VOLVO CONSTRUCTION EQUIPMENT
MATRIS REPORT

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Company name	Dealer	Report Issuer
Arnold Machinery	ARNOLD MACHINERY	

Contact name	Technician	Primary Application
	lvcetechn	Civil engineering/Heavy construction

Site	Workorder	Ground Condition

MATRIS Reading, Summary / Recommendation

Machine model	SerialNo	Operating Hours	Reading Date
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Main equipment	Type	Equipment
	Track chain	
	Hydraulic Fluid	
	Bucket size	
	X3 piping	
	Main Attachment	

Machine model	SerialNo	Operating Hours	Reading Date
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Fuel consumption distribution on work mode

Fuel consumption (L/h) = 11.5
Amount of fuel used (m3) = 62.2
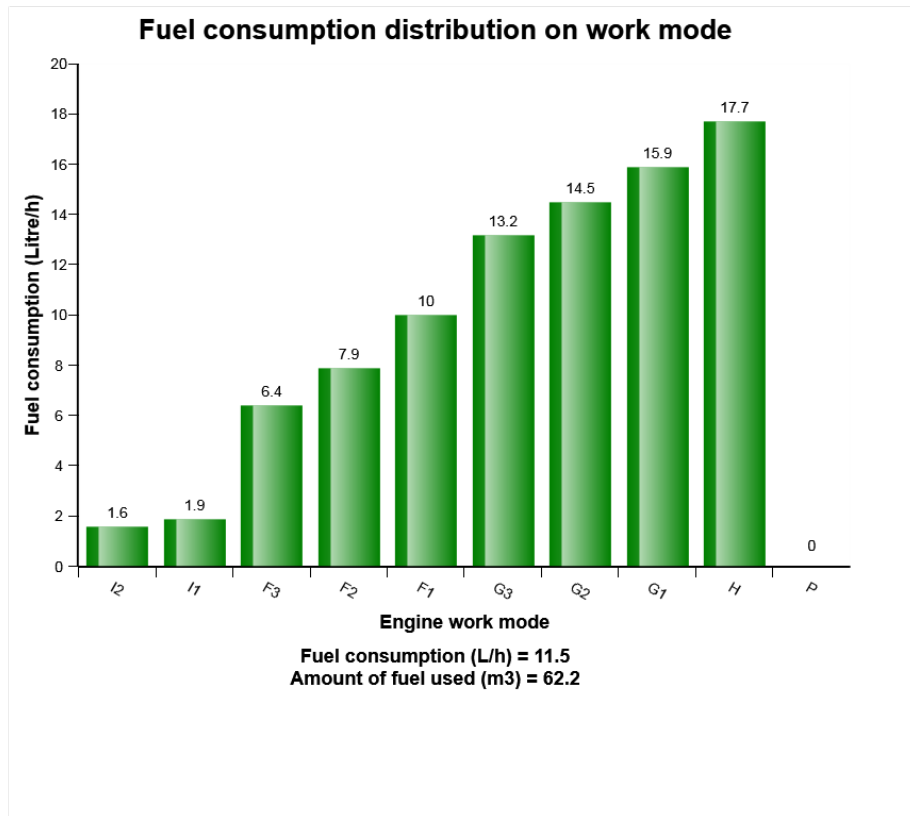
Definition:

This diagram shows the fuel consumption distribution rate on each work mode.

Distribution of each work mode is shown on top of its column in rate

Explanation:

Y-axis: The rate of the fuel consumption on each work mode.

X-axis: The work mode (10 steps in total)

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Distribution of each work mode is shown on top of its column in rate

Average fuel consumption per hour is listed below the diagram

Machine model	SerialNo	Operating Hours	Reading Date
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Machine utilization (%)

■ Working ■ Idle

60.6

39.4

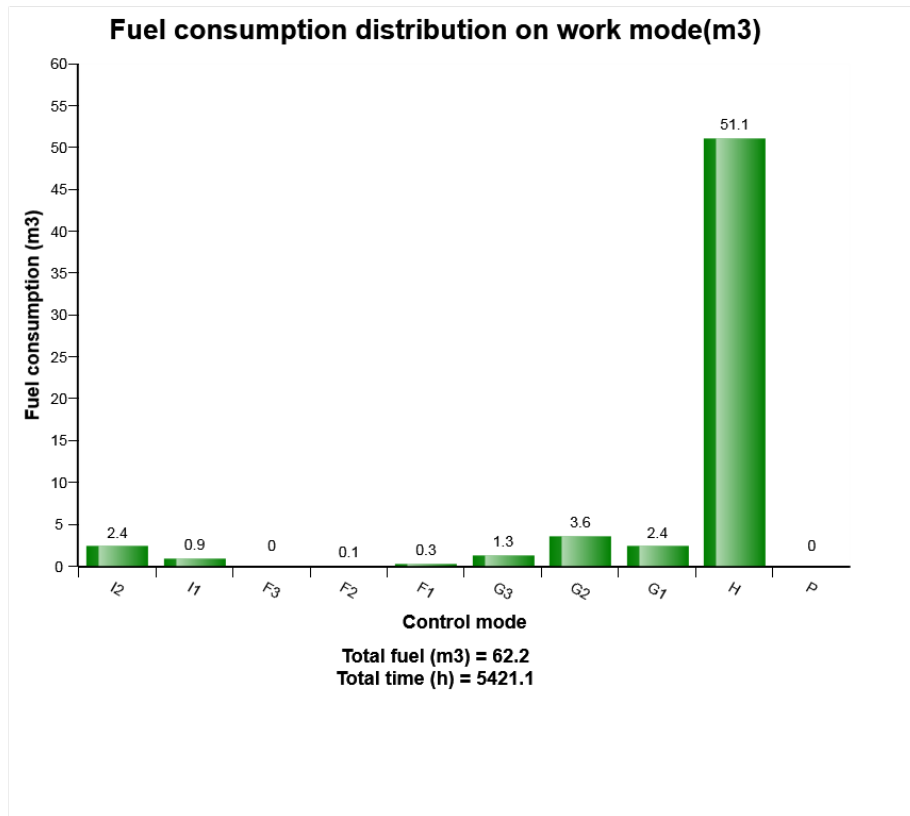**Total logged time (h) = 5438.5**
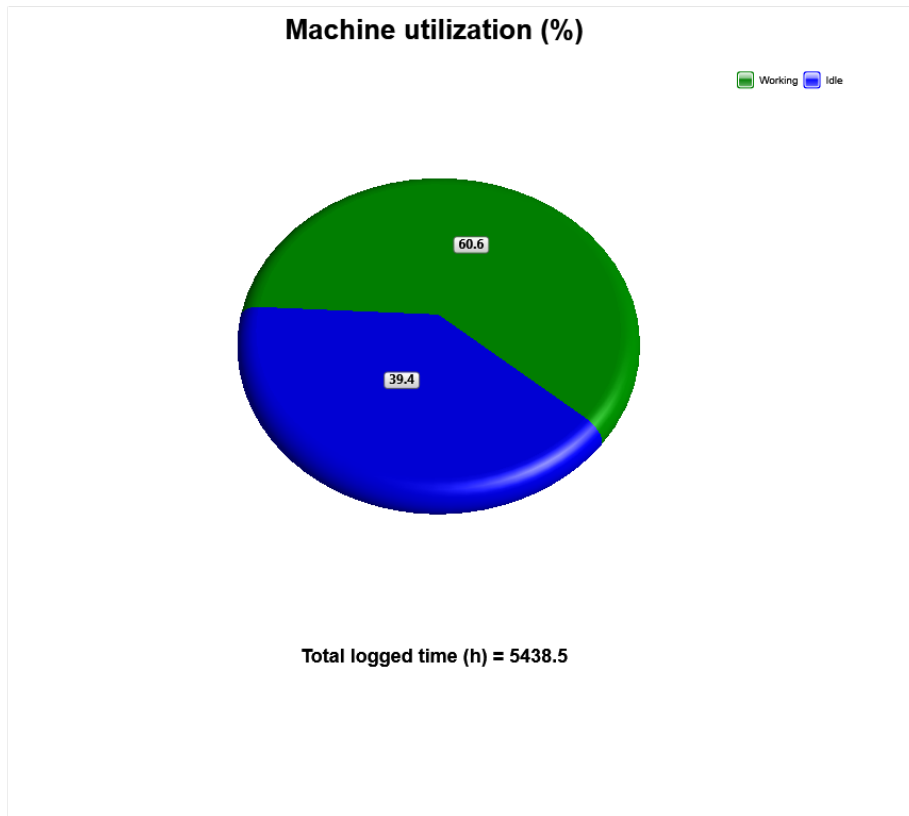
Definition:

The graph shows the distribution of the operating time for the machine. The operating time is defined as the time with engine on

Blue sector = Engine is running, but attachments and tracks are not moved

or operated .

Green sector = Machine in work with the move of attachments and tracks

VOLVO

Machine model	SerialNo	Operating Hours	Reading Date
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Fuel consumption distribution on work mode(m3)

Total fuel (m3) = 62.2
Total time (h) = 5421.1

Definition:

The diagram describes the amount of fuel consumed per engine speed mode distribution.

Total amount of fuel consumed (m3) in above means that the sum of the fuel while it consumed for engine ON. The values above distribution were calculated from theoretical calculation with logged data in V-ECU so it can be some different from actual performance in field.

ECO mode distribution (%)

ECO mode distribution
Total engine time (h)= 5437.1

Altitude distribution

Altitude (m)
Operating hours 5421.1

Engine coolant temperature, distribution (%)

Total coolant temperature hours = 5416.1

Engine coolant temperature, distribution (h)

Total coolant temperature hours = 5416.1

Machine model	SerialNo	Operating Hours	Reading Date
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Cooling Fan, speed control current distribution(h)

Total logged time (h) = 0.0
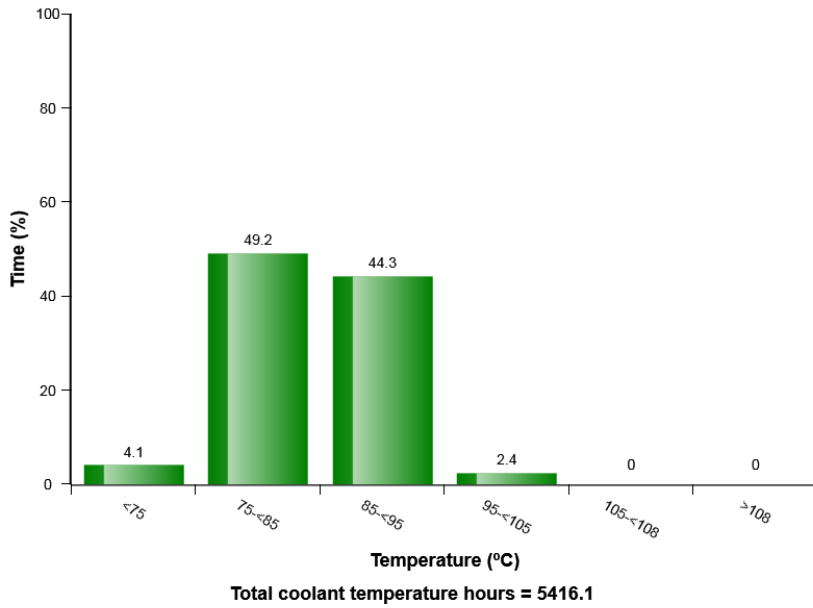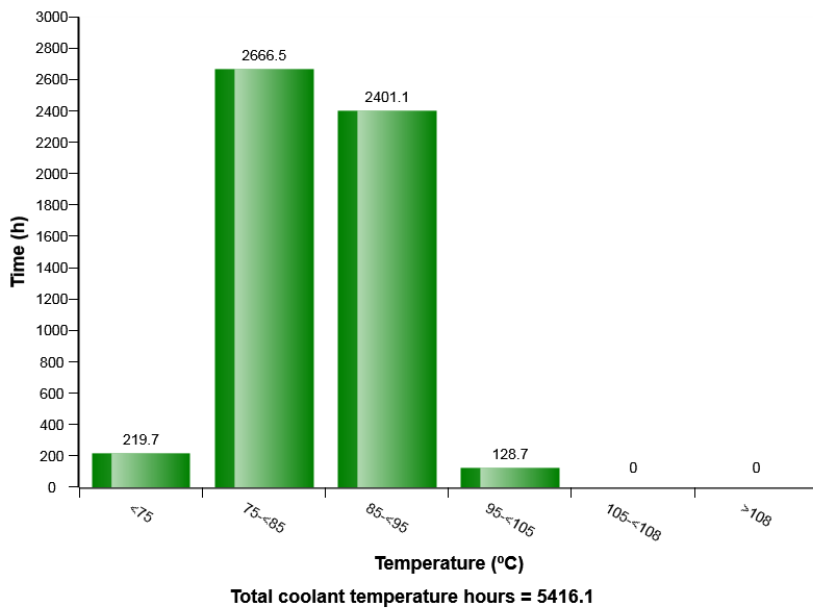
Definition:

The diagram describes Hydraulic Cooling fan speed control, Current (mA) distribution, on fan speed Control..

