

Race Engineering Tools

Modular Platform for Motorsport Performance

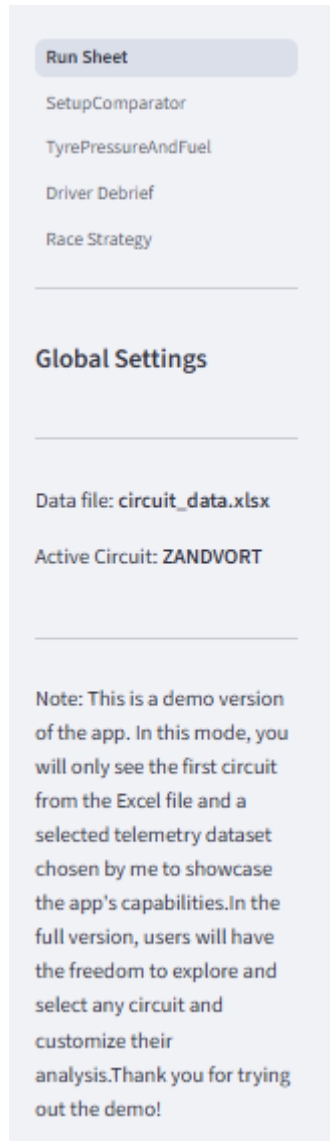
LINK:

[Race Engineering Tools - Streamlit](#)

November 2025

DOMENICO CERRETO

App Structure Overview



All your Race Engineering Data in **one unified platform**, helping teams:

- Organize and review all session data efficiently
- Quickly compare and adjust car setups
- Optimize tyre pressures and fuel consumption
- Simplify driver debrief and telemetry analysis
- Automate race strategy simulation and comparison

This results in **faster decisions, reduced errors, improved team collaboration**, and ultimately better race performance.

App Structure Overview

Run Sheet

SetupComparator

TyrePressureAndFuel

Driver Debrief

Race Strategy

Global Settings

Data file: circuit_data.xlsx

Active Circuit: ZANDVORT

Note: This is a demo version of the app. In this mode, you will only see the first circuit from the Excel file and a selected telemetry dataset chosen by me to showcase the app's capabilities. In the full version, users will have the freedom to explore and select any circuit and customize their analysis. Thank you for trying out the demo!

Everything is accessible in one place, ensuring your processes are streamlined and collaborative.

Demo Version:

Try out the main app features with sample data. In the full version, you can import track, tyre, and telemetry datasets for advanced and personalised analysis.

App Structure Overview

Run Sheet

SetupComparator

TyrePressureAndFuel

Driver Debrief

Race Strategy

Global Settings

Data file: circuit_data.xlsx

Active Circuit: ZANDVORT

Note: This is a demo version of the app. In this mode, you will only see the first circuit from the Excel file and a selected telemetry dataset chosen by me to showcase the app's capabilities. In the full version, users will have the freedom to explore and select any circuit and customize their analysis. Thank you for trying out the demo!

Run Sheet: Organise, save, and review all session data in one place.

Setup Comparator: Instantly compare car setups to see the impact of adjustments on key balances.

Tyre Pressure & Fuel: Calculate ideal tyre pressures and fuel needs for each stint, using session conditions.

Driver Debrief: Generate detailed feedback sheets for drivers and coaches to support thorough analysis.

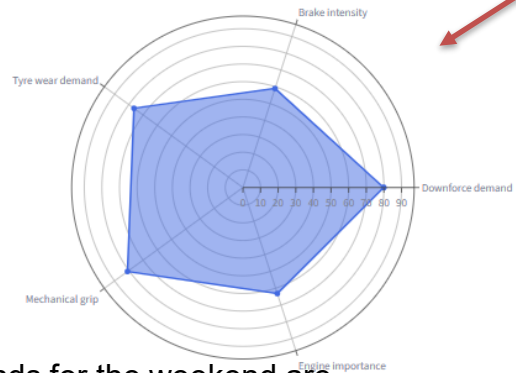
Race Strategy: Create and compare race strategies so you can choose the optimal approach for every event

Run Sheet

Overall information about the race weekend

Race Engineering Tools

Circuit Characteristics — ZANDVORT



Visual summary of circuit demands, based on knowledge and telemetry data

All main tyre compounds for the weekend are listed with corresponding performance data.

Race weekend options

☒ Tyres available

	Compound	Grip_New	Degradation_Per_Lap	Max_Laps	Sets_Available
0	Soft	1	0.05	20	3
1	Medium	0.97	0.03	30	2
2	Hard	0.95	0.02	40	2

Tyre degradation estimate and Fuel Consumption

Select Compound

Soft

Laps done with this set

0

Estimated grip remaining: 100.0%

Fuel required for 0 laps (+2 in/out): 5.0 L

Select any tyre and number of laps to immediately see estimated grip and fuel requirements for each stint.

