

OEE Studio

MTBF & MTTR

This Tool-Tip will guide you through the process of creating the MTBF and MTR reports in OEE Studio.

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Tool-Tip - MTBF

- The MTBF uses the **Availability – Tabular Analysis** sections of OEE Studio.
 - "Mean Time Between Failures" is literally the average time elapsed from one failure to the next. Usually people think of it as the average time that something works until it fails and needs to be repaired (again).
 - **MTBF** = Run Time/# of Breakdowns.
 - It is important to be able to specify the **TYPE** of breakdown to get a better picture of MTBF.
 - It is a good idea to code your downtime reasons in the Vorne XL by the type of breakdown – i.e. BR = breakdown, MS = Minor Stop, QA = Quality and so on. Then in the BR category, you can add another type such as BR MECH or BR ELEC and so on. Or you can add the asset that caused the failure – such as BR Capper, BR Labels, etc.

Tool-Tip - MTTR

- The MTTR uses the **Availability – Loss Events**.
 - "Mean Time To Repair" is the average time that it takes to repair something after a failure.
 - **MTTR** = Downtime/# Breakdown
 - Again, It is important to be able to specify the TYPE of breakdown to get a better picture of MTTR
 - With OEE Studio you can calculate **MTTR** either by Shift or by specific Parts.

Creating the MTBR Report

Select Tabular Analysis under Availability

Graphical Analysis
Tabular Analysis
Loss Events - Shift
Loss Events - Parts
State Comparison

Date Range
From 1/19/2015 11:00 PM
To 2/2/2015 11:00 PM
Preset Dates
Choose Preset

Production Filter
Shift [All Shift]
Device [All Devi]
Part [All Part]

Tabular Analysis Grid Analysis

Drag a column header here to group by that column

Device State

Include

Effect
 Run Time
 Down Time
 Setup Time
 Standby Time

Apply / Refresh

Print / Export

Select Run Time and Down Time

Select the Grid Analysis Tab

Click Apply/Refresh to view your data.

Tabular Analysis Grid Analysis

Drag a column header here to group by that column

Device	State	Start Time	End Time	Duration	Reason
D006_104WIND100	Down	1/5/2015 5:32 AM	1/5/2015 5:41 AM		00h 09m 15s CO Height
D006_104WIND100	Down	1/4/2015 11:23 PM	1/5/2015 12:45 AM		01h 22m 32s BR SEAMER 1 ACTION
D006_104WIND100	Down	1/5/2015 2:09 AM	1/5/2015 2:14 AM		00h 05m 24s MS LINER WEBGUIDE
D006_104WIND100	Down	1/5/2015 1:28 AM	1/5/2015 1:39 AM		00h 11m 41s MS PAPER SPLICE
D006_104WIND100	Running	1/5/2015 2:14 AM	1/5/2015 5:32 AM		03h 17m 24s Running
D006_104WIND100	Running	1/4/2015 11:10 PM	1/4/2015 11:23 PM		00h 12m 50s Running
D006_104WIND100	Running	1/5/2015 12:45 AM	1/5/2015 1:28 AM		00h 42m 28s Running
D006_104WIND100	Running	1/5/2015 1:39 AM	1/5/2015 2:09 AM		00h 29m 28s Running
D006_105WIND100	Down	1/5/2015 3:00 PM	1/5/2015 3:00 PM		00h 00m 01s None
D006_105WIND100	Down	1/5/2015 10:43 PM	1/5/2015 10:51 PM		00h 07m 43s None
D006_105WIND100	Down	1/5/2015 3:08 PM	1/5/2015 3:14 PM		00h 06m 10s MS PSO 1 MEMBRANE
D006_105WIND100	Running	1/5/2015 3:14 PM	1/5/2015 10:43 PM		07h 28m 53s Running
D006_104WIND100	Down	1/5/2015 3:00 PM	1/5/2015 3:02 PM		00h 01m 18s None