Total time (hours) in above means the sum of the time for Hydraulic Cooling fan operation.

Cooling fan (clutch type) speed distribution (%)

Total cooling fan operating hours = 5434.5

Cooling fan, Mode distribution (h)
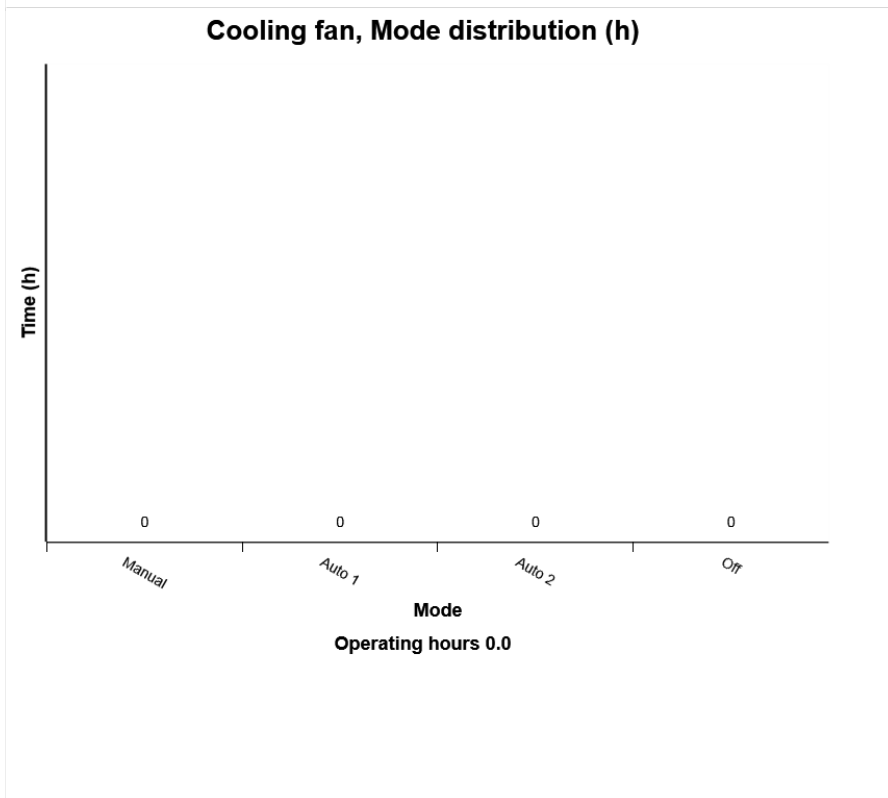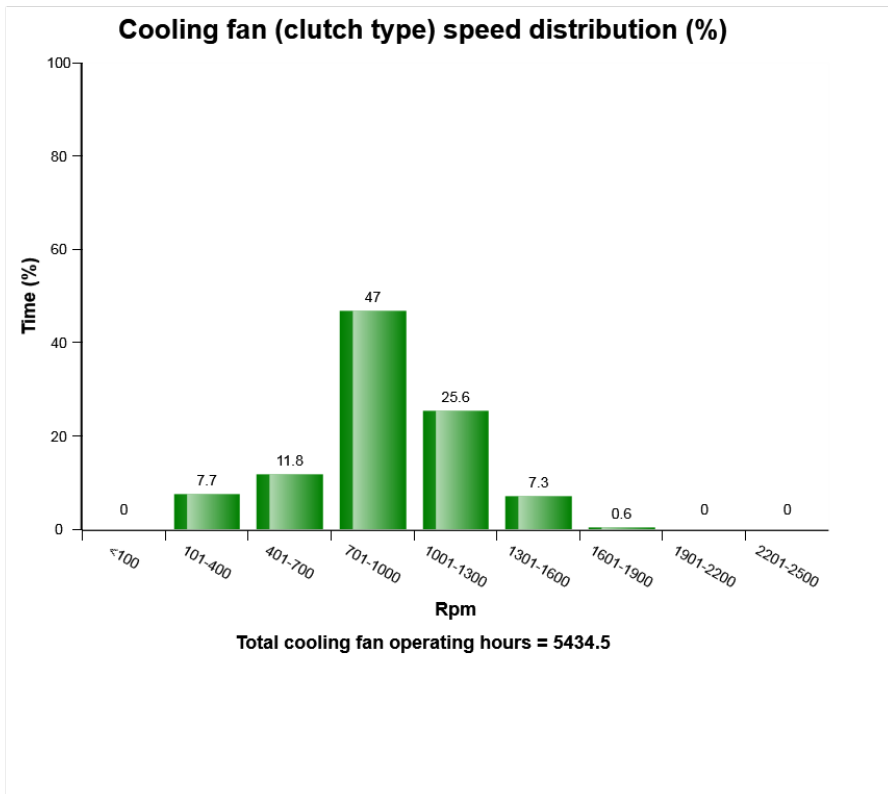
Operating hours 0.0

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Cooling fan, Normal-Reverse rotation distribution (%)

■ Normal rotation ■ Reverse rotation

100

0
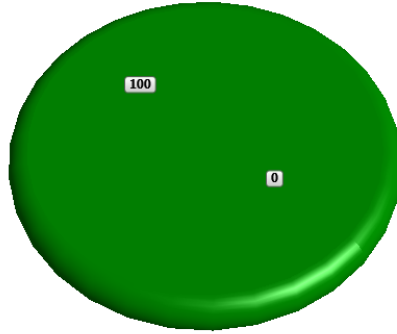
Total operating time (h) = 5438.5

Reverisble fan, Time setting distribution (h) at Auto 1 mode

Time (h)

| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-90 | 91-100 | 101-110 | 111-120 |

Setting time (min.)
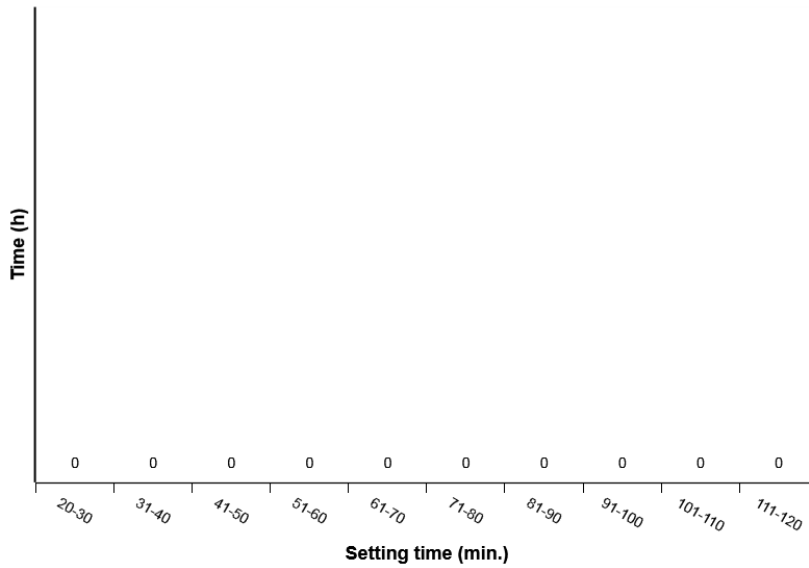
Total operating time at Auto 1 mode (h) = 0.0

Volvo Construction Equipment

Customer Support

Reversible fan, Time setting distribution (h) at Manual mode

Time (h)

	20-40	41-60	61-80	81-100	101-120	121-140	141-160	161-180
	0	0	0	0	0	0	0	0

Setting time (sec.)

Operating hours 0.0

Machine model	SerialNo	Operating Hours	Reading Date
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Engine boost air temperature distribution (h)

Total logged time (h) = 5316.4
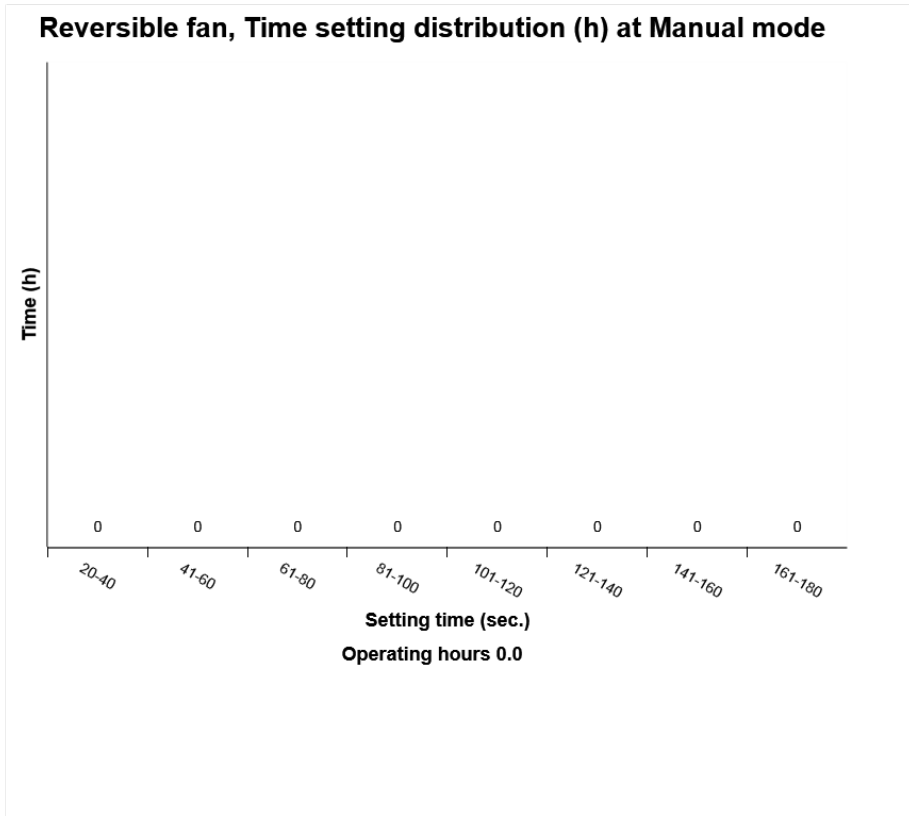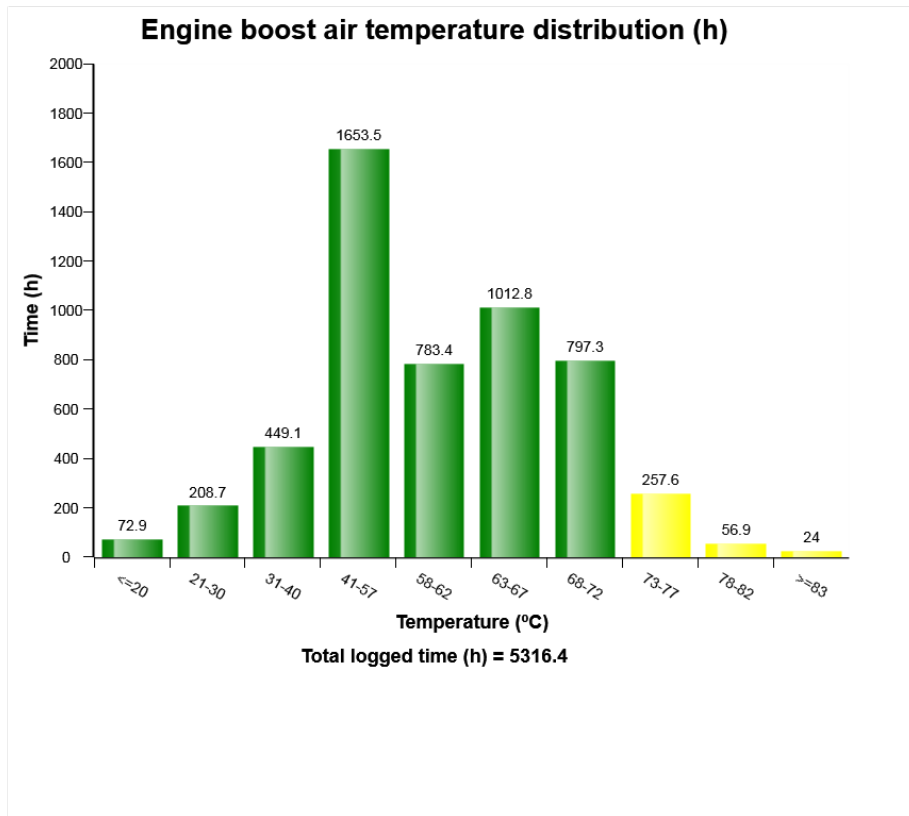
Definition:

The diagram describes Engine boost air temperature distribution of the machine when the engine is on.

Machine model	SerialNo	Operating Hours	Reading Date
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Engine work mode distribution in ECO mode(%)

Y-axis: Time (%), range 0 to 60

Values on columns:
I2: 0, I1: 0, F3: 0, F2: 0, F1: 0, G3: 1.8, G2: 4.4, G1: 2.7, H: 52.5, P: 0

X-axis: Engine work mode

Total time (h) = 5437.2
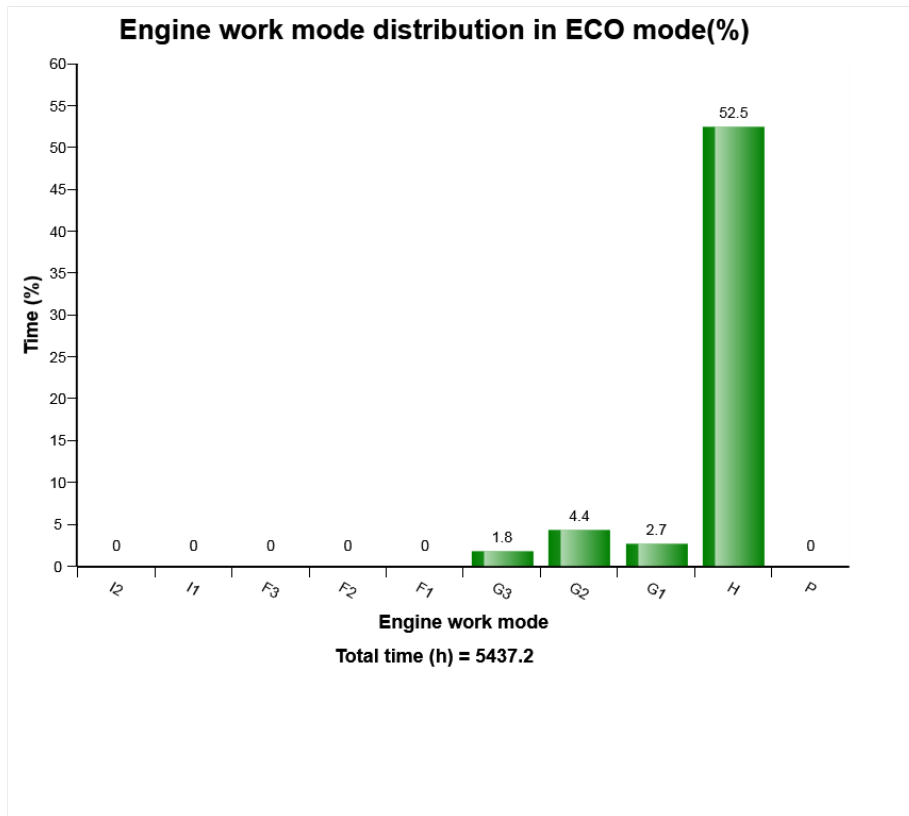
Definition:

This diagram shows the distribution of the engine work mode in percentage of time when ECO mode is engaged.

Explanation:

Y-axis: The percentage of the operating hours on each work mode when ECO mode is engaged.

X-axis: The engine work mode (10 step in total)

Distribution of each work mode is shown on top of the column in percentage.

Machine model	SerialNo	Operating Hours	Reading Date
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The sum of time distribution in percentage is 100%

Total time (h) is listed below the diagram.

Engine work mode distribution(%)

Time (%)

27.6	9	0.1	0.3	0.6	1.8	4.5	2.8	53.3	0
I2	I1	F3	F2	F1	G3	G2	G1	H	P

Engine work mode

Total time (h) = 5421.1
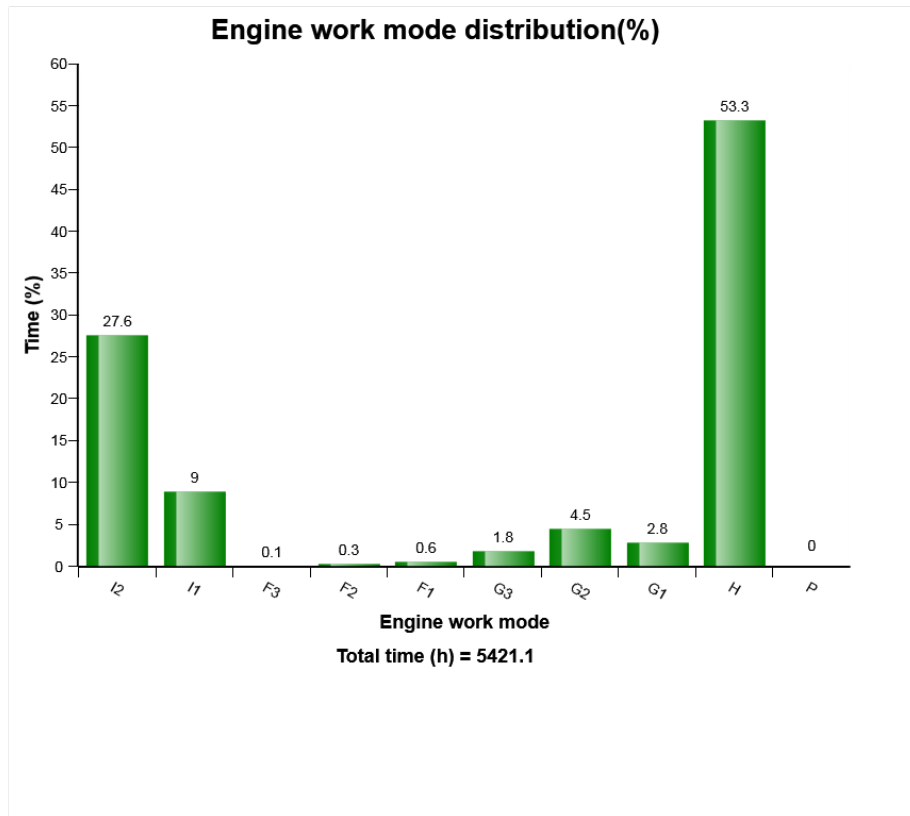
Definition:

This diagram shows the distribution of the engine work mode in time percent.

Distribution of each work mode is shown on top of the column in percentage.

Explanation:

Y-axis: The percentage of the operating hours on each work mode.

X-axis: The engine work mode (10 step in total)

Machine model	SerialNo	Operating Hours	Reading Date
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Distribution of each work mode is shown on top of the column in percentage.

The sum of time distribution in percentage is 100

Total time (h) is listed below the diagram

Machine model	SerialNo	Operating Hours	Reading Date
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Engine speed, distribution (h)

Time (h)

<600	0
600-700	0.1
700-800	246.6
800-900	1246.4
900-1000	24.6
1000-1200	461.9
1200-1400	40.5
1400-1600	186.9
1600-1800	912.6
1800-2000	2318
2000-2200	0.9
2200-2400	0
2400-2500	0
>2500	0

Engine speed (rpm)

Total logged time (h) = 5438.5
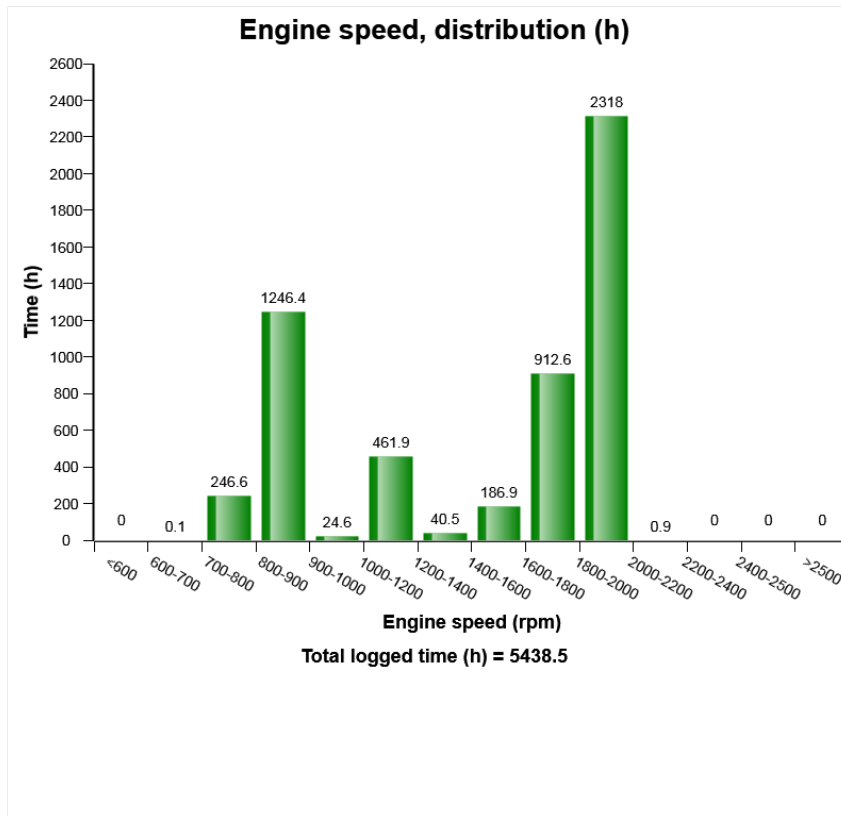
Definition:

The graph describes the engine speed distribution, in hours.

