وزارة الاتصالات
وتكنولوجيا المعلومات

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MANUFACTURING DOWNTIME

An Analytical Review of Downtime Factors and Their Impact on Soda Production Efficiency.

Project Idea

Analysis of productivity and downtime in a soda bottling production line. The dataset includes important details such as the operator, product, start and end times, and reasons for downtime for each batch. By studying these factors, we can understand what causes delays, spot inefficiencies, and find ways to improve the production line’s performance.

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Meet the Team

- Ahmed Mohsen
- Shaimaa Fayez
- Tarek Sobhy
- Inas Sobhy
- Shams Maged
- Zainab Aly

DATA Source

Data Type:

Microsoft EXCEL

The data was acquired through the Digital Egypt Pioneers Initiative (DEPI)

	A	B	C	D
1	Product	Flavor	Size	Min batch time
2	OR-600	Orange	600 ml	60
3	LE-600	Lemon lime	600 ml	60
4	CO-600	Cola	600 ml	60
5	DC-600	Diet Cola	600 ml	60
6	RB-600	Root Berry	600 ml	60
7	CO-2L	Cola	2 L	98
8				

Q19

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1							Downtime factor							
2	Batch	1	2	3	4	5	6	7	8	9	10	11	12	
3	422111		60					15						
4	422112		20						20					
5	422113		50											
6	422114				25		15							
7	422115										24			
8	422116													
9	422117		10				5							
10	422118						14	16				10	20	
11	422119				25									
12	422120				20	15				17				
13	422121							15						
14	422122							25						
15	422123				43			30						
16	422124					20	20							
17	422125											10	10	
18	422126								44					
19	422127						23							
20	422128					22		30						
21	422129												15	
22	422130		20											
23	422131				20						10			
24	422132													
25	422133							20						
26	422134							30	20					
27	422135				30								15	
28	422136													
29	422137								30		15			

Line productivity | Products | Downtime factors | Line downtime

Ready

	Date	Product	Batch	Operator	Start Time	End Time
2	2024-08-29	OR-600	422111	Mac	11:50:00	14:05:00
3	2024-08-29	LE-600	422112	Mac	14:05:00	15:45:00
4	2024-08-29	LE-600	422113	Mac	15:45:00	17:35:00
5	2024-08-29	LE-600	422114	Mac	17:35:00	19:15:00
6	2024-08-29	LE-600	422115	Charlie	19:15:00	20:39:00
7	2024-08-29	LE-600	422116	Charlie	20:39:00	21:39:00
8	2024-08-29	LE-600	422117	Charlie	21:39:00	22:54:00
9	2024-08-30	CO-600	422118	Dee	04:05:00	06:05:00
10	2024-08-30	CO-600	422119	Dee	06:05:00	07:30:00
11	2024-08-30	CO-600	422120	Dee	07:30:00	09:22:00
12	2024-08-30	CO-600	422121	Dennis	09:22:00	10:37:00
13	2024-08-30	CO-600	422122	Dennis	10:37:00	12:02:00
14	2024-08-30	CO-600	422123	Dennis	12:02:00	14:15:00
15	2024-08-30	CO-600	422124	Dennis	14:15:00	15:55:00
16	2024-08-30	CO-600	422125	Charlie	15:55:00	17:15:00
17	2024-08-30	CO-600	422126	Charlie	17:15:00	18:59:00
18	2024-08-30	CO-600	422127	Charlie	18:59:00	20:22:00
19	2024-08-30	CO-600	422128	Charlie	20:22:00	22:14:00
20	2024-08-30	CO-600	422129	Charlie	22:14:00	23:29:00
21	2024-08-31	CO-600	422130	Dee	07:45:00	09:05:00
22	2024-08-31	CO-600	422131	Dee	09:05:00	10:35:00
23	2024-08-31	CO-600	422132	Dee	10:35:00	11:35:00
24	2024-08-31	DC-600	422133	Dee	11:35:00	12:55:00

E11

	A	B	C	D
1	Factor	Description	Operator Error	
2	1	Emergency stop	No	
3	2	Batch change	Yes	
4	3	Labeling error	No	
5	4	Inventory shortage	No	
6	5	Product spill	Yes	
7	6	Machine adjustment	Yes	
8	7	Machine failure	No	
9	8	Batch coding error	Yes	
10	9	Conveyor belt jam	No	
11	10	Calibration error	Yes	
12	11	Label switch	Yes	
13	12	Other	No	
14				
15				

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Project Process

Clean

Modeling

DAX

Sample Visual

Report

Dashboard

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Clean Data

Line downtime table

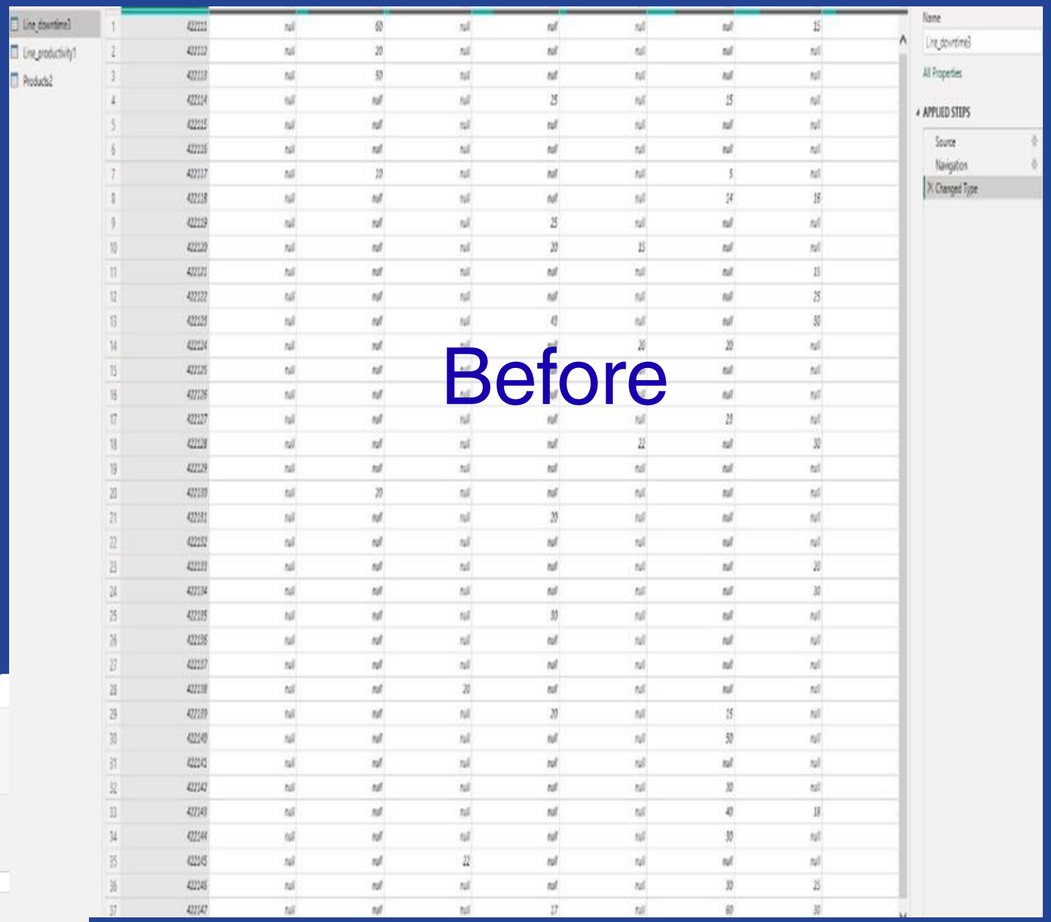
1.Check header (use first row as a header).