Creating the Filter

1. Right-Mouse click on Reason Column heading and select Filter Editor

	Reason
15s	CO Height
32s	BR SEAMER 1 ACTION
24s	MS LINER WEBGUIDE
41s	MS PAPER SPLICE
24s	Running
50s	Running
28s	Running
28s	Running
01s	None
43s	None
10s	MS PSO1 MEMBRANE
53s	Running
18s	None
00s	None
28s	CO Height
48s	MS PAI 1

- Sort Ascending
- Sort Descending
- Group By This Column
- Hide Group By Box
- Remove This Column
- Column Chooser
- Best Fit
- Best Fit (all columns)
- Filter Editor...**
- Show Find Panel
- Show Auto Filter Row

Filter Editor

Or +

- And
- Or**
- Not And
- Not Or
- Add Condition
- Add Group
- Clear All

2. Change the 'And' to 'Or'

Filter Editor

Or +

- [Reason] Begins with MS
- [Reason] Equals Running

OK Cancel Apply

3. Add these filters by clicking on each word to get the filter criteria.

D006_103WND100	Down	1/5/2015 11:02 PM	1/5/2015 11:10 PM			00h 08m 43s	MS SEAMER 1 ENDFEED
D006_103WND100	Down	1/5/2015 11:44 PM	1/6/2015 12:06 AM			00h 21m 57s	MS SEAMER 1 ENDFEED
D006_103WND100	Down	1/6/2015 5:55 AM	1/6/2015 6:05 AM			00h 10m 13s	MS PAPER FESTOONS
D006_103WND100	Running	1/6/2015 6:05 AM	1/6/2015 6:10 AM			00h 05m 16s	Running
D006_103WND100	Running	1/5/2015 11:10 PM	1/5/2015 11:44 PM			00h 34m 10s	Running
D006_103WND100	Running	1/6/2015 12:06 AM	1/6/2015 12:15 AM			00h 08m 24s	Running

Starts with([Reason], 'MS') Or [Reason] = 'Running'

Now you have the correct dataset and you can see your filter criteria at the bottom of the grid.

Tabular Analysis Grid Analysis

Drag a column header here to group by that column

Tabular Analysis Grid Analysis

Device ↑ Reason ↓

State	Start Time
+ Device = D006_101WND100 : 221h 41m 48s. Occurrences = 468	
+ Device = D006_102WND100 : 68h 41m 10s. Occurrences = 100	
+ Device = D006_103WND100 : 183h 09m 44s. Occurrences = 343	
+ Device = D006_104WND100 : 150h 52m 07s. Occurrences = 267	
- Device = D006_105WND100 : 343h 19m 20s. Occurrences = 486	
+ Reason = MS CANCELAN : 00h 14m 20s. Occurrences = 1	
+ Reason = MS CAPPER1 ACTION : 00h 23m 30s. Occurrences = 1	
+ Reason = MS CONVEY ELEVATOR : 00h 09m 01s. Occurrences = 1	
+ Reason = MS FLANGER1 : 02h 53m 28s. Occurrences = 10	
+ Reason = MS LABEL GLUE : 00h 17m 08s. Occurrences = 2	
+ Reason = MS LABEL REGISTRATION : 00h 33m 12s. Occurrences = 2	
+ Reason = MS LABEL SPLICE : 02h 48m 36s. Occurrences = 15	
+ Reason = MS LABEL STAND : 01h 20m 37s. Occurrences = 7	
+ Reason = MS LINER LUBE : 01h 04m 23s. Occurrences = 4	
+ Reason = MS LINER SPLICE : 02h 12m 04s. Occurrences = 12	
+ Reason = MS LINER STAND : 00h 14m 49s. Occurrences = 1	
+ Reason = MS PAL1 : 03h 08m 44s. Occurrences = 13	
+ Reason = MS PAPER FESTOONS : 00h 30m 37s. Occurrences = 1	
+ Reason = MS PAPER GLUE : 01h 07m 38s. Occurrences = 4	
+ Reason = MS PAPER SKIVER : 02h 48m 02s. Occurrences = 8	
+ Reason = MS PAPER SPLICE : 07h 37m 43s. Occurrences = 40	
+ Reason = MS PS01 ACTION : 01h 03m 03s. Occurrences = 4	
+ Reason = MS PS01 DISCHARGE : 00h 30m 47s. Occurrences = 2	
+ Reason = MS PS01 INFEED : 00h 23m 53s. Occurrences = 1	
+ Reason = MS PS01 MEMBRANE : 01h 51m 41s. Occurrences = 10	
+ Reason = MS SUPPORT PACKAGING : 00h 45m 21s. Occurrences = 3	
+ Reason = MS SUPPORT RAWMATERIALS : 01h 17m 26s. Occurrences = 4	
+ Reason = MS WAXER : 00h 35m 04s. Occurrences = 2	
+ Reason = MS WINDER : 01h 18m 06s. Occurrences = 5	
+ Reason = MS WINDER BALLUP : 03h 14m 57s. Occurrences = 17	
+ Reason = MS WINDER BELT : 00h 18m 32s. Occurrences = 1	
+ Reason = MS WINDER CUTTER : 01h 27m 49s. Occurrences = 7	
+ Reason = Running : 303h 08m 49s. Occurrences = 308	

