024-05-19T13:08:57.088000+00:00	5	26.157	26.157
104		Pierre GASLY	SOFT	2024-05-19T13:10:19.599000+00:00	6	26.052	26.052
124		Pierre GASLY	SOFT	2024-05-19T13:11:41.945000+00:00	7	25.912	25.912
180		Pierre GASLY	HARD	2024-05-19T13:16:16.642000+00:00	10	26.083	26.083
199		Pierre GASLY	HARD	2024-05-19T13:17:38.078000+00:00	11	26.089	26.089
218		Pierre GASLY	HARD	2024-05-19T13:18:59.571000+00:00	12	26.109	26.109
238		Pierre GASLY	HARD	2024-05-19T13:20:21.471000+00:00	13	26.196	26.196
257		Pierre GASLY	HARD	2024-05-19T13:21:43.471000+00:00	14	26.024	26.024
276		Pierre GASLY	HARD	2024-05-19T13:23:05.210000+00:00	15	25.957	25.957
296		Pierre GASLY	HARD	2024-05-19T13:24:27.208000+00:00	16	26.063	26.063

	full_name	compound	date_start	lap_number	duration_sector_1	c
316	Pierre GASLY	HARD	2024-05-19T13:25:49.372000+00:00	17	26.197	
336	Pierre GASLY	HARD	2024-05-19T13:27:11.768000+00:00	18	26.155	
356	Pierre GASLY	HARD	2024-05-19T13:28:34.155000+00:00	19	26.215	
376	Pierre GASLY	HARD	2024-05-19T13:29:56.461000+00:00	20	26.139	
396	Pierre GASLY	HARD	2024-05-19T13:31:18.684000+00:00	21	26.119	
416	Pierre GASLY	HARD	2024-05-19T13:32:41.126000+00:00	22	26.034	
434	Pierre GASLY	HARD	2024-05-19T13:34:03.449000+00:00	23	26.182	
454	Pierre GASLY	HARD	2024-05-19T13:35:25.910000+00:00	24	26.092	
471	Pierre GASLY	HARD	2024-05-19T13:36:48.465000+00:00	25	26.185	
491	Pierre GASLY	HARD	2024-05-19T13:38:11.142000+00:00	26	26.134	
509	Pierre GASLY	HARD	2024-05-19T13:39:33.881000+00:00	27	26.135	
529	Pierre GASLY	HARD	2024-05-19T13:40:56.687000+00:00	28	26.195	
547	Pierre GASLY	HARD	2024-05-19T13:42:19.840000+00:00	29	26.418	
604	Pierre GASLY	MEDIUM	2024-05-19T13:46:55.914000+00:00	32	25.965	
624	Pierre GASLY	MEDIUM	2024-05-19T13:48:17.235000+00:00	33	26.005	
644	Pierre GASLY	MEDIUM	2024-05-19T13:49:38.955000+00:00	34	26.101	
663	Pierre GASLY	MEDIUM	2024-05-19T13:51:00.575000+00:00	35	25.872	
683	Pierre GASLY	MEDIUM	2024-05-19T13:52:24.064000+00:00	36	25.902	
703	Pierre GASLY	MEDIUM	2024-05-19T13:53:45.570000+00:00	37	25.921	
723	Pierre GASLY	MEDIUM	2024-05-19T13:55:07.152000+00:00	38	26.103	
740	Pierre GASLY	MEDIUM	2024-05-19T13:56:28.798000+00:00	39	25.758	
760	Pierre GASLY	MEDIUM	2024-05-19T13:57:50.565000+00:00	40	25.929	
780	Pierre GASLY	MEDIUM	2024-05-19T13:59:13.899000+00:00	41	26.892	
799	Pierre GASLY	MEDIUM	2024-05-19T14:00:36.930000+00:00	42	26.007	
819	Pierre GASLY	MEDIUM	2024-05-19T14:02:00.781000+00:00	43	25.690	

	full_name	compound	date_start	lap_number	duration_sector_1	duration_sector_2	duration_sector_3	duration_total
839	Pierre GASLY	MEDIUM	2024-05-19T14:03:22.269000+00:00	44	25.902			
859	Pierre GASLY	MEDIUM	2024-05-19T14:04:44.170000+00:00	45	25.908			
879	Pierre GASLY	MEDIUM	2024-05-19T14:06:07.739000+00:00	46	26.439			
899	Pierre GASLY	MEDIUM	2024-05-19T14:07:30.621000+00:00	47	26.056			
919	Pierre GASLY	MEDIUM	2024-05-19T14:08:52.880000+00:00	48	25.985			
939	Pierre GASLY	MEDIUM	2024-05-19T14:10:14.632000+00:00	49	26.032			
959	Pierre GASLY	MEDIUM	2024-05-19T14:11:36.690000+00:00	50	26.011			
979	Pierre GASLY	MEDIUM	2024-05-19T14:12:58.588000+00:00	51	26.070			
999	Pierre GASLY	MEDIUM	2024-05-19T14:14:20.733000+00:00	52	26.095			
1018	Pierre GASLY	MEDIUM	2024-05-19T14:15:42.947000+00:00	53	25.990			
1036	Pierre GASLY	MEDIUM	2024-05-19T14:17:04.835000+00:00	54	26.039			
1055	Pierre GASLY	MEDIUM	2024-05-19T14:18:27.066000+00:00	55	25.711			
1074	Pierre GASLY	MEDIUM	2024-05-19T14:19:49.603000+00:00	56	26.071			
1093	Pierre GASLY	MEDIUM	2024-05-19T14:21:13.424000+00:00	57	25.850			
1112	Pierre GASLY	MEDIUM	2024-05-19T14:22:36.377000+00:00	58	26.123			
1131	Pierre GASLY	MEDIUM	2024-05-19T14:23:59.396000+00:00	59	25.915			
1150	Pierre GASLY	MEDIUM	2024-05-19T14:25:22.784000+00:00	60	26.651			
1168	Pierre GASLY	MEDIUM	2024-05-19T14:26:46.764000+00:00	61	25.746			

Pits

Before to finish the analysis, I added the Pits sections where it can see how much time teams spent in the box.

In [445...]

```
pit = libraryDataF1.obtain_information('pit', session_key=9496)
```

In [446...]

```
jointables = pd.merge(drivers,pit,on=['driver_number']).query("pit_duration > 0")
jointables
pit_duration = pd.DataFrame(jointables.groupby('team_name')['pit_duration'].sum())
pit_duration
```

Out[446...]

pit_duration

team_name	
Red Bull Racing	23.025000
Aston Martin	23.080000
McLaren	23.100000
Ferrari	23.266667
RB	23.350000
Mercedes	23.400000
Alpine	23.575000
Williams	24.300000
Haas F1 Team	24.533333
Kick Sauber	25.300000