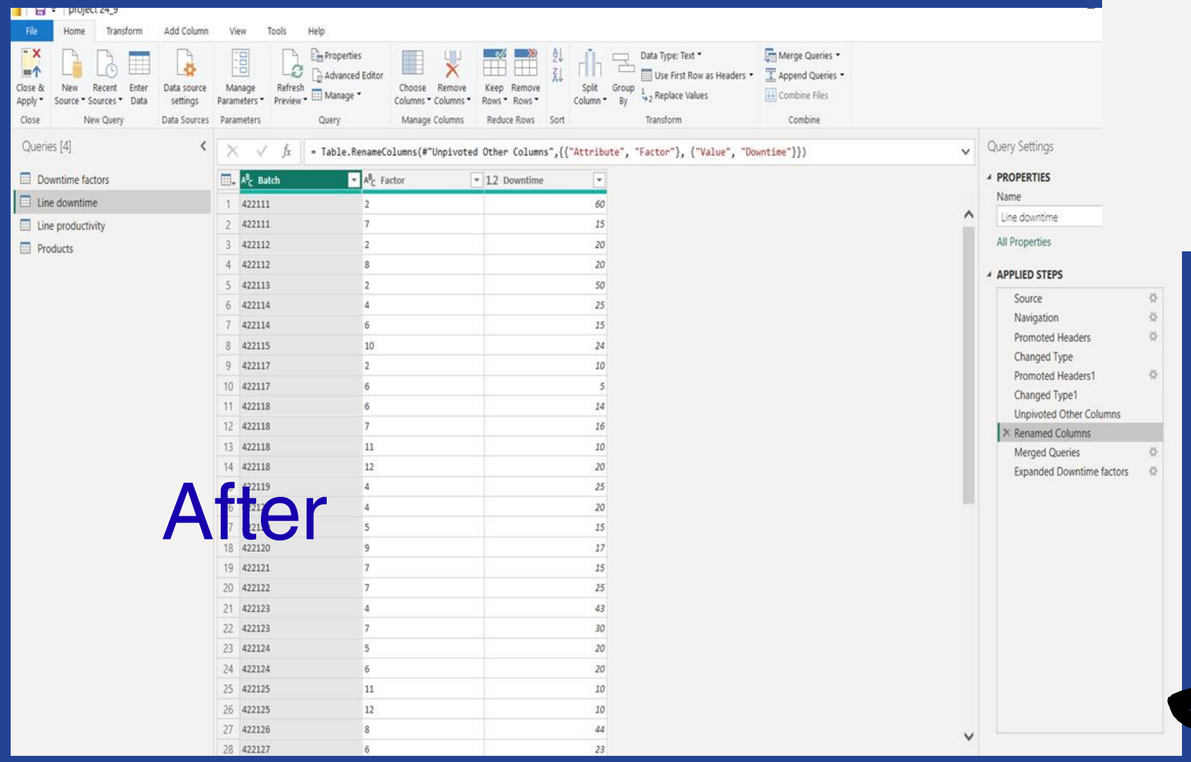
2.Check datatype for headers Batch :Text format

3. transform (unpivot other column)

4.Attribute changed to Factor (header)

5.Value changed to Downtime (header)





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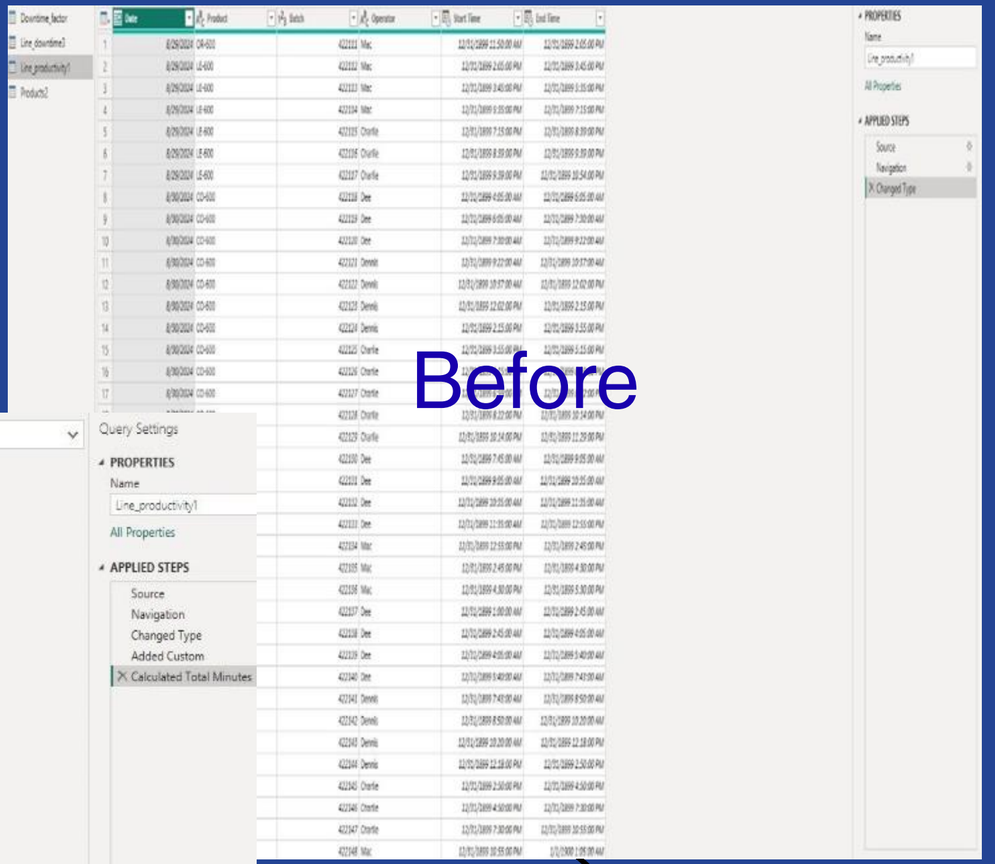
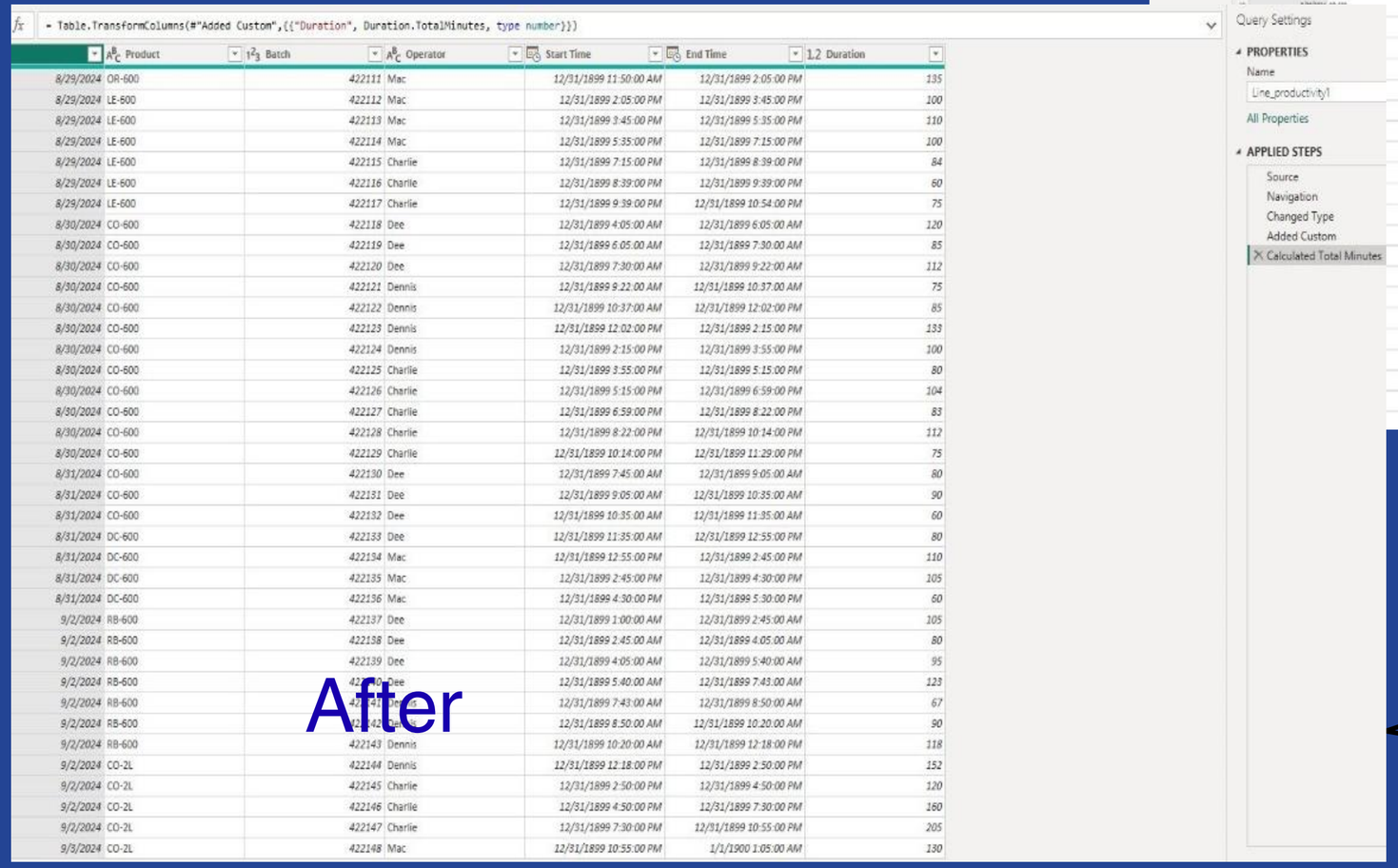
LINE PRODUCTIVITY TABLE