Run Sheet

Easily create, save, and organise sessions and runs.

Keep all data structured for quick review and **PDF/Excel export**.

Automatic checks prevent errors and missing information, so every run is complete and reliable.

Run Sheet (MVP)

Session name (e.g. FP1, Qualifying, Race)

FP1

Create new session

Button for session creation

Session 'FP1' create!

Select session

FP1

+ New Run

Choose all run conditions

Driver

Condition

Setup

Set tires

Dry

Soft #1

Expected number of launched laps

1

Initial fuel (L)

0,00

Ambient Temperature (°C)

25,00

Track Temperature (°C)

30,00

⚠ Not enough fuel! For 1 laps + 2 extra you need at least 7.5 L.

Instant feedback alerts for missing or wrong data

Create Run

Button for run generation

Select the session to export

FP1



Export your run to PDF for future review and analysis

Generate PDF

Setup Comparator

Compare multiple car setups in real time.

See the impact of every change on core metrics: balance, stiffness and aero. Get instant insights with derived metrics and visual warnings for critical parameters.

 **Setup Comparator** Save or export setups for documentation and post-session analysis.  Instantly compare two car setups.

Save Setup 1

Save Setup 2

Compare Setups

Setup 1 and Setup 2 are loaded automatically from the files.

Setup 1

Adjust every major parameter: tyres, dampers, aero, and more; for each car area.

Tyres

Left Front

Left Front PSI S1

30.00

Current value: 30.0

Left Front Toe S1

0.50

Current value: 0.5

Left Front Camber S1

-2.60

Current value: -2.6

Left Front Caster S1

8.00

Current value: 8.0

Right Front

Left Rear

Right Rear

Mechanical Grip

Dampers

Aero

Setup 2

Tyres

Mechanical Grip

Dampers

Left Front

Left Front Bump S2

8

Current value: 8

Left Front Fast Bump S2

6

Current value: 6

Left Front Rebound S2

10

Current value: 10

Left Front Fast Rebound S2

8

Current value: 8

Right Front

Left Rear

Right Rear

Right Front

Left Rear

Right Rear

Aero

Setup Comparator

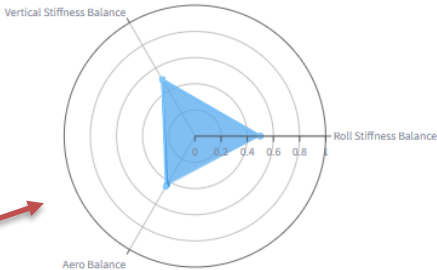
Derived Metrics

[More info about setup metrics](#)

	Parameter	Setup 1	Setup 2
0	Roll Stiffness Balance	0.5000	0.5000
1	Vertical Stiffness Balance	0.5000	0.5000
2	Aero Balance	0.4270	0.4470

Instantly compare key performance metrics with the derived metrics table.
A helpful PDF guide is available for interpreting the KPIs, avoiding confusion if several engineers are involved.

Radar Chart of Derived Metrics



The radar chart visualises which setup is optimal in each area at a glance.

Receive quick feedback on setup health and risks, with colored warnings for out-of-range or suboptimal results.

Setup 1 Tips & Alerts

- Roll Stiffness Balance is within optimal range.
- Vertical Stiffness Balance is balanced.
- Rear Aero Balance high → More rear downforce, possible high-speed understeer.

Setup 2 Tips & Alerts

- Roll Stiffness Balance is within optimal range.
- Vertical Stiffness Balance is balanced.
- Rear Aero Balance high → More rear downforce, possible high-speed understeer.

Tire & Fuel

Get precise tyre pressure recommendations for any session.

Tyre Pressure & Fuel Management Dashboard

Step 1: Session Setup

Select session and tyre parameters. All values can be adjusted based on your data.

Tyre Compound

Soft

Ambient Temperature (°C)

25,00

Rim Temperature (°C)

30,00

Planned Laps

1

Adjust session conditions
for instant cold pressure
calculation.

 Target Hot Pressures (psi) – expected pressure once tyres are hot on track.

FL

28,00

FR

28,00

RL

28,00

RR

28,00

Set the target pressure and see
optimal recommendations.

The K factor correction refines pressure recommendations after each run, using measured values for higher accuracy.