✖ Starts with([Reason], 'MS') Or [Reason] = 'Running' ▼

Creating the Report

Drag the Device Column to the top where it says 'Drag a column header here'.

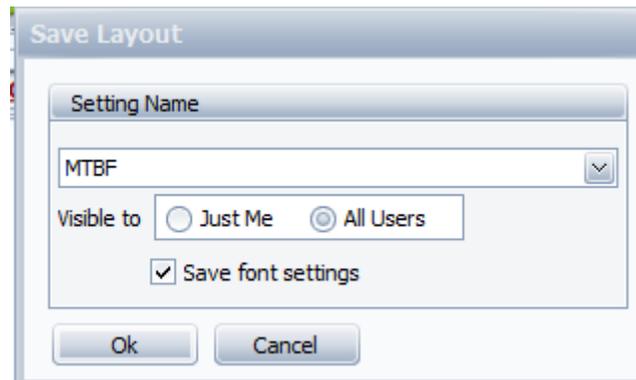
Next drag the Reason Column header to be next to the Device.

All of the data will be collapsed.

You can expand a device to see all the **events** with duration and counts.

You also see the total **Running** duration.

You can drill down further by selecting specific down events.



Saving the Report

Select the “**Click here for Printing. . .**” options.

Click on the **Save Layout** button.

Enter a name for the report. Select ‘**All Users**’.

Click the **OK** button.

You can call up the report by following the same process and select the **Restore Layout** button.

Creating the MTTR Report

The process is the same whether you select **Availability - Loss Events - Shift** or **Loss Events - Parts**.

1. Select Loss Events - Shift under Availability

2. Select the Date Range

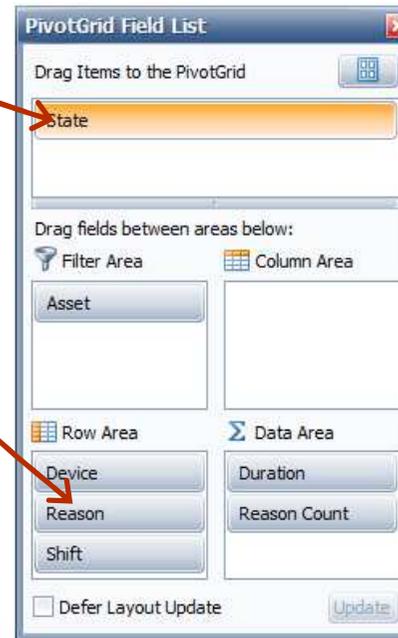
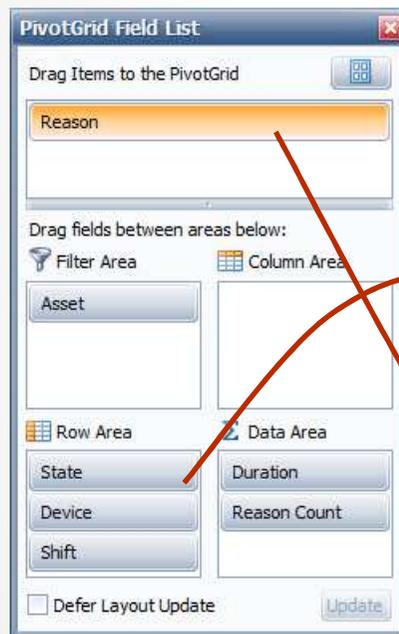
The screenshot shows the 'Availability' menu with 'Loss Events - Shift' circled in red. A 'Date Range' dialog box is open, showing 'From' as 1/1/2015 11:00 PM and 'To' as 2/1/2015 11:00 PM. The 'Preset Dates' dropdown is set to 'Choose Preset'.