- Check the datatype for header Batch: Text format
- Calculate (Batch duration) Add column, custom column, end time_ start time.
- Clean and trim for operator column





Product	Batch	Operator	Start Time	End Time	Duration
8/29/2024 OR-600	422111	Mac	12/31/1899 11:50:00 AM	12/31/1899 2:05:00 PM	135
8/29/2024 LE-600	422112	Mac	12/31/1899 2:05:00 PM	12/31/1899 3:45:00 PM	100
8/29/2024 LE-600	422113	Mac	12/31/1899 3:45:00 PM	12/31/1899 5:35:00 PM	110
8/29/2024 LE-600	422114	Mac	12/31/1899 5:35:00 PM	12/31/1899 7:15:00 PM	100
8/29/2024 LE-600	422115	Charlie	12/31/1899 7:15:00 PM	12/31/1899 8:39:00 PM	84
8/29/2024 LE-600	422116	Charlie	12/31/1899 8:39:00 PM	12/31/1899 9:39:00 PM	60
8/29/2024 LE-600	422117	Charlie	12/31/1899 9:39:00 PM	12/31/1899 10:54:00 PM	75
8/30/2024 CO-600	422118	Dee	12/31/1899 4:05:00 AM	12/31/1899 6:05:00 AM	120
8/30/2024 CO-600	422119	Dee	12/31/1899 6:05:00 AM	12/31/1899 7:30:00 AM	85
8/30/2024 CO-600	422120	Dee	12/31/1899 7:30:00 AM	12/31/1899 9:22:00 AM	112
8/30/2024 CO-600	422121	Dennis	12/31/1899 9:22:00 AM	12/31/1899 10:37:00 AM	75
8/30/2024 CO-600	422122	Dennis	12/31/1899 10:37:00 AM	12/31/1899 12:02:00 PM	85
8/30/2024 CO-600	422123	Dennis	12/31/1899 12:02:00 PM	12/31/1899 2:15:00 PM	133
8/30/2024 CO-600	422124	Dennis	12/31/1899 2:15:00 PM	12/31/1899 3:55:00 PM	100
8/30/2024 CO-600	422125	Charlie	12/31/1899 3:55:00 PM	12/31/1899 5:15:00 PM	80
8/30/2024 CO-600	422126	Charlie	12/31/1899 5:15:00 PM	12/31/1899 6:59:00 PM	104
8/30/2024 CO-600	422127	Charlie	12/31/1899 6:59:00 PM	12/31/1899 8:22:00 PM	83
8/30/2024 CO-600	422128	Charlie	12/31/1899 8:22:00 PM	12/31/1899 10:14:00 PM	112
8/30/2024 CO-600	422129	Charlie	12/31/1899 10:14:00 PM	12/31/1899 11:29:00 PM	75
8/31/2024 CO-600	422130	Dee	12/31/1899 7:45:00 AM	12/31/1899 9:05:00 AM	80
8/31/2024 CO-600	422131	Dee	12/31/1899 9:05:00 AM	12/31/1899 10:35:00 AM	90
8/31/2024 CO-600	422132	Dee	12/31/1899 10:35:00 AM	12/31/1899 11:35:00 AM	60
8/31/2024 DC-600	422133	Dee	12/31/1899 11:35:00 AM	12/31/1899 12:55:00 PM	80
8/31/2024 DC-600	422134	Mac	12/31/1899 12:55:00 PM	12/31/1899 2:45:00 PM	110
8/31/2024 DC-600	422135	Mac	12/31/1899 2:45:00 PM	12/31/1899 4:30:00 PM	105
8/31/2024 DC-600	422136	Mac	12/31/1899 4:30:00 PM	12/31/1899 5:30:00 PM	60
9/2/2024 RB-600	422137	Dee	12/31/1899 1:00:00 AM	12/31/1899 2:45:00 AM	105
9/2/2024 RB-600	422138	Dee	12/31/1899 2:45:00 AM	12/31/1899 4:05:00 AM	80
9/2/2024 RB-600	422139	Dee	12/31/1899 4:05:00 AM	12/31/1899 5:40:00 AM	95
9/2/2024 RB-600	422140	Dee	12/31/1899 5:40:00 AM	12/31/1899 7:43:00 AM	123
9/2/2024 RB-600	422141	Dennis	12/31/1899 7:43:00 AM	12/31/1899 8:50:00 AM	67
9/2/2024 RB-600	422142	Dennis	12/31/1899 8:50:00 AM	12/31/1899 10:20:00 AM	90
9/2/2024 RB-600	422143	Dennis	12/31/1899 10:20:00 AM	12/31/1899 12:18:00 PM	118
9/2/2024 CO-2L	422144	Dennis	12/31/1899 12:18:00 PM	12/31/1899 2:50:00 PM	152
9/2/2024 CO-2L	422145	Charlie	12/31/1899 2:50:00 PM	12/31/1899 4:50:00 PM	120
9/2/2024 CO-2L	422146	Charlie	12/31/1899 4:50:00 PM	12/31/1899 7:30:00 PM	160
9/2/2024 CO-2L	422147	Charlie	12/31/1899 7:30:00 PM	12/31/1899 10:55:00 PM	205
9/3/2024 CO-2L	422148	Mac	12/31/1899 10:55:00 PM	1/1/1900 1:05:00 AM	130