The sum of all bars = total time of engine running.

Explanation:

Y-axis: Engine running time in hours.

X-axis: Engine speed in rpm.

Green bars   = Normal engine speed range.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Red bars   =The engine speed has exceeded the maximum design speed.

Exceeding the maximum design speed may cause severe damage to the engine.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Engine speed, distribution (%)

Total logged time (h) = 5438.5
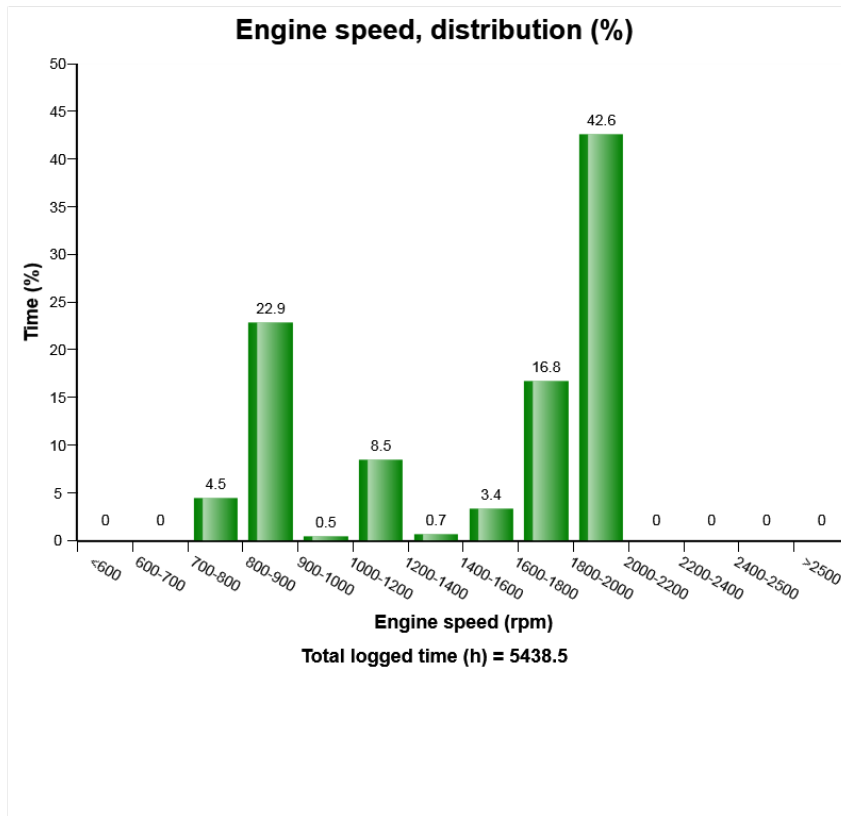
Definition:

The graph describes the engine speed distribution in percent of time.

The sum of all bars=100% of engine running time.

Explanation:

Y-axis: Engine running time in percent.

X-axis: Engine speed in rpm.

Green bars = Normal engine speed range

Blue bar = Idling interval.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Red bars =The engine speed has exceeded the maximum design speed.

Exceeding the maximum design speed may cause severe damage to the engine

Machine model	SerialNo	Operating Hours	Reading Date
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Average engine load per mode distribution (%)

Operating hours 5420.8

Machine model	SerialNo	Operating Hours	Reading Date
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Engine load on "G,H,P" speed mode distribution (%)

Engine time on "G,H,P" (h)= 3381.5
Total engine time (h)= 5421.1
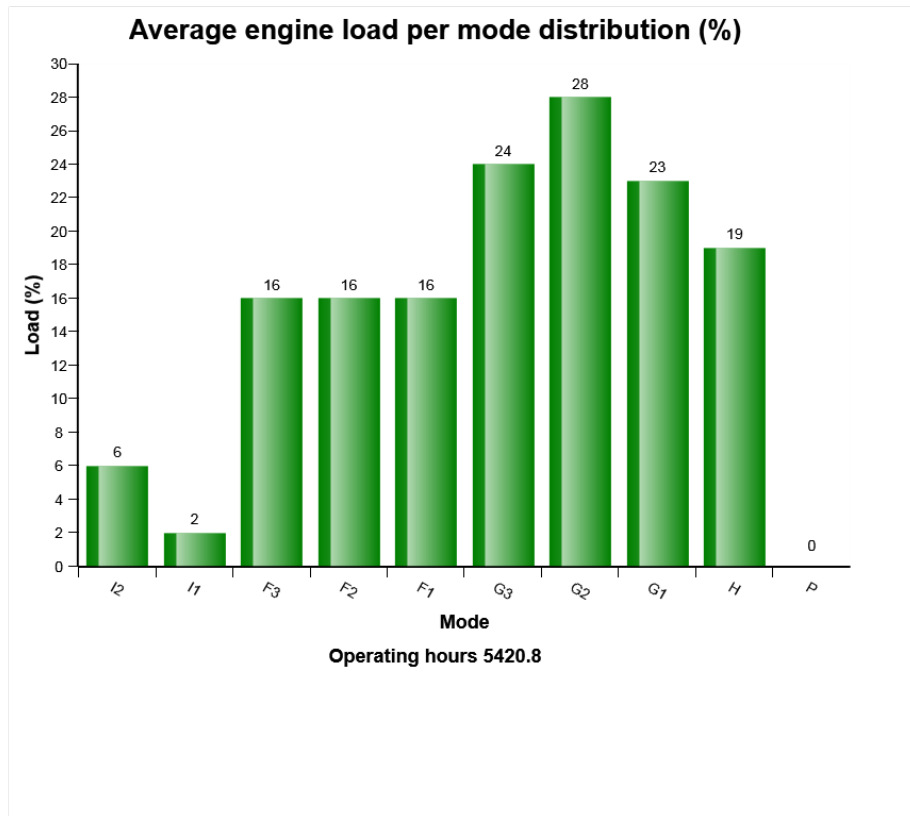
This graph shows the distribution of the engine load.

Blue bar: Low load

Green bar: Normal load

Yellow ba   r: Excessive load

Load distribution for each bar is shown on top of its column in percentage.

The sum of bars is 100%.

Machine model	SerialNo	Operating Hours	Reading Date
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Average number of starts per hour

0.5

| 0 | 0.05 | 0.1 | 0.15 | 0.2 | 0.25 | 0.3 | 0.35 | 0.4 | 0.45 | 0.5 | 0.55 |

Total number of starts: 2597
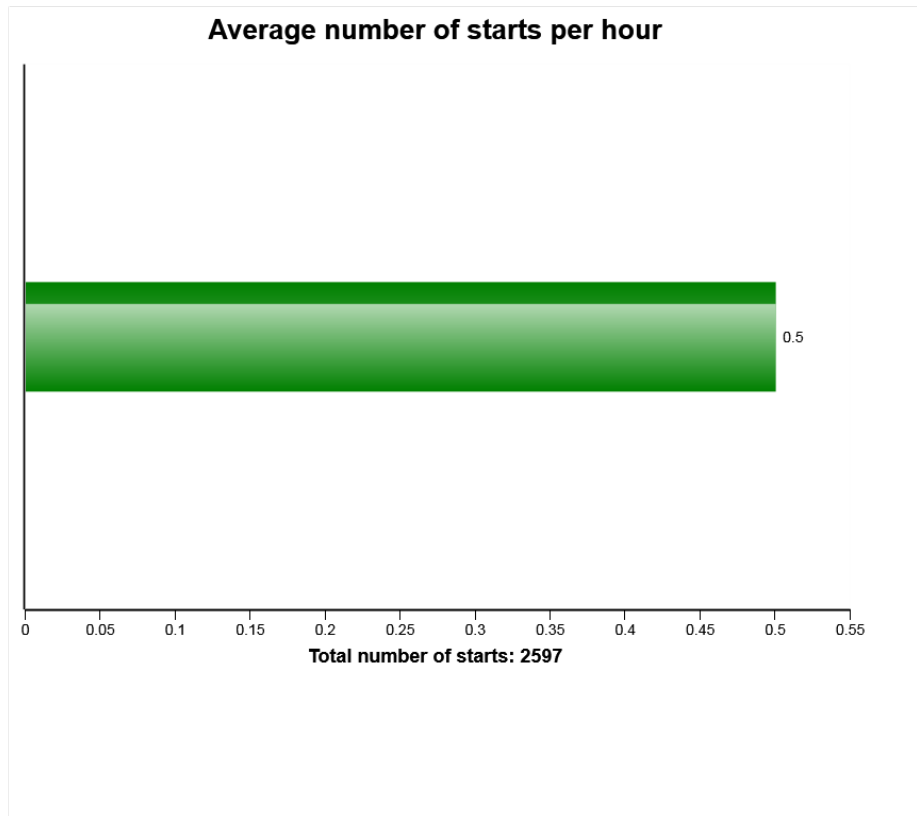
Definition:

The graph describes the average number of engine starts per engine running hour.

Explanation:

X-axis: Number of average starts per hour.

The actual time used for calculation, is time with engine on

If the fuel consumption is high one reason may be that the engine is not turned off often enough, perhaps machine is left idling for long periods. Check " Machine utilization".

The value can vary a lot depending on in which application the machine is used.

To see at which different temperatures engine is started see" Start at different engine temperatures."

Green bar   = Number of average starts per hour

Machine model	SerialNo	Operating Hours	Reading Date
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Idle time before shut down (%)

Low speed shutdown= 2317
Total number of engine shutdowns= 2734
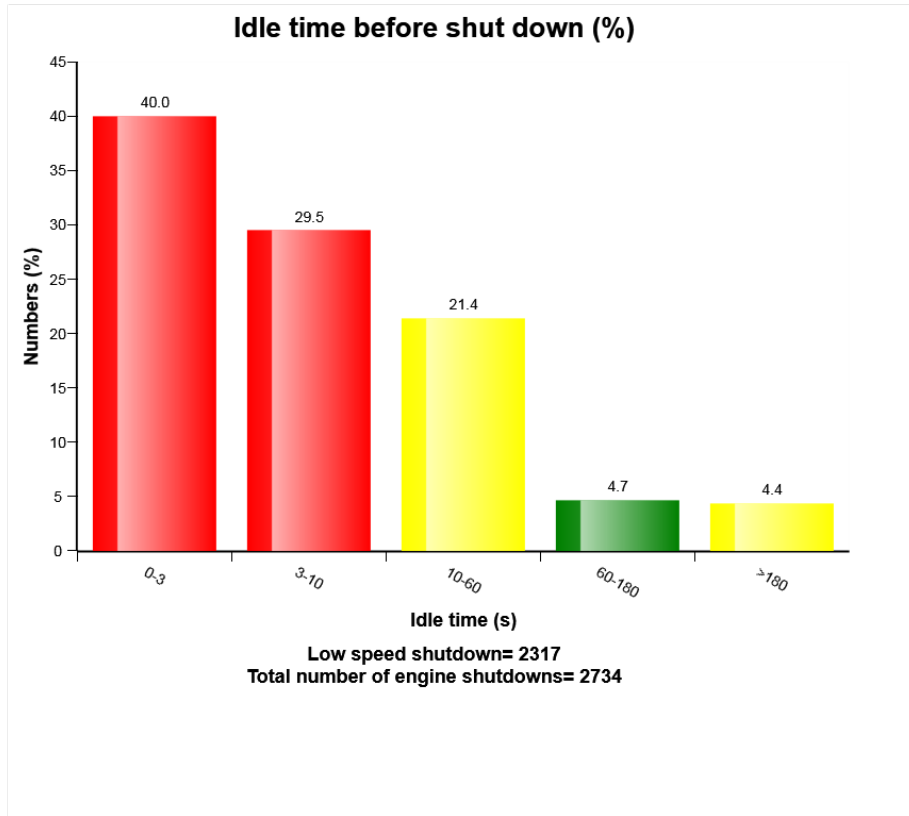
Definition:

This graph shows the distribution of delayed time at low idle speed until the engine is turned off.