Session type

☒ Qualifying
☐ Race

Option for a different time to achieve
the optimal pressure condition

Step 2: Enter k factors and measured pressures

- k is the correction factor linking cold and hot pressure.
- Initially, use estimated values (default = 1.00).
- After a stint, enter the **measured hot pressures** (values measured in the pits, at the end of the run).
- Then, click 'Calibrate k from measured values' to refine k and update the cold pressure targets automatically.

The K factor starts from 1
and then changes if
target pressures are not
achieved

Insert the pressure measure
in the pit after the run to
evaluate if there are some
differences with the
expectation

k FL

1,00

k FR

1,00

k RL

1,00

k RR

1,00

Measured Hot Pressures (psi) – measured in the pits after the stint.

FL

28,00

FR

28,00

RL

28,00

RR

28,00

Tire & Fuel

Evaluate the data and, if necessary, recalculate the k and the new cold pressure

Step 3: Calibrate k factors based on measured data

Click this button **after entering measured hot pressures**.
The system will:

1. Calculate new k values for each tyre.
2. Update the cold pressure recommendations automatically.

After each run, input real measured pressures to automatically recalculate k factors and refine cold pressure recommendations for the next stints.

Calibrate k from measured values

Step 4: Pressure Summary

Review the pressure summary table to quickly check target, measured, and suggested values for all tyres.

	Hot Target (psi)	Measured Hot (psi)	Suggested Cold (psi)	Current k
FL	28.00	28.00	22.85	1.00
FR	28.00	28.00	22.85	1.00
RL	28.00	28.00	22.85	1.00
RR	28.00	28.00	22.85	1.00

💡 Set these pressures **cold** in the garage to achieve the desired hot pressures on track.

Fuel you need in relation to the target lap number

Step 5: Fuel Calculation

Enter race length to estimate the total required fuel for the session.

Race Laps

10

- +

Extra Laps (in/out)

2

- +

Total Fuel Required (L)

30.0

2.5 L/lap × (10+2) laps

Instantly estimate total fuel needed for your planned laps, including in/out procedures, so every run is fully prepared.

Driver Debrief

Driver Telemetry & Feedback

 Telemetry  Track Map  Turn Feedback  Export Report

X Axis

Time

Select channels to plot (Y)

SPEED x

THROTTLE x

STEERANGLE x

BRAKE x

GEAR x

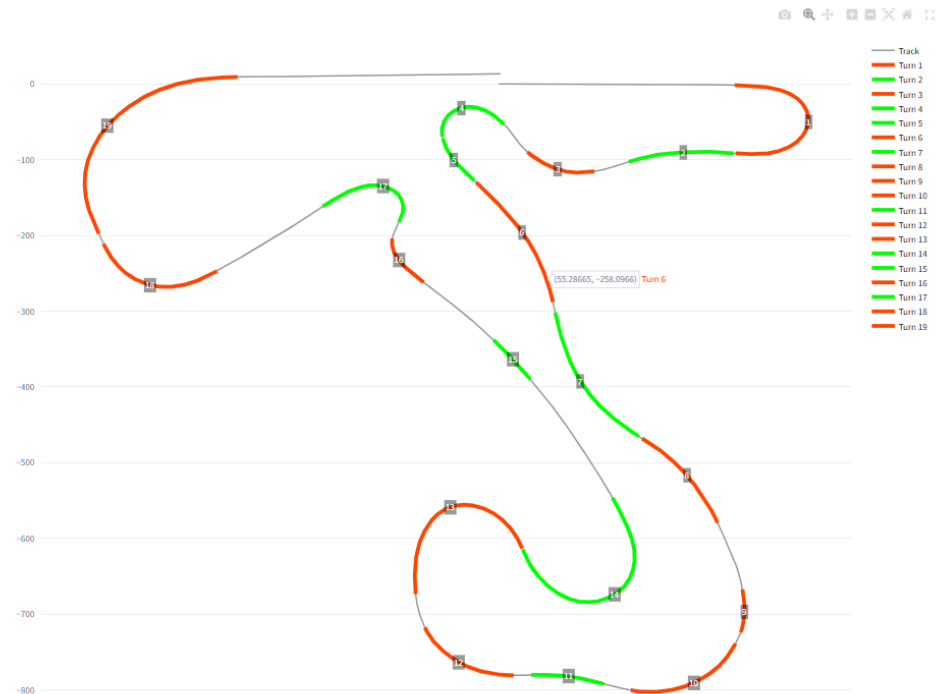
The **track map** is generated based on the **telemetry** and auto-divided into turns, making it easy to focus on every sector and pinpoint areas for improvement.

The driver coach can analyse the telemetry without any knowledge of complex analysis software.