After

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Downtime Factors Table

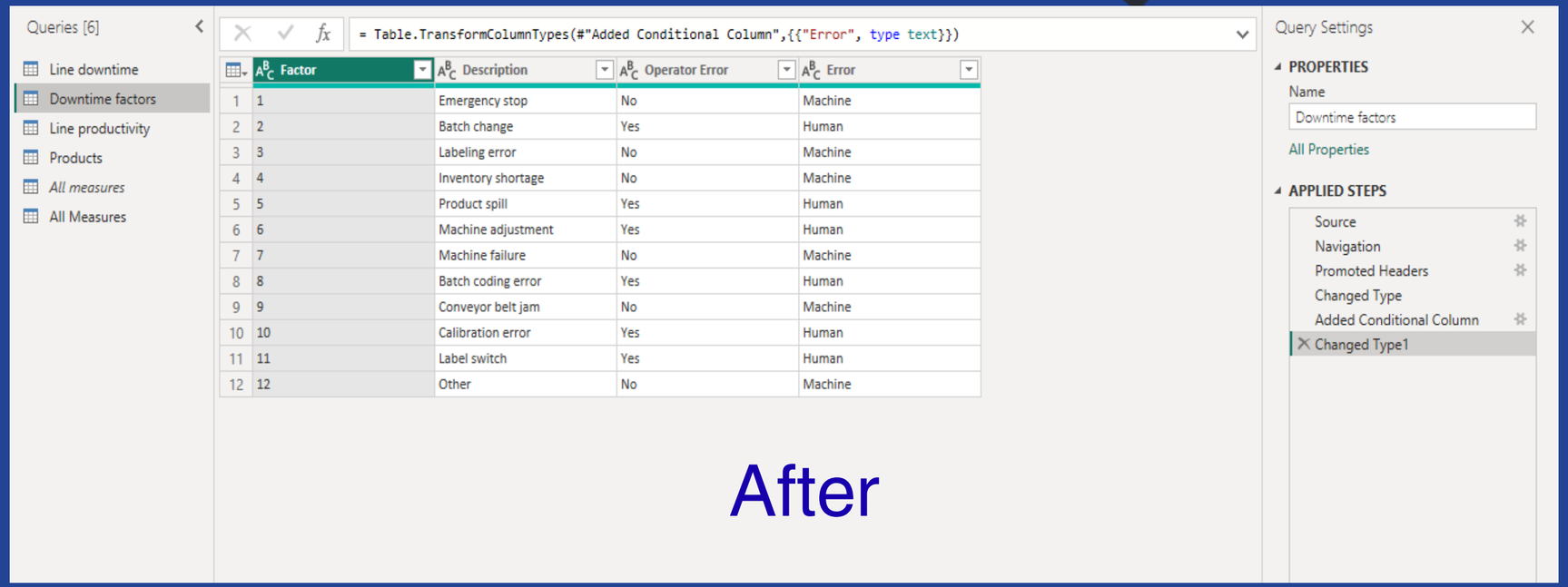
1. The data type is text for all columns
2. Clean and trim the description column.
3. add column, conditional column
OPERATOR ERROR YES, HUMAN
OPERATOR ERROR=NO, MACHINE

	Factor	Description	Operator Error
1	1	Emergency stop	No
2	2	Batch change	Yes
3	3	Labeling error	No
4	4	Inventory shortage	No
5	5	Product spill	Yes
6	6	Machine adjustment	Yes
7	7	Machine failure	No
8	8	Batch coding error	Yes
9	9	Conveyor belt jam	No
10	10	Calibration error	Yes
11	11	Label switch	Yes
12	12	Other	No

PROPERTIES
Name
Downtime_factor
All Properties

APPLIED STEPS
Source
Navigation
Changed Type

Before



Queries [6]
Line downtime
Downtime factors
Line productivity
Products
All measures
All Measures

= Table.TransformColumnTypes(#"Added Conditional Column",{{"Error", type text}})

	Factor	Description	Operator Error	Error
1	1	Emergency stop	No	Machine
2	2	Batch change	Yes	Human
3	3	Labeling error	No	Machine
4	4	Inventory shortage	No	Machine
5	5	Product spill	Yes	Human
6	6	Machine adjustment	Yes	Human
7	7	Machine failure	No	Machine
8	8	Batch coding error	Yes	Human
9	9	Conveyor belt jam	No	Machine
10	10	Calibration error	Yes	Human
11	11	Label switch	Yes	Human
12	12	Other	No	Machine

Query Settings

PROPERTIES
Name
Downtime factors
All Properties

APPLIED STEPS
Source
Navigation
Promoted Headers
Changed Type
Added Conditional Column
Changed Type1

After

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Before Merge Row Data

1.line downtime table, Merge queries, choose downtime factors table.

2.Expand the new column, choose only description and error.

2024-08-29	LE-600	422115	Charlie	19:15:00	20:39:00
2024-08-29	LE-600	422116	Charlie	20:39:00	21:39:00
2024-08-29	LE-600	422117	Charlie	21:39:00	22:54:00
2024-08-30	CO-600	422118	Dee	04:05:00	06:05:00
2024-08-30	CO-600	422119	Dee	06:05:00	07:30:00
2024-08-30	CO-600	422120	Dee	07:30:00	09:22:00
2024-08-30	CO-600	422121	Dennis	09:22:00	10:37:00
2024-08-30	CO-600	422122	Dennis	10:37:00	12:02:00
2024-08-30	CO-600	422123	Dennis	12:02:00	14:15:00
2024-08-30	CO-600	422124	Dennis	14:15:00	15:55:00
2024-08-30	CO-600	422125	Charlie	15:55:00	17:15:00
2024-08-30	CO-600	422126	Charlie	17:15:00	18:59:00
2024-08-30	CO-600	422127	Charlie	18:59:00	20:22:00
2024-08-30	CO-600	422128	Charlie	20:22:00	22:14:00
2024-08-30	CO-600	422129	Charlie	22:14:00	23:29:00
2024-08-31	CO-600	422130	Dee	07:45:00	09:05:00
2024-08-31	CO-600	422131	Dee	09:05:00	10:35:00
2024-08-31	CO-600	422132	Dee	10:35:00	11:35:00
2024-08-31	DC-600	422133	Dee	11:35:00	12:55:00
2024-08-31	DC-600	422134	Mac	12:55:00	14:45:00
2024-08-31	DC-600	422135	Mac	14:45:00	16:30:00
2024-08-31	DC-600	422136	Mac	16:30:00	17:30:00
2024-09-02	RB-600	422137	Dee	01:00:00	02:45:00
2024-09-02	RB-600	422138	Dee	02:45:00	04:05:00
2024-09-02	RB-600	422139	Dee	04:05:00	05:40:00
2024-09-02	RB-600	422140	Dee	05:40:00	07:43:00
2024-09-02	RB-600	422141	Dennis	07:43:00	08:50:00
2024-09-02	RB-600	422142	Dennis	08:50:00	10:20:00
2024-09-02	RB-600	422143	Dennis	10:20:00	12:18:00

avor	Size	Min ba
range	600 ml	
emon lime	600 ml	
ola	600 ml	
iet Cola	600 ml	
ot Beer	600 ml	
ola	2 L	