The delayed time distribution for each bar is shown on top of its column in percentage.

The sum of bars is 100%.

Machine model	SerialNo	Operating Hours	Reading Date
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Engine shut down numbers per engine speed mode distribution (%)

High speed stops = 417.0
Number of engine shut downs = 2734.0
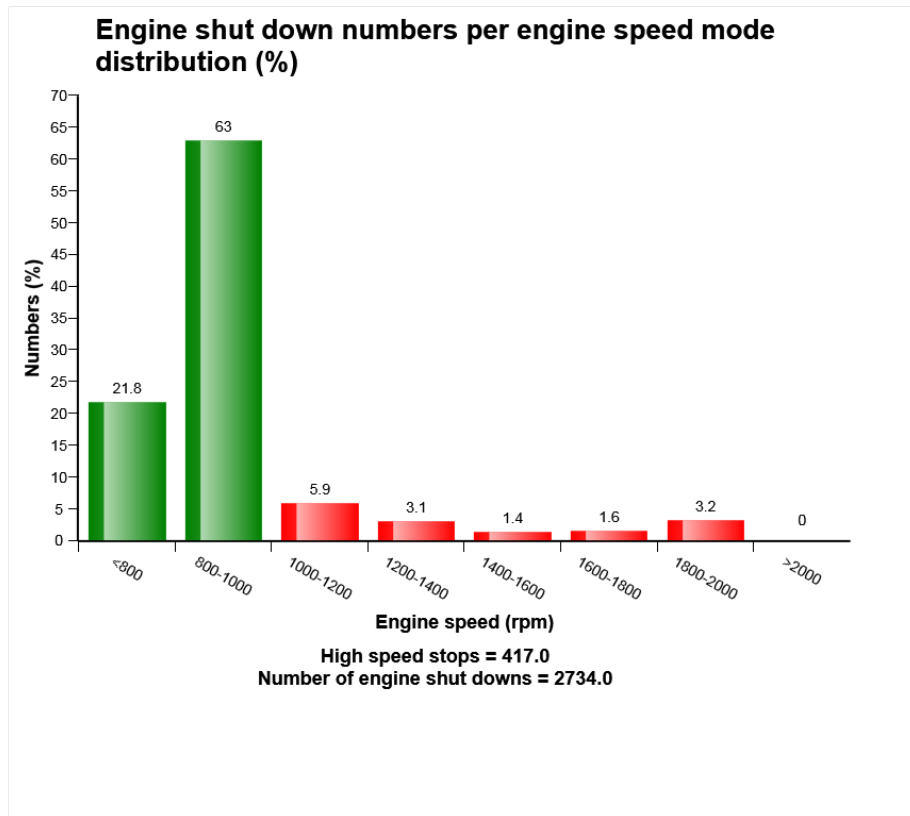
Definition:

The diagram shows the number of stops at high idle (I1 ~ P mode).

Green bars = Normal engine stop

Red bars = Abnormal engine stop

Engine stops at a high idle can cause server damage to the turbo charger due to shortage of the oil lubrication. The engine should be stopped at low idle(I2 mode).

Explanation:

Y-axle: Number of engine stop at each work mode.

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X-axle: Work mode.

Distribution of each work mode is shown on top of its column in number.

Total number of shut down is listed below the diagram.

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Start at different engine coolant temperatures

Number

2000
1800
1600
1400
1200
1000
800
600
400
200
0

1749

848

0

<0   0-<40   >=40

Temperature (°C)

Total number of starts: 2597
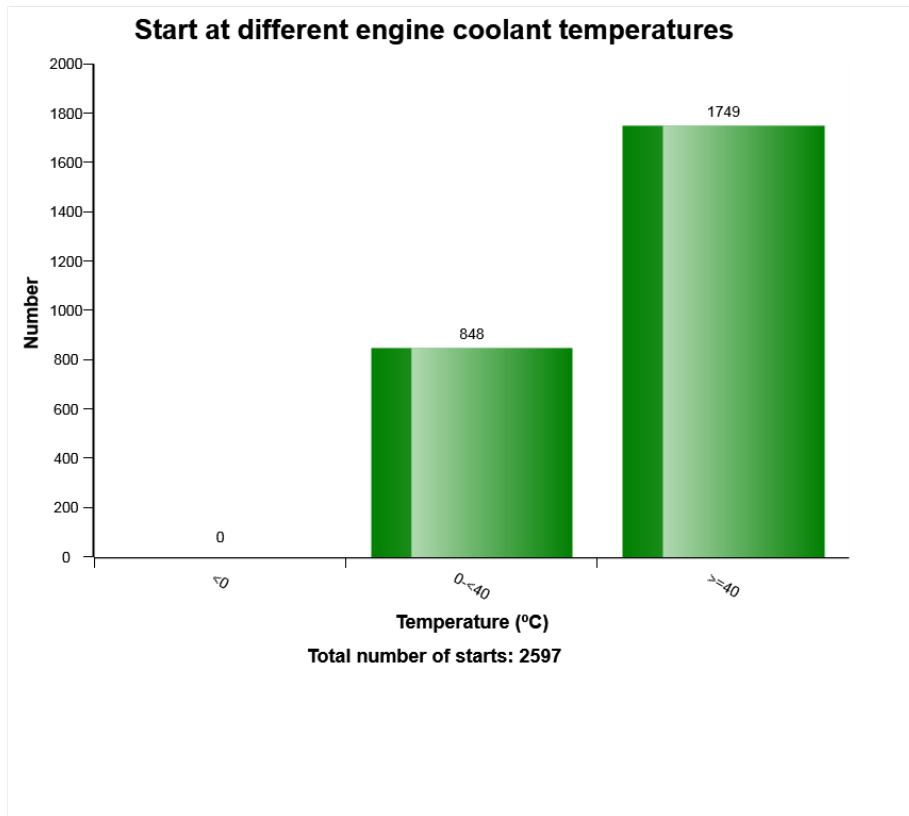
Definition:

The graph shows the distribution of engine coolant temperature, at the starting moment.

Explanation:

Y-axis: Number of engine starts

X-axis: Engine coolant temperature.

A great proportion of engine wear is due to cold starts. Try to avoid extremely cold starts. Try using an electric coolant heater.

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Under the graph the total number of engine starts is displayed.

Also see " *Number of starts / hour*" to get a complete picture of engine starting.

Machine model	SerialNo	Operating Hours	Reading Date
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Low coolant level
Total number of occurences = 512

	Op hours	Year	Month	Day	Hour	Minute	Duration (sec)
*	5391	2017	10	24	20	8	1879
*	5393	2017	10	24	21	35	689
*	5431	2017	11	28	3	6	639
*	5431	2017	11	27	2	32	1080
*	5431	2017	11	27	2	22	15
*	5432	2017	11	29	2	51	78
*	5432	2017	11	28	21	6	12
*	5432	2017	11	29	0	14	78
*	5432	2017	11	29	1	55	36
*	5432	2017	12	1	0	45	74
*	5432	2017	11	30	5	34	1307
*	5432	2017	11	30	4	33	25
*	5432	2017	11	30	4	11	1128
*	5432	2017	11	29	3	48	159
*	5433	2017	12	1	19	56	112
*	5433	2017	12	1	1	43	48
*	5433	2017	12	4	2	25	536
*	5434	2018	1	25	23	11	32
*	5437	2018	6	11	1	32	21
*	5437	2018	6	13	0	39	42

Definition   :

This type of table shows the latest occasions when a specific event has occurred. When a specified criteria is fulfilled a registration is made. Each table row corresponds to one occasion. Operating

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

hours is displayed in the first column, followed by year, month , day , hour and minute to show when an event has occurred.

The rows are not ordered chronological (The latest event may be in the middle).

Only one event per minute is registered.

Over the table the total number of events is displayed

Criteria :

In order for an occurrence of low engine coolant level to be recorded in a data point, the count to increment by 1 the engine coolant level state must change from "normal" to "low."

Machine model	SerialNo	Operating Hours	Reading Date
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Low engine oil level at start
Total number of occurences = 0

	Op hours	Year	Month	Day	Hour	Minute
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0
*	0	2000	0	0	0	0

Definition :

This type of table shows the latest occasions when a specific event has occurred. When a specified criteria is fulfilled a registration is made. Each table row corresponds to one occasion. Operating

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

hours is displayed in the first column, followed by year, month , day , hour and minute to show when an event has occurred.

The rows are not ordered chronological (The latest event may be in the middle).

Only one event per minute is registered.

Over the table the total number of events is displayed

Criteria :

In order for an occurrence of low engine oil level to be recorded in a data point and the count to increment by 1, an Alarm shall have been received at start up of machine

Low Engine Oil Pressure
Total number of occurences = 0

	Op hours	Year	Month	Day	Hour	Minute	Duration (sec)
A	0	2000	0	0	0	0	0
R	0	2000	0	0	0	0	0
Q	0	2000	0	0	0	0	0
P	0	2000	0	0	0	0	0
O	0	2000	0	0	0	0	0
N	0	2000	0	0	0	0	0
M	0	2000	0	0	0	0	0
L	0	2000	0	0	0	0	0
K	0	2000	0	0	0	0	0
J	0	2000	0	0	0	0	0
I	0	2000	0	0	0	0	0
H	0	2000	0	0	0	0	0
G	0	2000	0	0	0	0	0
F	0	2000	0	0	0	0	0
E	0	2000	0	0	0	0	0
D	0	2000	0	0	0	0	0
C	0	2000	0	0	0	0	0
B	0	2000	0	0	0	0	0
S	0	2000	0	0	0	0	0
T	0	2000	0	0	0	0	0

Definition   :

This type of table shows the latest occasions when a specific event has occurred. When a specified criteria is fulfilled a registration is made. Each table row corresponds to one occasion. Operating hours is displayed in the first column, followed by year, month, day, hour

Extreme (bar)
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0

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and minute to show when an event has occurred.

The rows are not ordered chronological (The latest event may be in the middle).

Only one event per minute is registered.

Over the table the total number of events is displayed

Duration ：

The duration of each event is shown after the timestamp of the event.

The duration is counted as long as the criteria is fulfilled.

Extreme value：

The extreme value column displays the most extreme value during the event.

Criteria：

In order for an occurrence of low engine oil pressure to be recorded in a data point and the count to increment by 1, the engine oil pressure state must change from "normal" or "error" to "low." The event of low transmission oil pressure will end when the status changes from "low" back to "normal" or "error."

Machine model	SerialNo	Operating Hours	Reading Date
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Fuel Filter Clogging
Total number of occurences = 2

Op hours	Year	Month	Day	Hour	Minute	Duration (min)
2729	2016	3	15	4	38	0
2729	2016	3	15	23	10	1
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0

Low Air filter pressure
Total number of occurences = 0

Op hours	Year	Month	Day	Hour	Minute	Duration (sec)
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0

Definition   :

This type of table shows the latest occasions when a specific event has occurred. When a specified criteria is fulfilled a registration is made. Each table row corresponds to one occasion. Operating

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

hours is displayed in the first column, followed by year, month, day, hour and minute to show when an event has occurred.

The rows are not ordered chronological (The latest event may be in the middle).

Only one event per minute is registered.