3. Select Down Time

The screenshot shows the 'Include' dialog box with 'Down Time' checked and circled in red. Other options like 'Run Time', 'Setup Time', and 'Standby Time' are unchecked.

4. Click Apply/Refresh to view your data. >>>

Asset		Duration		Reason Count		Drop Column Fields Here	
State	Device	Shift	Duration	Reason Count	Grand Total	Duration	Reason Count
Down	D006_101WND100	First Shift	26h 13m 43s	144	D006_101WND100 Total	6h 09m 20s	338
		Second Shift	23h 06m 21s	123		23h 06m 21s	123
		Third Shift	11h 49m 16s	71		11h 49m 16s	71
		D006_101WND100 Total				6h 09m 20s 338	
Down	D006_102WND100	First Shift	06h 03m 16s	28	D006_102WND100 Total	03h 59m 17s	20
		Second Shift	03h 59m 17s	20		07h 18m 53s	15
		Third Shift	07h 18m 53s	15		17h 21m 26s	63
		D006_102WND100 Total				17h 21m 26s 63	
Down	D006_103WND100	First Shift	23h 52m 32s	86	D006_103WND100 Total	22h 07m 29s	100
		Second Shift	22h 07m 29s	100		13h 30m 31s	57
		Third Shift	13h 30m 31s	57		59h 30m 32s	243
		D006_103WND100 Total				59h 30m 32s 243	
Down	D006_104WND100	First Shift	19h 51m 15s	74	D006_104WND100 Total	16h 56m 24s	76
		Second Shift	16h 56m 24s	76		23h 55m 15s	49
		Third Shift	23h 55m 15s	49		60h 42m 54s	199
		D006_104WND100 Total				60h 42m 54s 199	
Down	D006_105WND100	First Shift	23h 30m 19s	108	D006_105WND100 Total	30h 28m 36s	134
		Second Shift	30h 28m 36s	134		27h 10m 36s	110
		Third Shift	27h 10m 36s	110		81h 09m 31s	352
		D006_105WND100 Total				81h 09m 31s 352	
Down Total						279h 53m 43s 1195	



Creating the Filter

First, we need to get our data elements set up.

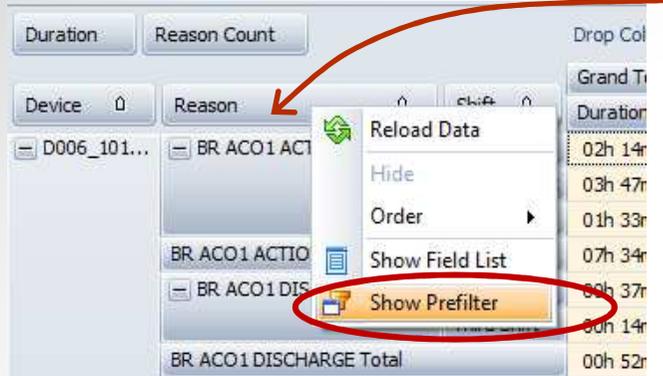
Select the “Click here for Printing . . .”.