Driver Telemetry & Feedback

 Telemetry  Track Map  Turn Feedback  Export Report

Reconstruct track from SPEED + YAW



Driver Debrief

Let the drivers write down their own feeling

Enable drivers to easily log their feedback for every turn after each run.

Fill in detailed feedback and notes per corner, supporting quick and precise analysis.

Share these insights with engineers, who can evaluate setup changes objectively and independently.

The driver and engineer can work in parallel, ensuring unbiased processing of both performance and technical feedback for the next session.



Driver Telemetry & Feedback

[Telemetry](#) [Track Map](#) [Turn Feedback](#) [Export Report](#)

Automatic turn detection and feedback form

Session Details

Session

FP1

Run Number

1

Driver

Driver's Name

Date

2025/10/29

Detected 19 turns.

▼ Turn 1 (Left)

Feeling Front

Choose options

Feeling Rear

Choose options

Notes

Race Strategy

Optimise your race plan

Race Strategy

Strategy builder — Stint-focused

Strategies

New strategy name

Create strategy

No strategies yet. Create one.

Generate and compare race strategies using real circuit and tyre data.

Alternate between auto-generated and manual editing for stints, compounds, and fuel loads.

Edit stints — 1

Stint 1

☒ Active

Start lap: 1

End lap (inclusive) for stint 1

13

- +

Compound #1

Medium

▼

Starting fuel (L)

52,50

- +

Estimated end lap: 13 (laps: 13)

This stint ends before race finish. Add another stint to model the next tyre change.

Set lap, tyre compound, and fuel for every stint.

Stint 2

☒ Active

Start lap: 14

End lap (inclusive) for stint 2

20

- +

Compound #2

Hard

▼

Fuel added at this pit (L)

10,00

- +

Estimated end lap: 20 (laps: 7)

This stint reaches race finish.

 Remove last stint

Race Strategy

Automate strategy creation to minimize race time under real conditions

Simulation

Strategy Generator & Optimizer

More iterations = more precision,
longer calculation.

The screenshot shows a web interface for a race strategy optimizer. It features a 'Strategy Generator & Optimizer' section with a 'v Optimizer Settings' dropdown. Inside, there are three input fields: 'Optimization iterations' (set to 300), 'Number of top strategies to generate' (set to 3), and 'Max pits to try (0-3)' (set to 2). Each field has minus and plus buttons for adjustment. Below these are two checked checkboxes: 'Require at least two different compounds' and 'Require at least one pit stop'. At the bottom of the settings panel is a 'Generate & Optimize Strategies' button. Below the settings panel are four buttons: 'Simulate selected strategy', 'Simulate all strategies', and 'Clear simulations'. A red arrow points from the text 'More iterations = more precision, longer calculation.' to the 'Optimization iterations' input field. Another red arrow points from the text 'Simulate and visualise each generated plan to compare options side by side, quickly choose the most effective solution.' to the 'Simulate all strategies' button.

Optimization iterations: 300 - +

Number of top strategies to generate: 3 - +

Max pits to try (0-3): 2 - +

☒ Require at least two different compounds

☒ Require at least one pit stop

Generate & Optimize Strategies

Simulate selected strategy

Simulate all strategies

Clear simulations

Simulate and visualise each
generated plan to compare
options side by side, quickly
choose the most effective
solution.

Set optimisation
parameters:

Control iteration count for
precision, limit pit stops,
and force use of multiple
compounds if needed.

Instantly **generate the
best strategies** for your
constraints, using your
circuit and tyre data.

Race Strategy

Simulate the race strategy

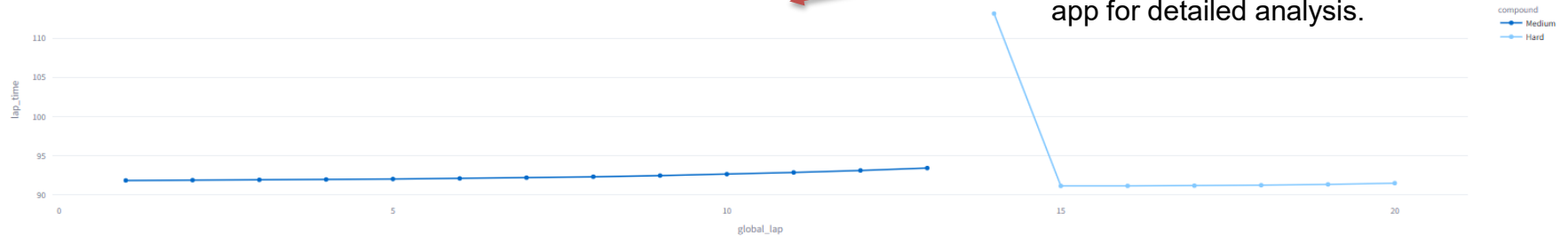
Simulation results

Optimized_1_t1845s Optimized_2_t1845s Optimized_3_t1845s

Switch between created or optimised strategies.