Factor	Description	Operator Error
1	Emergency stop	No
2	Batch change	Yes
3	Labeling error	No
4	Inventory shortage	No
5	Product spill	Yes
6	Machine adjustment	Yes
7	Machine failure	No
8	Batch coding error	Yes
9	Conveyor belt jam	No
10	Calibration error	Yes
11	Label switch	Yes
12	Other	No

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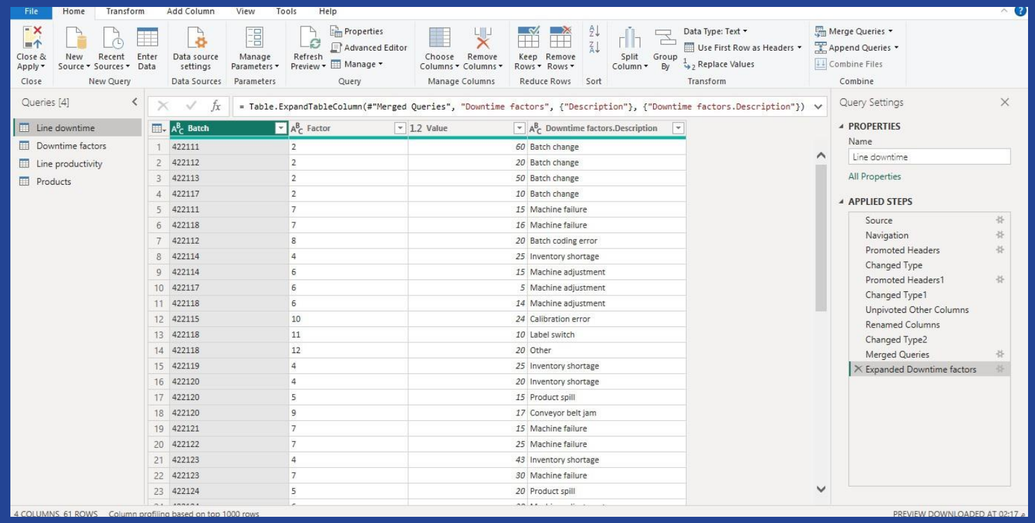
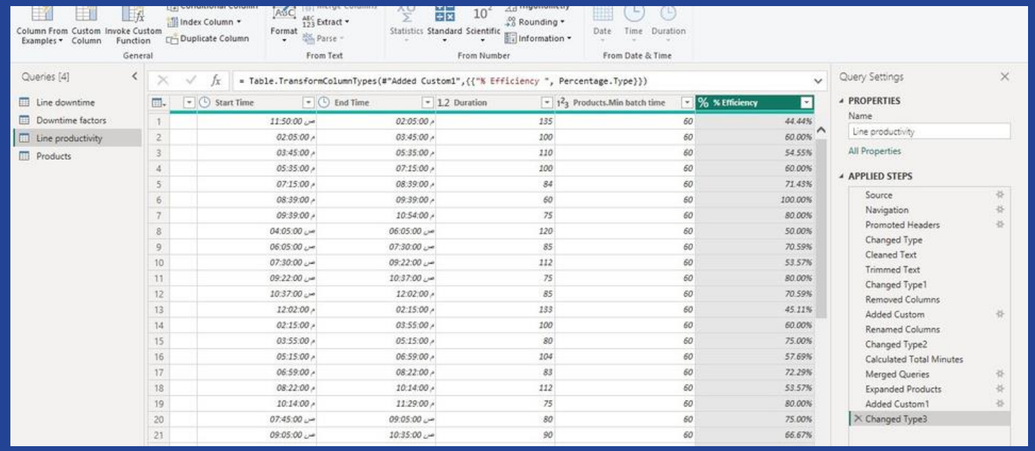
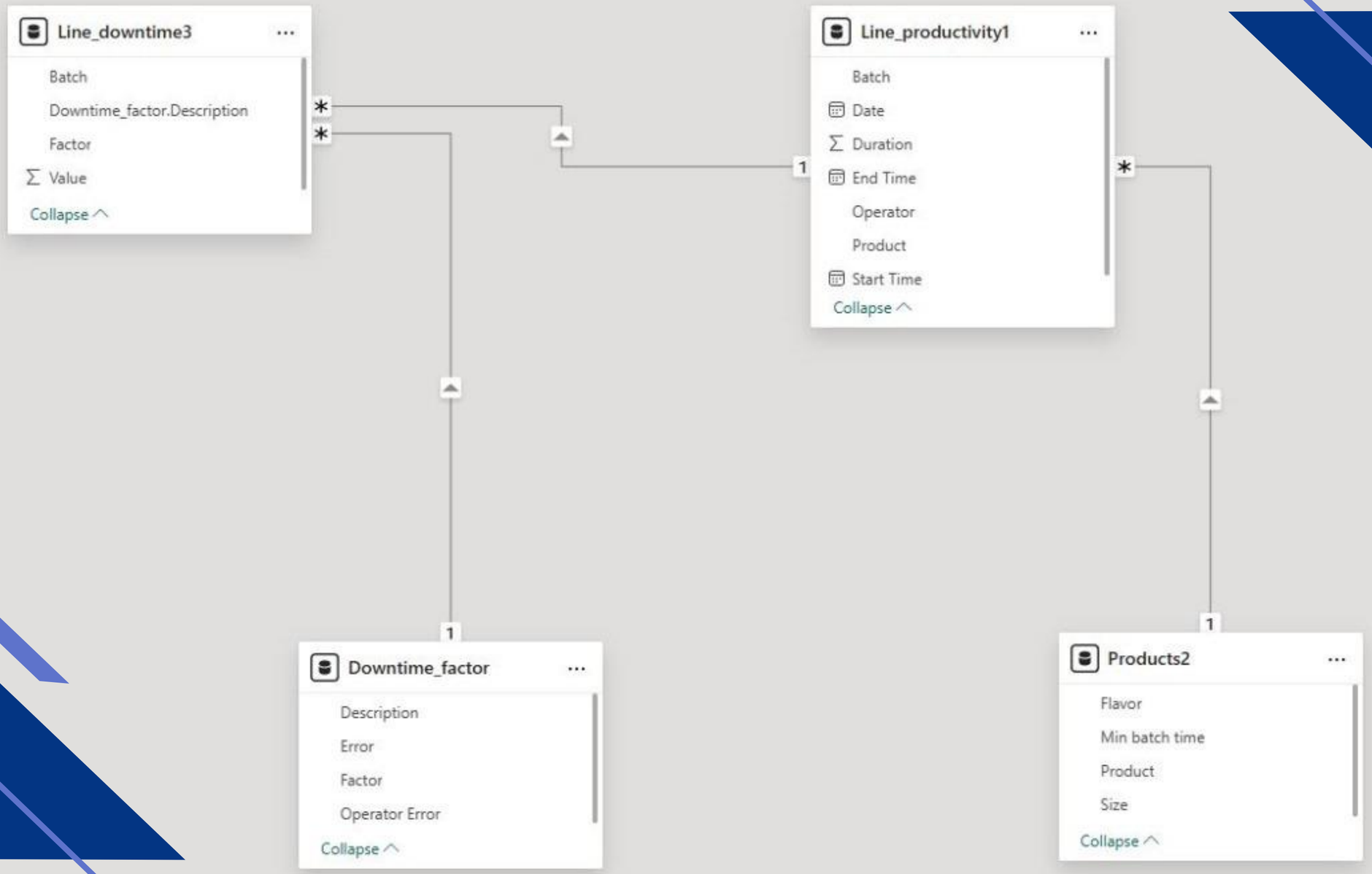
After Merge QUERIES