Click on the **Show and Hide Fields** button.

The PivotGrid Field List on the left is the default display.

1. Drag the State Item on the bottom left to the top.
2. Drag the Reason from the top to the bottom left as shown on the right display.

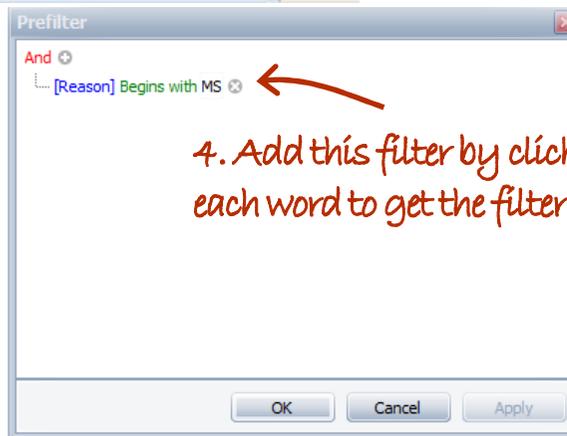
Asset		Drop Column Fields Here		
Duration	Reason Count	Grand Total		
Device	Reason	Shift	Duration	Reason Count
D006_101...	BR ACO1 ACTION	First Shift	02h 14m 14s	8
		Second Shift	03h 47m 00s	8
		Third Shift	01h 33m 23s	3
BR ACO1 ACTION Total			07h 34m 37s	19
BR ACO1 DISCHARGE	BR ACO1 DISCHARGE	First Shift	00h 37m 44s	2
		Third Shift	00h 14m 31s	1
BR ACO1 DISCHARGE Total			00h 52m 15s	3
BR CONVEY ELEVATOR	BR CONVEY ELEVATOR	First Shift	01h 56m 35s	5



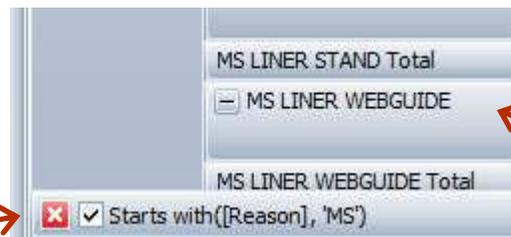
3. Right-Mouse click on Reason Column heading and select Show Prefilter

Create Filter – (cont'd)

Select the specific reason set.



4. Add this filter by clicking on each word to get the filter criteria.



Now you have the correct dataset and you can see your filter criteria at the bottom of the grid.

Layout

- Set Font
- Save Layout
- Restore Layout
- Revert to Default Layout

Fields

- Show and Hide Fields
- Define Custom Fields**

General

- Print / Export

Create the MTRR calculation =

$$\text{Duration} / \text{Reason Count} / 60$$

Duration is in seconds so we need to divide by 60 to get minutes.

Make sure you select **Use Summary Values**.

Creating the MTRR Calculation

New Custom Expression

Options

Field Description: **MTRR (minutes)**

Result Type

- Boolean
- Date and Time
- Date Only
- Decimal
- Integer
- String
- Currency
- Custom Date Interval

Summary Type

- Count
- Sum
- Min
- Max
- Average
- Std Dev
- Std Dev P
- Var
- Var P

The sum of the values.

Use Summary Values

Field Area

Data Area

Enterprise		Location		Plant		Line	
Area	Shift	Availability	OEE	Availability	OEE	Availability	OEE
Packaging	Shift 1	47.3	33.9	46.7	35.2	47.0	34.5
	Shift 2	0.0	0.0	0.0	0.0	0.0	0.0
	Shift 3	58.1	41.0	65.1	47.5	61.6	44.3
	Shift 4	3.9	3.1	10.9	8.8	5.8	4.7
	Packaging Total		37.7	26.9	45.3	33.6	41.2

Expression editor

[Duration] / [Reason Count] / 60

Functions

Operators

Fields

Constants

[Device]
[duration(SEC)]
[Duration]
[Part]
[Reason Count]
[Reason]
[State]

OK Cancel

Completing the Report

The new field appears in the Data Area.