Over the table the total number of events is displayed.

Duration :

The duration of each event is shown after the timestamp of the event.

The duration is counted as long as the criteria is fulfilled.

Criteria :

The criteria to get an registration, is that the alarm signal for air filter clogged is active, and that the diesel engine is running.

Machine model	SerialNo	Operating Hours	Reading Date
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High Charge air temperature
Total number of occurences = 43

Op hours	Year	Month	Day	Hour	Minute	Duration (sec)	Extreme (° C)
1811	2015	9	23	22	29	5377	74
2075	2015	11	11	3	3	871	73
2076	2015	11	11	3	56	9931	77
2241	2015	12	11	22	17	8013	73
2571	2016	2	16	4	31	8558	74
2681	2016	3	3	3	36	10406	77
2789	2016	3	23	1	17	15876	75
2960	2016	4	28	1	32	17143	76
3040	2016	5	10	0	8	840	73
3295	2016	6	17	7	1	120	71
3347	2016	6	23	3	58	11924	123
3358	2016	6	24	2	35	17024	76
3409	2016	7	1	3	56	1099	72
3442	2016	7	8	4	5	8451	76
3464	2016	7	11	23	5	432	71
3721	2016	9	21	23	16	1113	76
4951	2017	6	19	3	38	5036	73
5030	2017	8	16	3	56	4538	71
5056	2017	8	19	2	35	1435	78
5189	2017	9	14	2	11	8587	72

Definition   :

This type of table shows the latest occasions when a specific event has occurred. When a specified criteria is fulfilled a registration is made. Each table row corresponds to one occasion. Operating

hours is displayed in the first column, followed by year, month , day , hour and minute to show when an event has occurred.

The rows are not ordered chronological (The latest event may be in the middle).

Only one event per minute is registered.

Over the table the total number of events is displayed

Duration :

The duration of each event is shown after the timestamp of the event.

The duration is counted as long as the criteria is fulfilled.

Extreme value :

The extreme value column displays the most extreme value during the event.

Criteria :

In order for an occurrence of high engine charge air temperature to be recorded and the count to increment by 1, the engine charge air temperature must change from "normal" to "high." The event of high engine charge air temperature will end when the status changes from "high" back to "normal."

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Regeneration ignored
Total number of ignored regenerations 257

	Op hours	Year	Month	Day	Hour	Minute	Duration (min)
*	5390	2017	10	23	3	20	65
*	5391	2017	10	24	20	7	34
*	5391	2017	10	24	20	6	1
*	5392	2017	10	24	20	41	21
*	5392	2017	10	24	21	8	21
*	5420	2017	11	2	3	30	5
*	5420	2017	11	2	3	35	28
*	5421	2017	11	2	4	3	10
*	5421	2017	11	2	4	15	25
*	5421	2017	11	2	4	40	3
*	5421	2017	11	2	4	49	25
*	5422	2017	11	2	5	15	10
*	5422	2017	11	2	19	5	46
*	5423	2017	11	2	20	10	60
*	5423	2017	11	2	21	20	8
*	5423	2017	11	2	21	34	22
*	5424	2017	11	2	21	59	22
*	5424	2017	11	2	22	32	2
*	5424	2017	11	3	21	22	24
*	5425	2017	11	3	21	48	14

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Regeneration aborted
Total number of occurences = 239

Op hours	Year	Month	Day	Hour	Minute
5237	2017	9	22	1	36
5244	2017	9	22	23	35
5286	2017	9	28	3	32
5300	2017	9	29	19	44
5341	2017	10	5	22	29
5358	2017	10	10	5	9
5359	2017	10	10	19	40
5386	2017	10	18	20	31
5387	2017	10	19	23	17
5390	2017	10	23	2	39
5390	2017	10	23	2	2
5391	2017	10	23	4	25
5421	2017	11	2	3	59
5421	2017	11	2	4	39
5422	2017	11	2	5	15
5422	2017	11	2	5	26
5423	2017	11	2	21	10
5424	2017	11	2	21	56
5424	2017	11	2	22	21
5438	2018	6	13	2	33

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Regeneration duration
Total number of occurences = 1102

Op hours	Year	Month	Day	Hour	Minute	Duration (min)
5390	2017	10	23	2	23	16
5390	2017	10	23	3	30	14
5391	2017	10	23	4	9	14
5392	2017	10	24	20	45	16
5392	2017	10	24	21	15	14
5398	2017	10	27	21	28	26
5403	2017	10	29	21	10	28
5413	2017	10	31	4	15	28
5420	2017	11	2	3	36	16
5421	2017	11	2	4	15	24
5421	2017	11	2	4	50	25
5422	2017	11	2	5	16	10
5422	2017	11	2	19	22	25
5423	2017	11	2	21	34	22
5423	2017	11	2	21	20	1
5423	2017	11	2	20	41	19
5424	2017	11	2	22	33	1
5424	2017	11	2	22	0	13
5425	2017	11	3	21	48	14
5437	2018	6	13	1	51	32

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

High engine coolant temperature
Total number of occurences = 3

Op hours	Year	Month	Day	Hour	Minute	Duration (sec)	Extreme (°C)
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
3531	2016	8	11	2	53	6	105
3531	2016	8	11	2	50	59	108
3650	2016	9	8	2	22	256	104

Definition   :

This type of table shows the latest occasions when a specific event has occurred. When a specified criteria is fulfilled a registration is made. Each table row corresponds to one occasion. Operating

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

hours is displayed in the first column, followed by year, month, day, hour and minute to show when an event has occurred.

The rows are not ordered chronological (The latest event may be in the middle).

Only one event per minute is registered.

Over the table the total number of events is displayed.

Duration :

The duration of each event is shown after the timestamp of the event.

The duration is counted as long as the criteria is fulfilled.

Extreme value :

The extreme value column displays the most extreme value during the event.

Criteria :

The criteria to get an registration, is that the alarm signal for high engine coolant temperature is active and that the diesel engine is running.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Water level warning in water separator
Total number of occurences = 0

Op hours	Year	Month	Day	Hour	Minute	Duration (min)
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0
0	2000	0	0	0	0	0

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

X1 control distribution
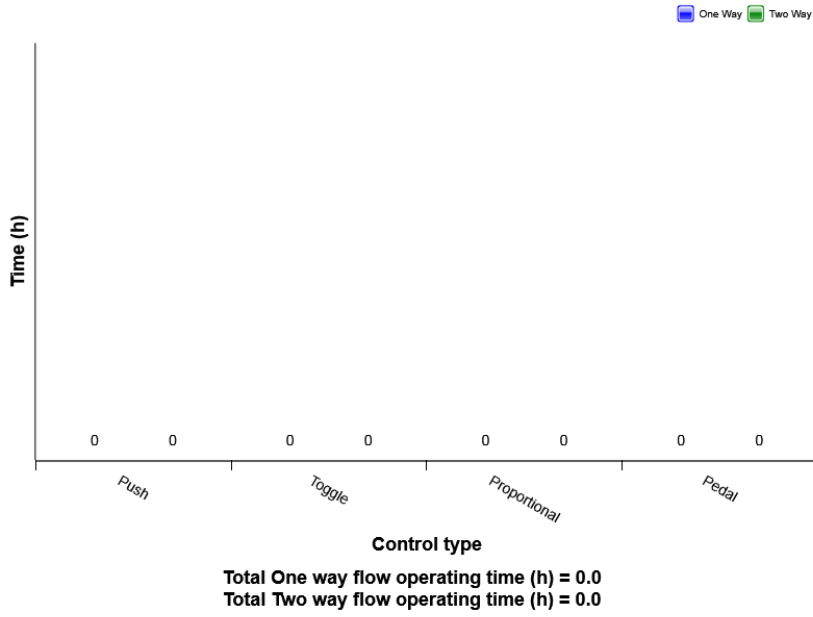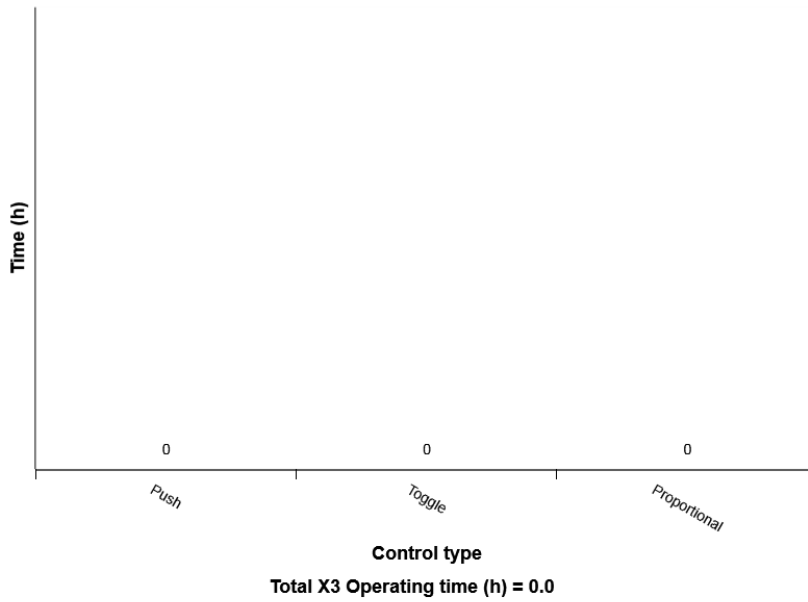
■ One Way ■ Two Way

Time (h)

0   0   0   0   0   0   0   0

Push   Toggle   Proportional   Pedal

Control type

Total One way flow operating time (h) = 0.0
Total Two way flow operating time (h) = 0.0

X3 Control distribution

Time (h)

0   0   0

Push   Toggle   Proportional

Control type

Total X3 Operating time (h) = 0.0

Volvo Construction Equipment

Customer Support

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

HVAC Auto - Manual mode selection distribution (%)

Total logged time (h) = 5081.2
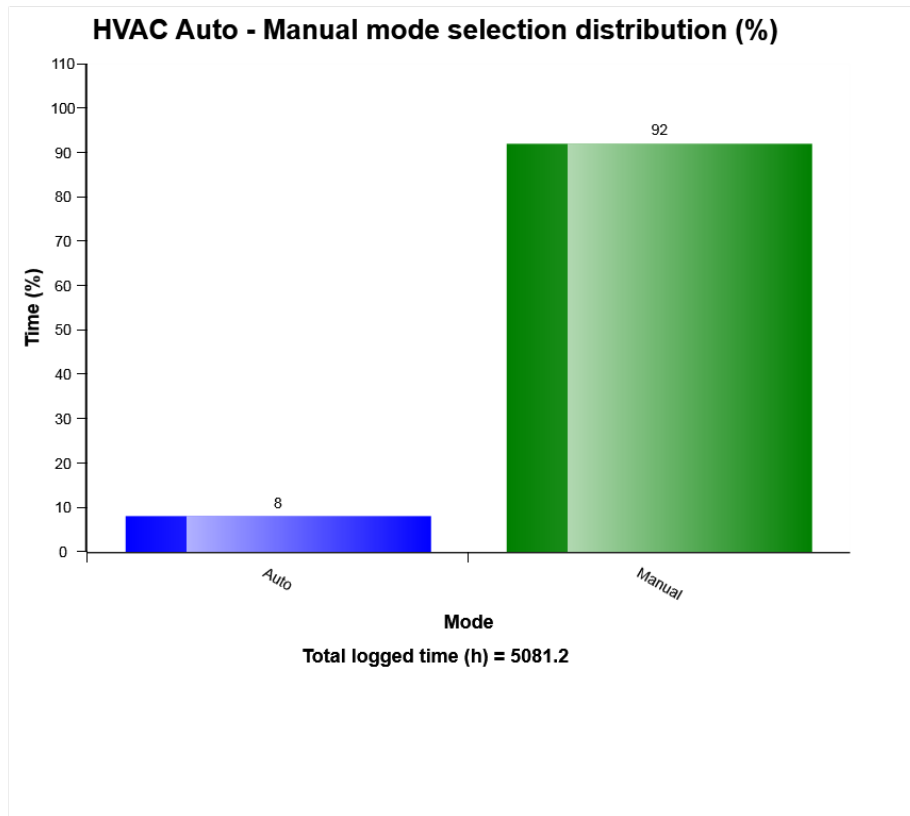
Definition:

The diagram describes auto-manual mode sele ction distribution of HVAC system in machine while it Works. The share of each mode compared to Total time of HVAC operation is displayed.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

HVAC air temperature setting in auto control mode distribution (h)
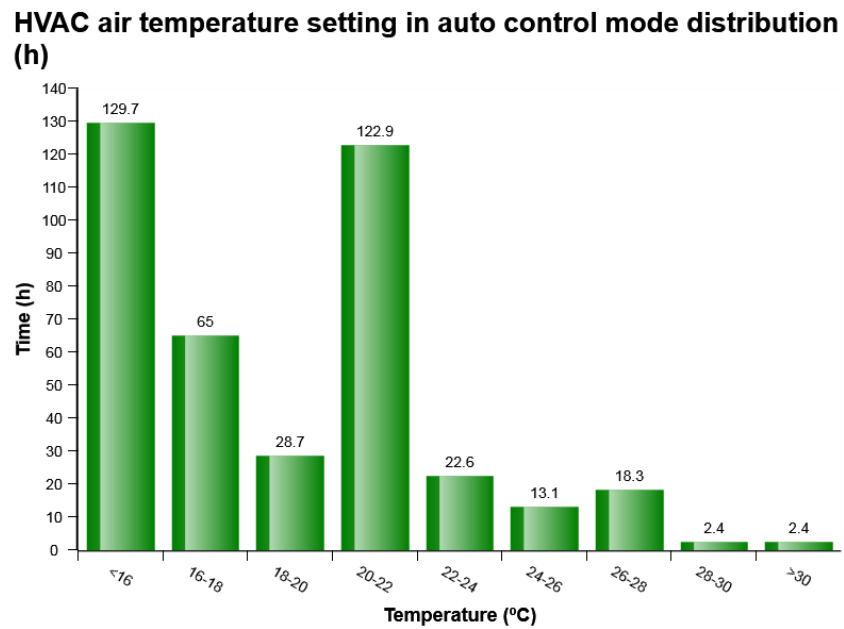
Definition:

The diagram describes air temperature setting distribution for HVAC auto control mode established by operator in Cabin

Machine ambient temperature distribution (h)

Total logged time (h) = 5444.4

Definition:

The diagram describes ambient temperature distribution of the machine while machine operates.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

AC Compressor usage

2878.6

Total logged time (h) = 5445.0
Number of engagements = 116613.0
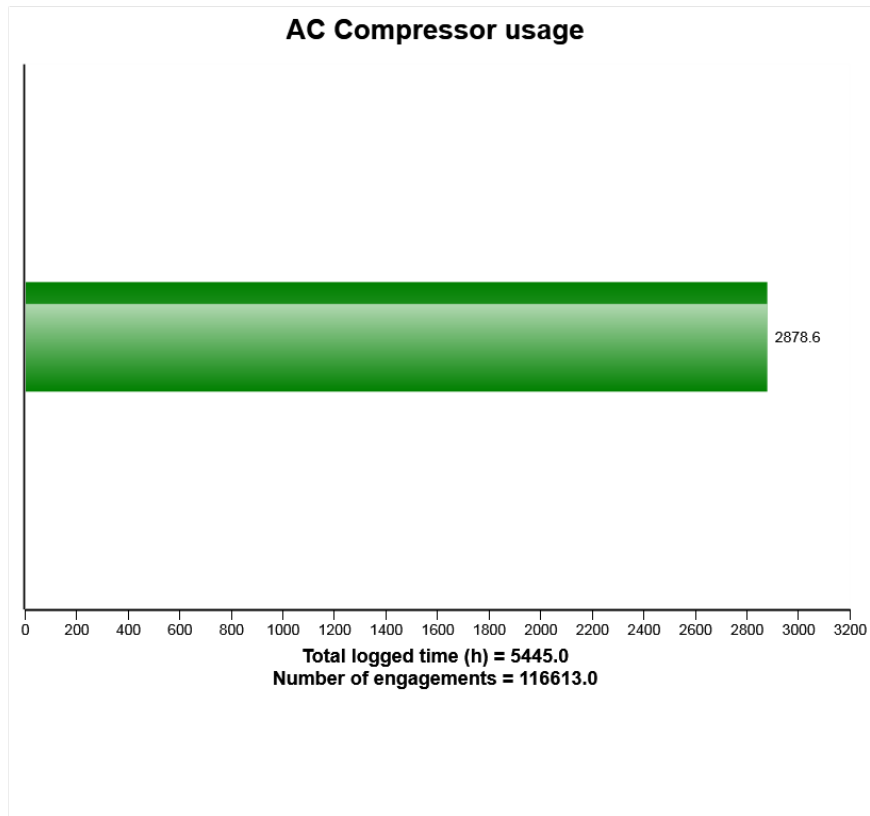
Definition:

 The graph shows the total time of AC compressor engagement.

  Explanation:

Green bar: Total time in hours, AC compressor has been engaged.

Under the graph the total engine running time (in hours) is displayed.

Total number of AC compressor activations is also displayed.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

-

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

HVAC air flow direction in manual mode distribution (h)

Bar chart showing Time (h) on the y-axis (0 to 4000) versus Air flow direction on the x-axis:
- To Face: 3000.4
- To Foot: 460
- To Face and Foot: 1185.3
- To Defroster: 30.3
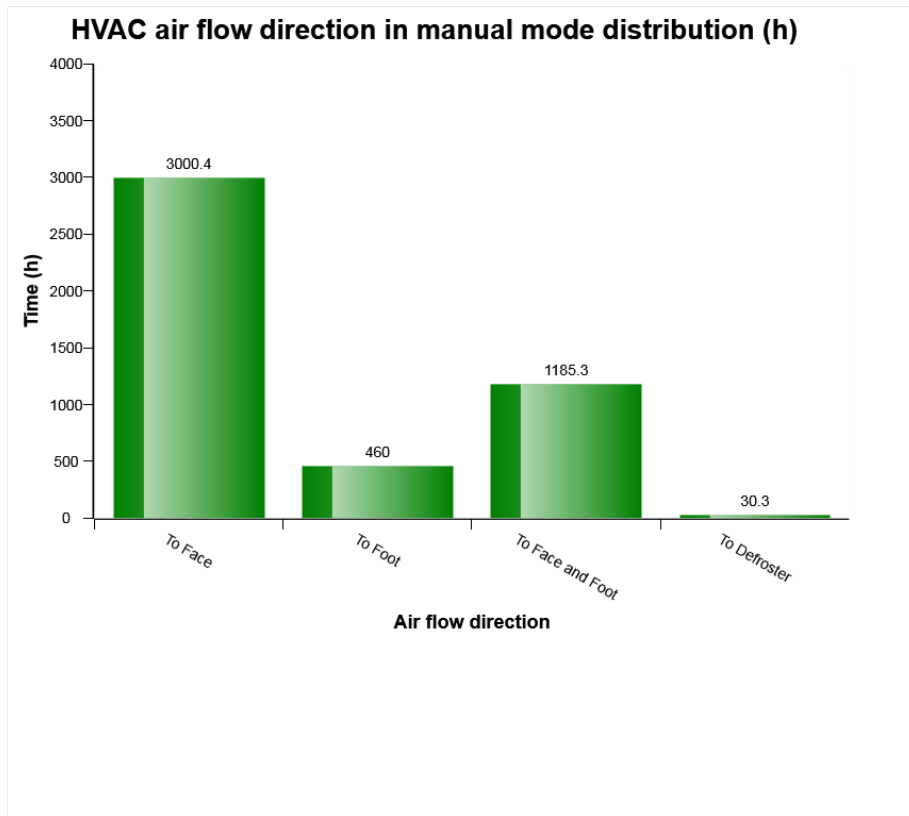
Definition:

The diagram describes air flow direction distribution for HVAC manual control mode established by operator in Cabin.

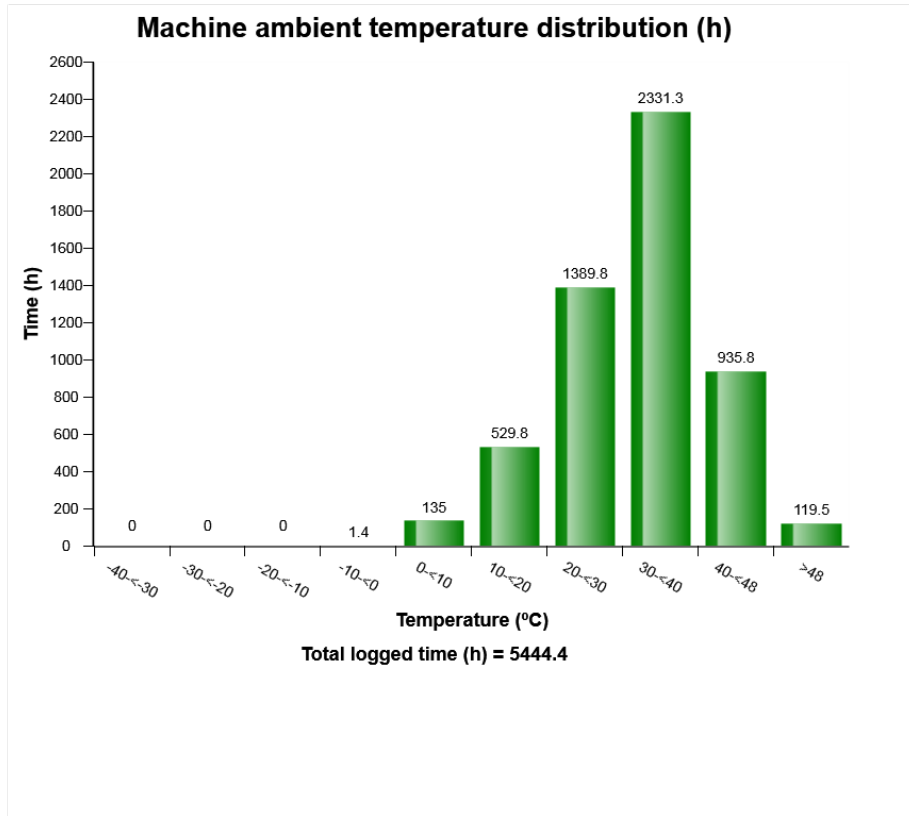HVAC air blower motor speed in manual mode distribution (h)

Definition:

The diagram describes air blower motor speed distribution for HVAC manual control mode established by operator in Cabin.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

AC High Pressure
Total number of occurences = 0

Op hours	Year	Month	Day	Hour	Minute	Duration (sec)	Extreme (° C)
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0

Definition :

This type of table shows the latest occasions when a specific event has occurred. When a specified criteria is fulfilled a registration is made. Each table row corresponds to one occasion. Operating

hours is displayed in the first column, followed by year, month , day , hour and minute to show when an event has occurred.

The rows are not ordered chronological (The latest event may be in the middle).

Only one event per minute is registered.