Modeling



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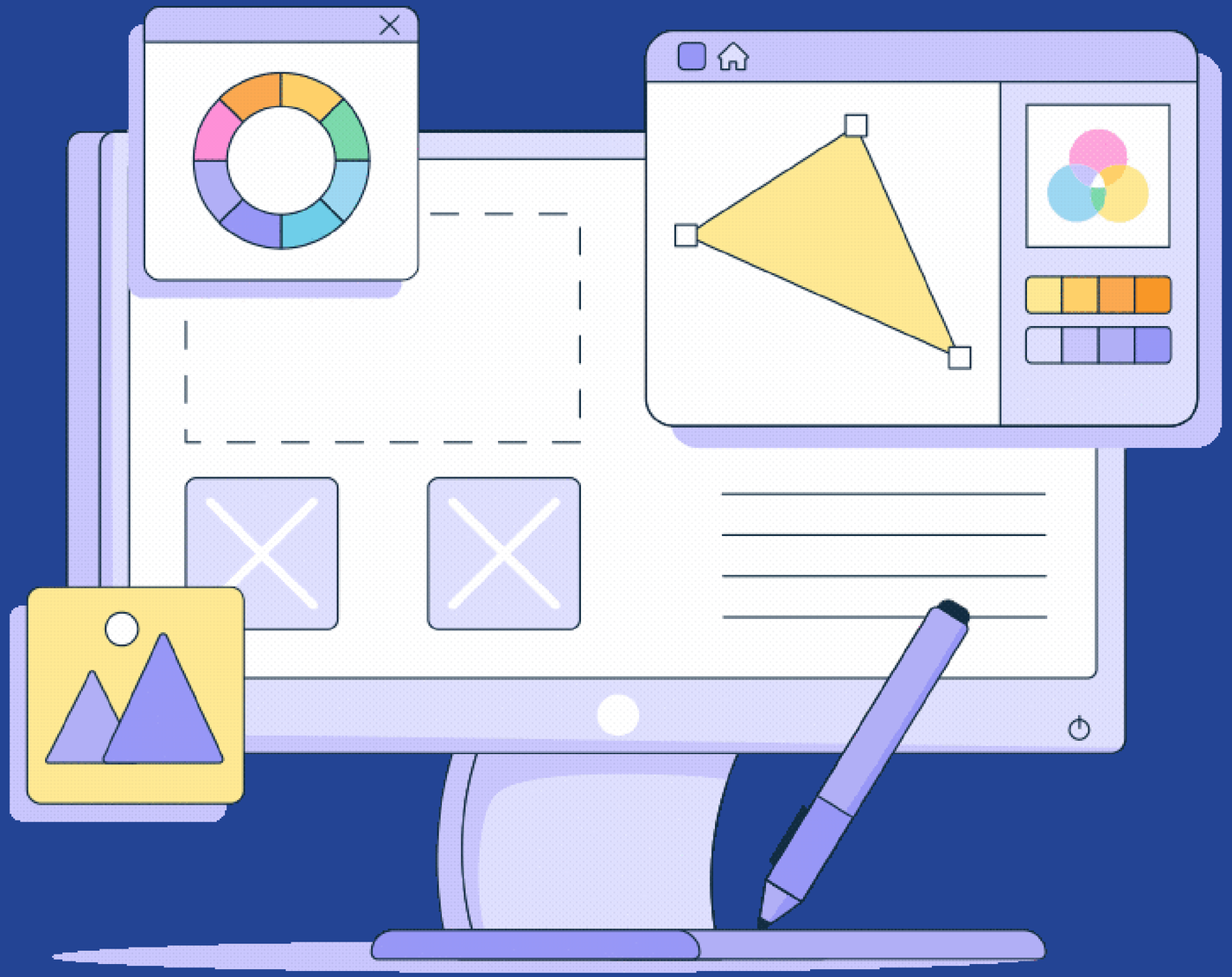
DAX



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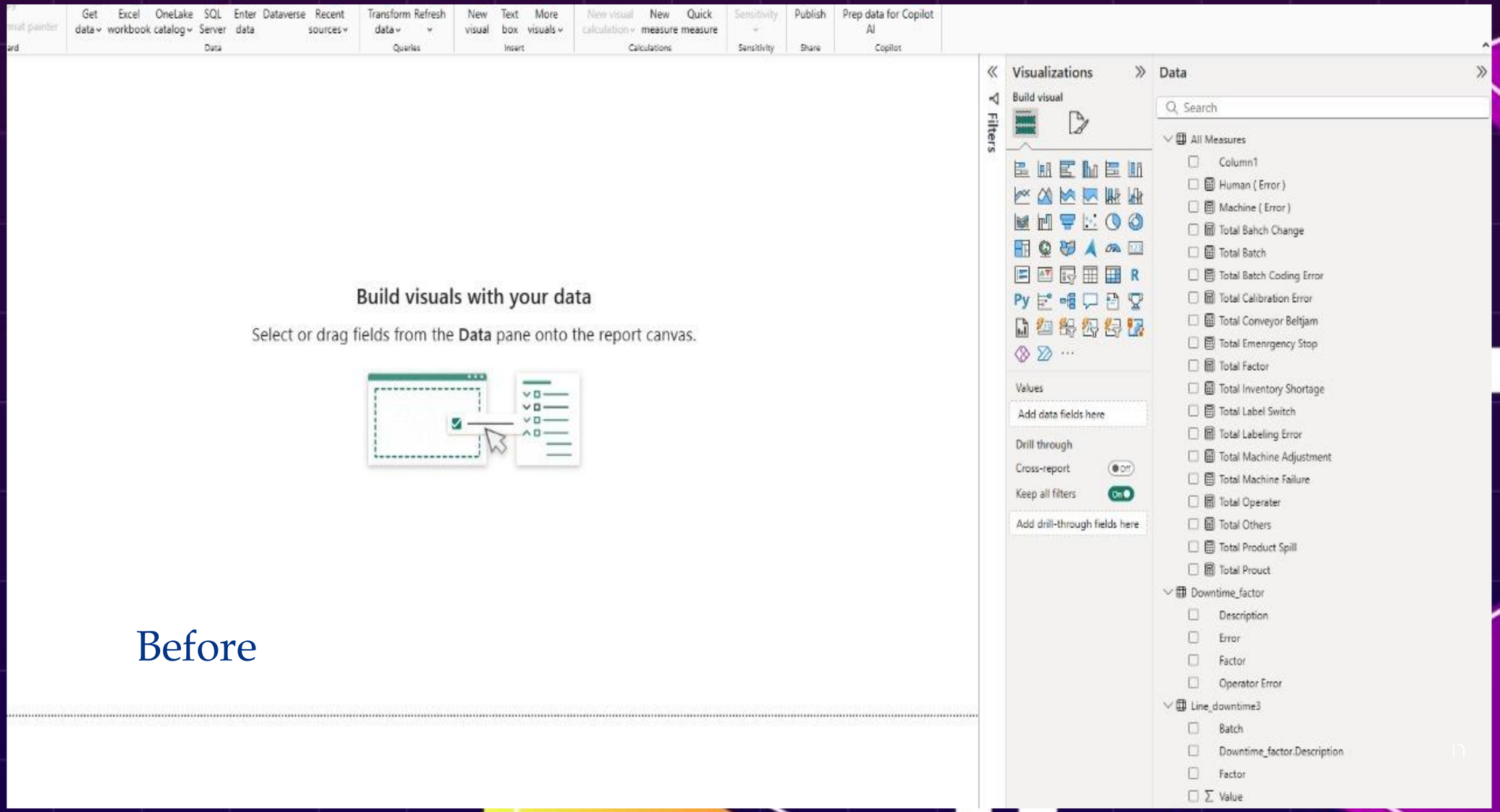
All Measures