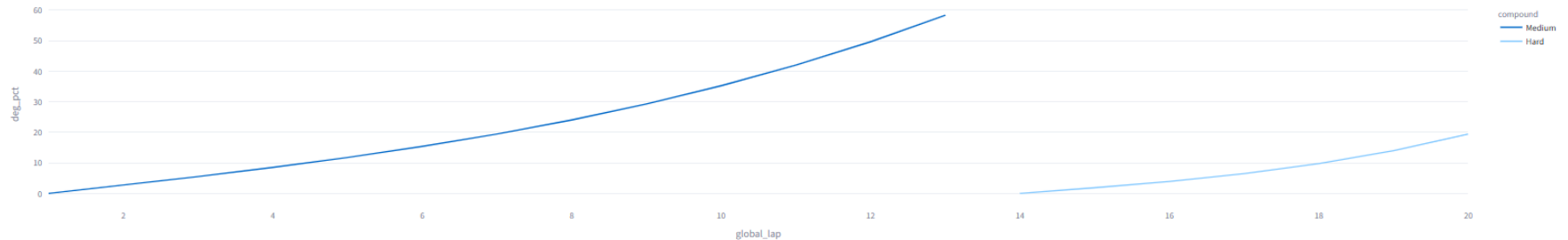
1 — details

Lap Time Trend



Visualise lap times, tyre degradation, and other key metrics to understand the race impact of each strategy. Other insightful graphs are available in-app for detailed analysis.

Tyre Degradation (%)



Race Strategy

Compare the race strategies results

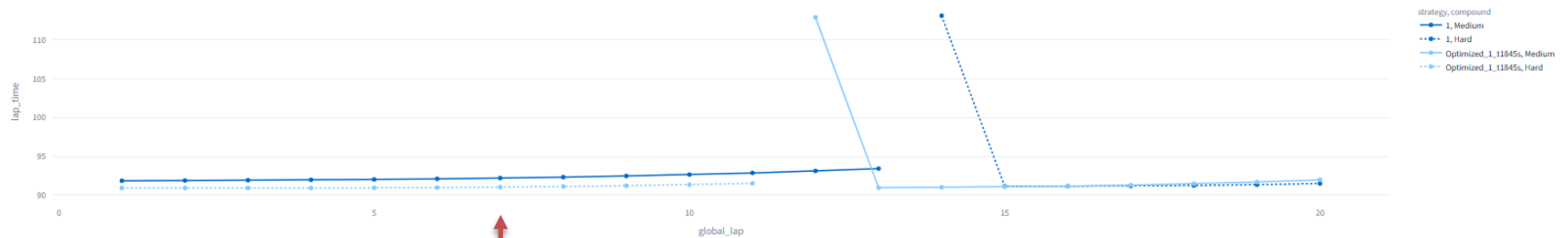
Strategy Comparison

Select strategies to compare

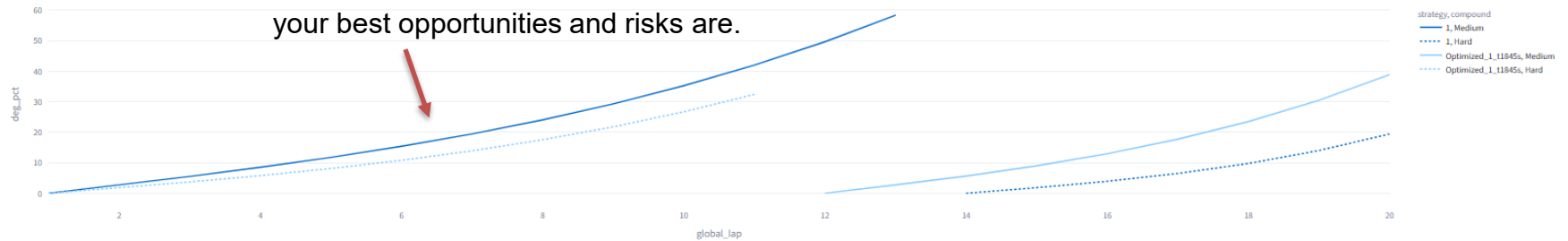
1 x Optimized_1_t1...

Compare your generated and manual strategies in one view.

Lap Time Comparison Across Strategies



Tyre Degradation Comparison



Overlay lap time and tyre degradation curves for each scenario to see where your best opportunities and risks are.