PivotGrid Field List

Drag Items to the PivotGrid

End Time
Job
Start Time

Drag fields between areas below:

Filter Area

Asset
State
Enterprise

Column Area

Row Area

Device
Part
Reason

Data Area

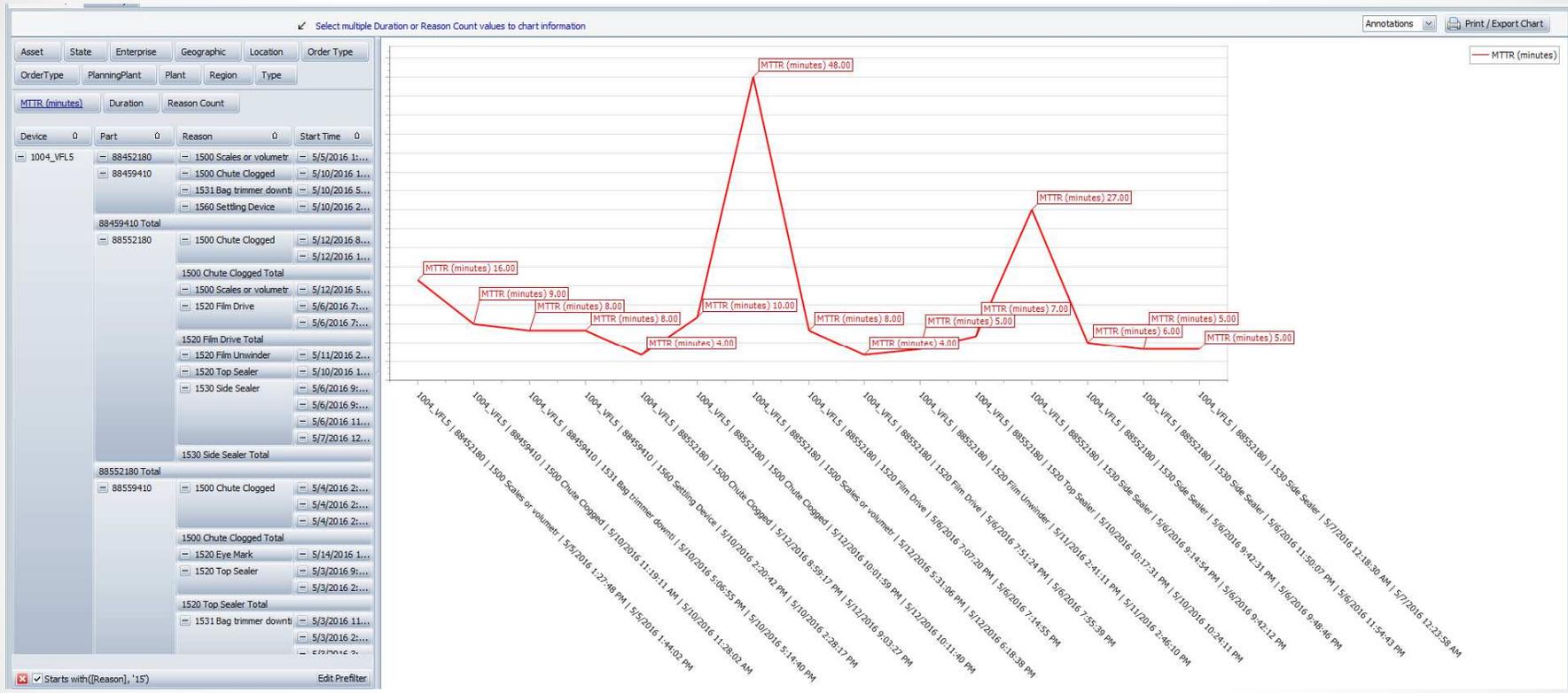
Duration
Reason Count
MTTR (minutes)