Before

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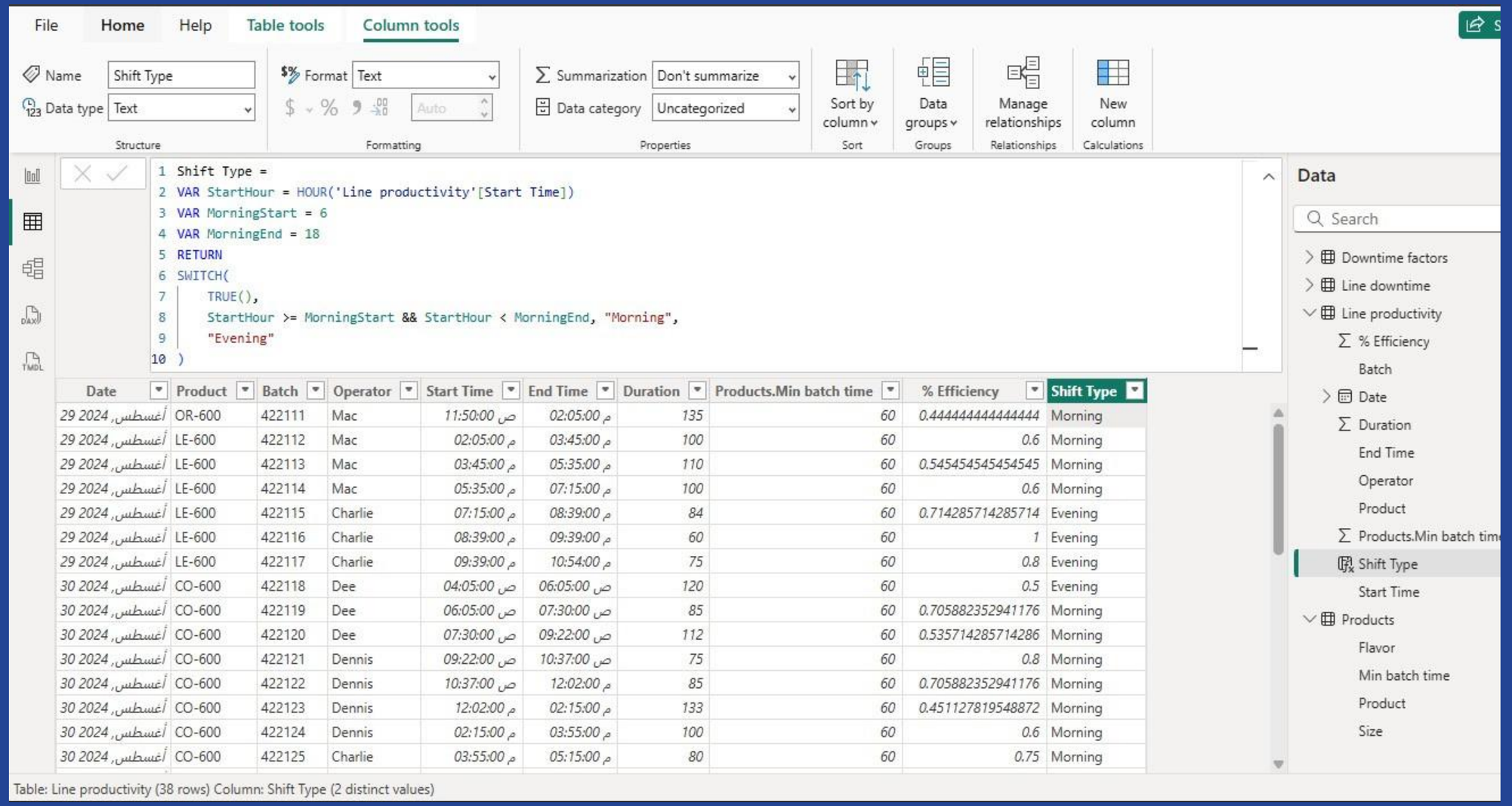
Sample DAX



Date	Product	Batch	Operator	Start Time	End Time	Duration	Products.Min batch time	% Efficiency	Shift Type
29 أغسطس 2024	OR-600	422111	Mac	11:50:00 ص	02:05:00 م	135	60	0.444444444444444	Morning
29 أغسطس 2024	LE-600	422112	Mac	02:05:00 م	03:45:00 م	100	60	0.6	Morning
29 أغسطس 2024	LE-600	422113	Mac	03:45:00 م	05:35:00 م	110	60	0.545454545454545	Morning
29 أغسطس 2024	LE-600	422114	Mac	05:35:00 م	07:15:00 م	100	60	0.6	Morning
29 أغسطس 2024	LE-600	422115	Charlie	07:15:00 م	08:39:00 م	84	60	0.714285714285714	Evening
29 أغسطس 2024	LE-600	422116	Charlie	08:39:00 م	09:39:00 م	60	60	1	Evening
29 أغسطس 2024	LE-600	422117	Charlie	09:39:00 م	10:54:00 م	75	60	0.8	Evening
30 أغسطس 2024	CO-600	422118	Dee	04:05:00 ص	06:05:00 ص	120	60	0.5	Evening
30 أغسطس 2024	CO-600	422119	Dee	06:05:00 ص	07:30:00 ص	85	60	0.705882352941176	Morning
30 أغسطس 2024	CO-600	422120	Dee	07:30:00 ص	09:22:00 ص	112	60	0.535714285714286	Morning
30 أغسطس 2024	CO-600	422121	Dennis	09:22:00 ص	10:37:00 ص	75	60	0.8	Morning
30 أغسطس 2024	CO-600	422122	Dennis	10:37:00 ص	12:02:00 م	85	60	0.705882352941176	Morning
30 أغسطس 2024	CO-600	422123	Dennis	12:02:00 م	02:15:00 م	133	60	0.451127819548872	Morning
30 أغسطس 2024	CO-600	422124	Dennis	02:15:00 م	03:55:00 م	100	60	0.6	Morning
30 أغسطس 2024	CO-600	422125	Charlie	03:55:00 م	05:15:00 م	80	60	0.75	Morning

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Sample DAX

```
Batch Change Count = CALCULATE(COUNTROWS('Line downtime'),  'Line downtime'[Downtime factors.Description] = "Batch change"

Shift Type = VAR StartHour = HOUR('Line productivity'[Start Time])
VAR MorningStart = 6
VAR MorningEnd = 18
RETURN
SWITCH(   TRUE(),   StartHour >= MorningStart && StartHour < MorningEnd, "Morning",   "Evening"
```