Defer Layout Update

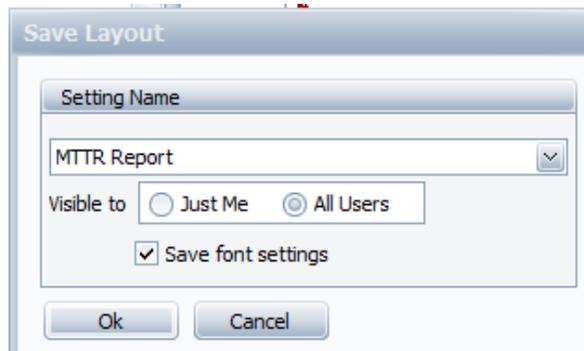
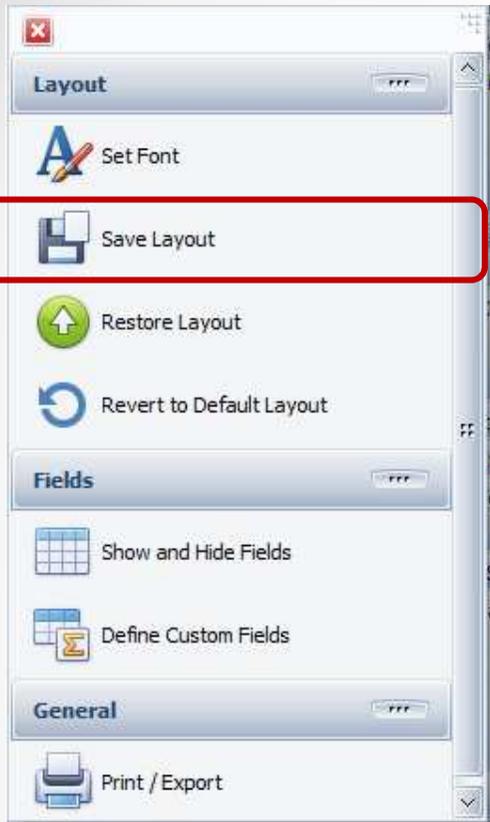
Asset	State	Enterprise	Geographic	Location	Order Type	OrderType	PlanningPlant	Plant	
Duration			Reason Count			MTTR (minutes)			
Drop Column Fields Here			Grand Total						
Device	Part	Reason	Duration	Reason Count	MTTR (minutes)				
1004_VFL5	88452180	1500 Scales or volumetr	00h 16m 14s	1	16.00				
		1500 Chute Clogged	00h 08m 51s	1	9.00				
		1531 Bag trimmer downti	00h 07m 45s	1	8.00				
		1560 Settling Device	00h 07m 35s	1	8.00				
	88459410 Total			00h 24m 11s	3	8.00			
	88552180	1500 Chute Clogged	1500 Scales or volumetr	00h 13m 51s	2	7.00			
			1520 Film Drive	00h 47m 32s	1	48.00			
		1520 Film Drive	00h 11m 50s	2	6.00				
		1520 Film Unwinder	00h 04m 59s	1	5.00				
		1520 Top Sealer	00h 06m 40s	1	7.00				
	1530 Side Sealer	00h 43m 37s	4	11.00					
	88552180 Total			02h 08m 29s	11	12.00			
	88559410	1500 Chute Clogged	1520 Eye Mark	00h 22m 29s	3	7.00			
			1520 Top Sealer	00h 07m 34s	1	8.00			
			1520 Top Sealer	00h 13m 32s	2	7.00			
1531 Bag trimmer downti	03h 03m 28s	11	17.00						
88559410 Total			03h 47m 03s	17	13.00				
88652180	1520 Top Sealer	00h 04m 53s	1	5.00					
1004_VFL5 Total			06h 40m 50s	33	12.00				

Graphing the Report

Create a trend graph by adding the start and end time.



Saving the Report



Select the “**Click here for Printing. . .**” options.

Click on the **Save Layout** button.

Enter a name for the report. Select ‘**All Users**’.

Click the **OK** button.

You can call up the report by following the same process and select the **Restore Layout** button.