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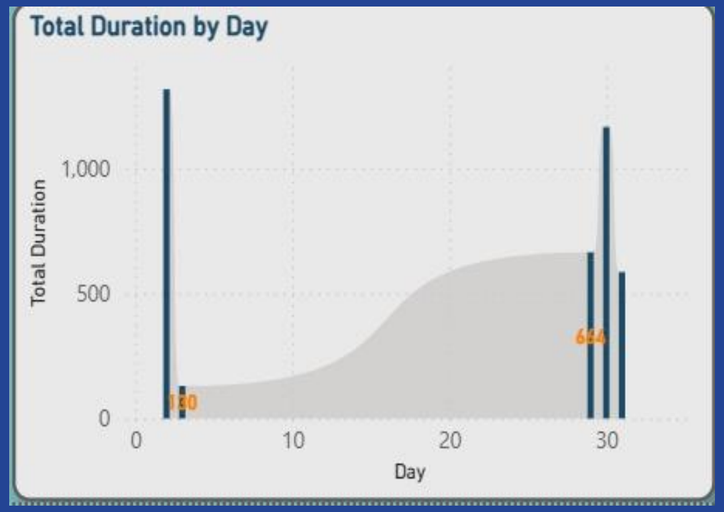
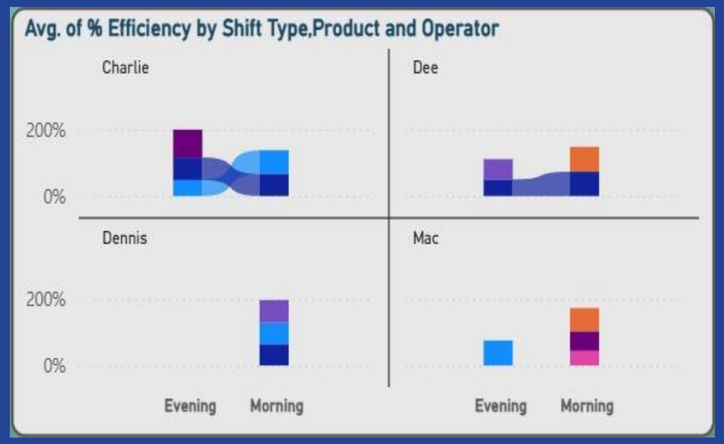
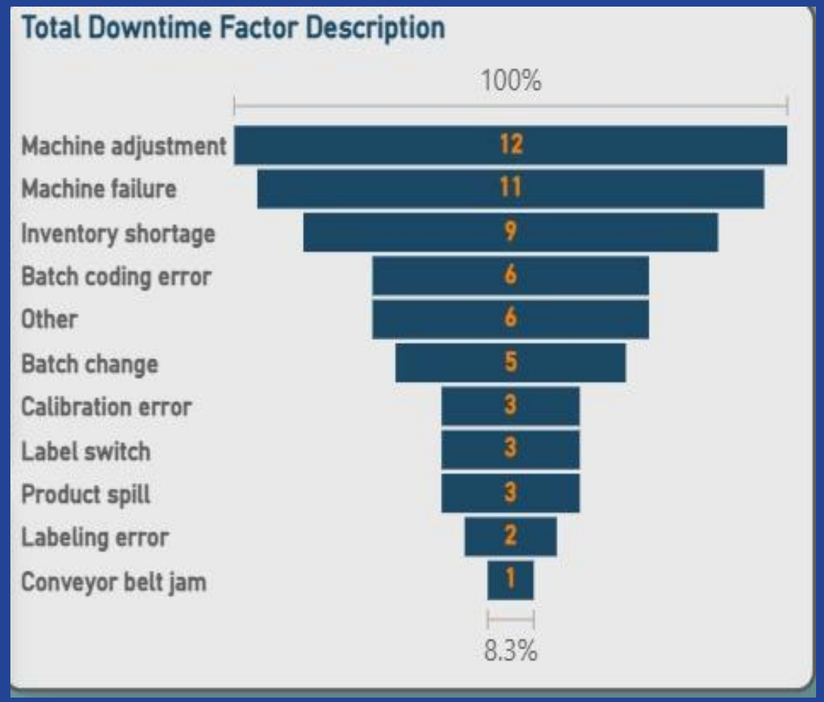
Visual Samples







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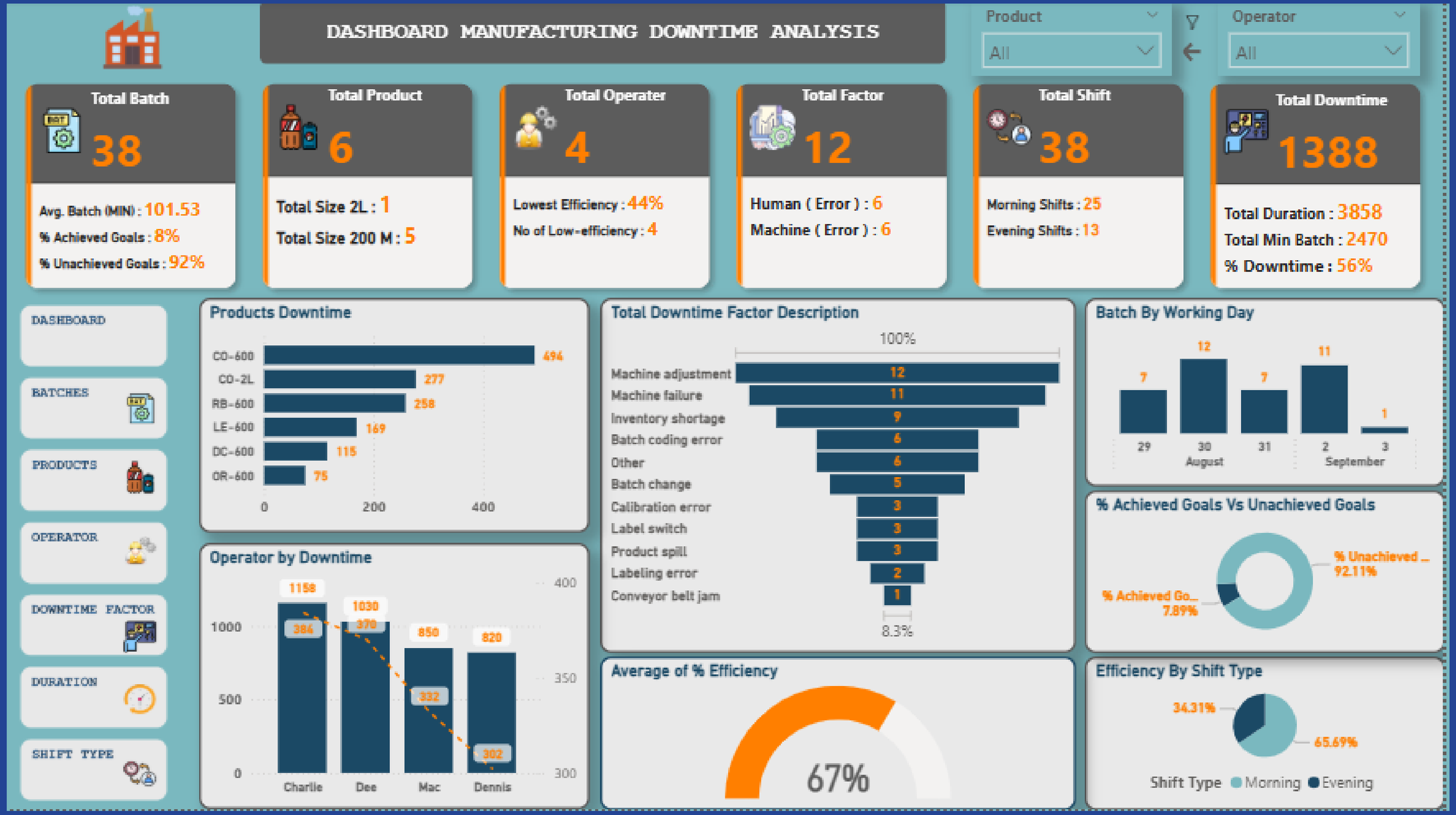

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Thank