Over the table the total number of events is displayed

Duration :

The duration of each event is shown after the timestamp of the event.

The duration is counted as long as the criteria is fulfilled.

Extreme value :

The extreme value column displays the most extreme value during the event.

Criteria :

Logging is performed when, High AC Pressure signal is active. Ambient temp is viewed.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

AC Boiling Protection
Number of engagements = 0

Op hours	Year	Month	Day	Hour	Minute	Duration (sec)	Extreme (° C)
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0

Definition   :

This type of table shows the latest occasions when a specific event has occurred. When a specified criteria is fulfilled a registration is made. Each table row corresponds to one occasion. Operating

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

hours is displayed in the first column, followed by year, month , day , hour and minute to show when an event has occurred.

The rows are not ordered chronological (The latest event may be in the middle).

Only one event per minute is registered.

Over the table the total number of events is displayed

Duration :

The duration of each event is shown after the timestamp of the event.

The duration is counted as long as the criteria is fulfilled.
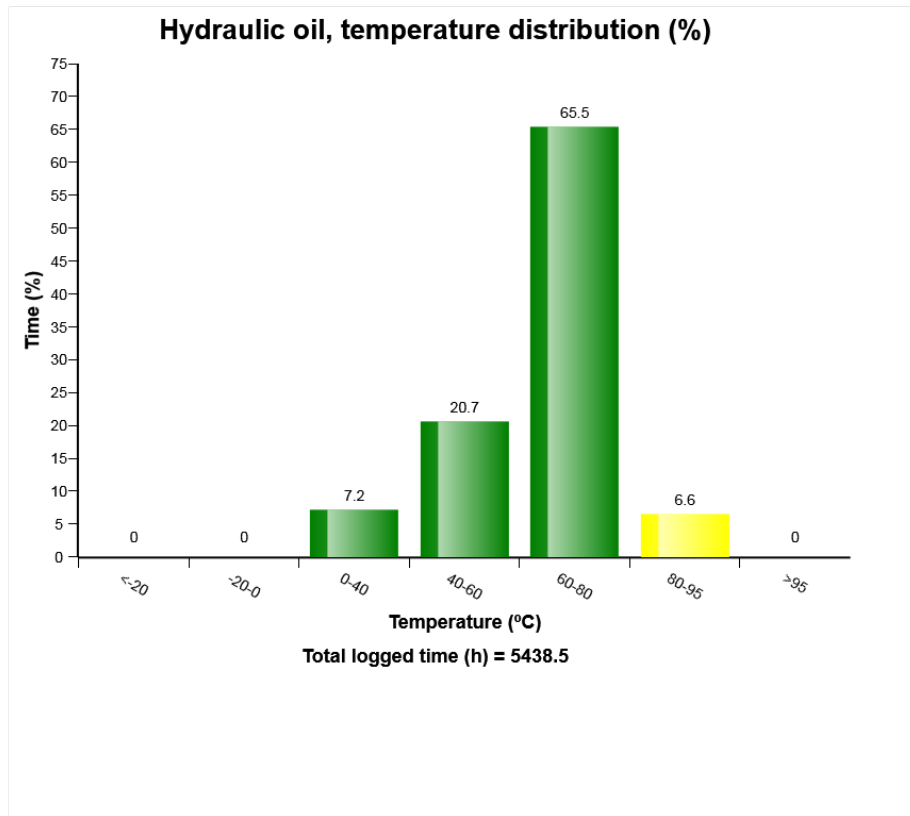
Extreme value :

The extreme value column displays the most extreme value during the event.

Criteria :

Logging is performed when, Boiling protection signal is active. Ambient temp is viewed.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

AC System Cut Out Pressure
Total number of occurences = 4

Op hours	Year	Month	Day	Hour	Minute	Duration (sec)	Extreme (° C)
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
3504	2016	7	15	19	29	3	25
3504	2016	7	15	6	20	4	38
3509	2016	7	16	1	2	5	39
3513	2016	7	17	19	17	2	25

Definition   :

This type of table shows the latest occasions when a specific event has occurred. When a specified criteria is fulfilled a registration is made. Each table row corresponds to one occasion. Operating

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

hours is displayed in the first column, followed by year, month , day , hour and minute to show when an event has occurred.

The rows are not ordered chronological (The latest event may be in the middle).

Only one event per minute is registered.

Over the table the total number of events is displayed

Duration :

The duration of each event is shown after the timestamp of the event.

The duration is counted as long as the criteria is fulfilled.

Extreme value :

The extreme value column displays the most extreme value during the event.

Criteria :

Logging is performed when, AC cut out pressure signal is active. Ambient temp is viewed.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Hydraulic oil, temperature distribution (%)

Time (%) — Y-axis

65.5 at 60-80
20.7 at 40-60
7.2 at 0-40
6.6 at 80-95
0 at <-20
0 at -20-0
0 at >95

Temperature (ºC)

Total logged time (h) = 5438.5

Definition:

The graph shows the time distribution of the temperature, while engine running.

Explanation:

Y-axis: Time

X-axis: Temperature distribution in classes.

Blue bar   = Warm-up phase.

During the engine warm-up phase, this temperature region is passed.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

It is normal to have registrations in this region.

Green bar   = Normal working temperature. The Major part of the registrations shall be in this region.
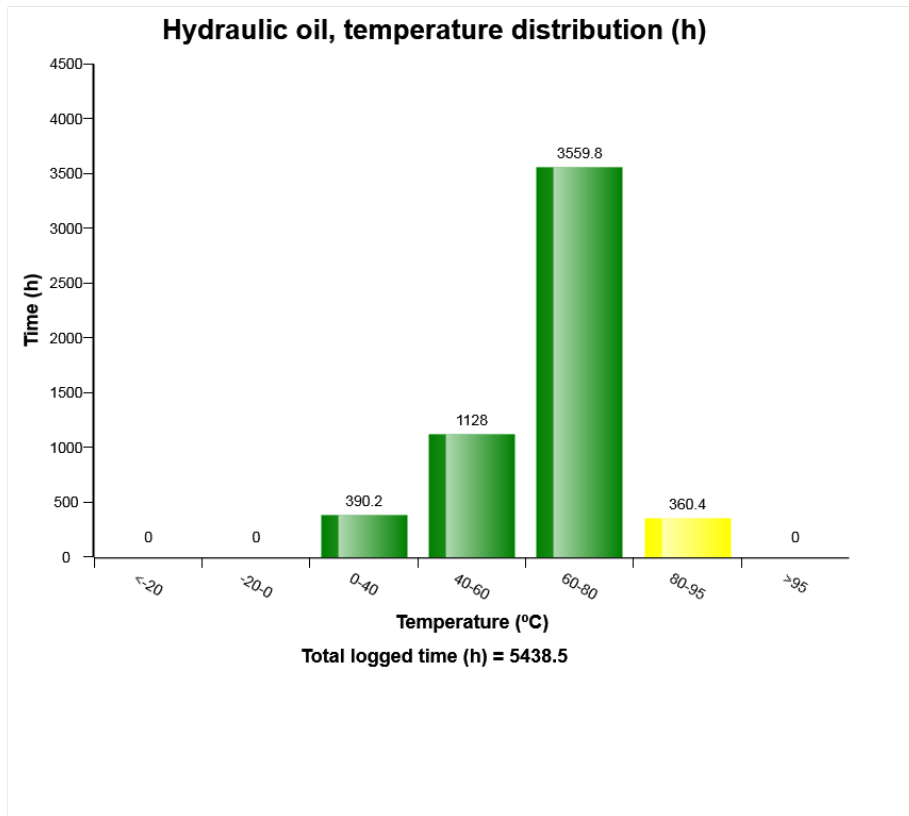
Yellow bar   =   High working temperature. It is normal to have some registrations in this region.

Red bar   = Alarm.

Registrations in this region is not normal, running in this region may cause severe damage.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Hydraulic oil, temperature distribution (h)

Total logged time (h) = 5438.5

Definition:

The graph shows the time distribution of the temperature, while engine running.

Explanation:

Y-axis: Time

X-axis: Temperature distribution in classes.

Blue bar = Warm-up phase.

During the engine warm-up phase, this temperature region is passed.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

It is normal to have registrations in this region.

Green bar   = Normal working temperature. The Major part of the registrations shall be in this region.
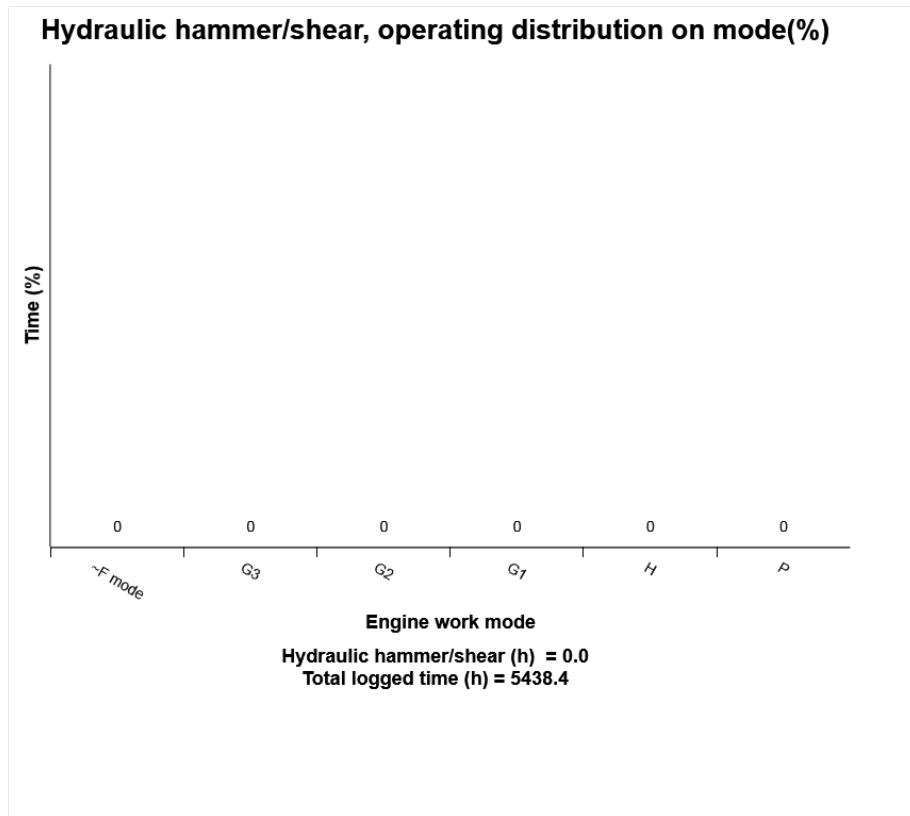
Yellow bar   =   High working temperature. It is normal to have some registrations in this region.

Red bar   = Alarm.

Registrations in this region is not normal, running in this region may cause severe damage.

Hydraulic hammer/shear, operating distribution on mode(%)

Time (%)

| 0 | 0 | 0 | 0 | 0 | 0 |
~F mode   G3   G2   G1   H   P

Engine work mode

Hydraulic hammer/shear (h) = 0.0
Total logged time (h) = 5438.4

Definition:

The graph describes the operating hours (%) for hydraulic hammer/shears on each engine control mode .

Recommended to use green column mode of the hammer operation.

I2 = Idle 2

I1 = Idle 1

F3= Fine control 3

F2= Fine control 2

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

F1= Fine control 1

G3 = General 3

G2 = General 2

G1 = General 1

H = Heavy Duty

P = Power max

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Hydraulic Power boosted working operation distribution (%)

Boost and solenoid ON (h) = 0.7
Boost solenoid ON, F mode (h) = 56.8
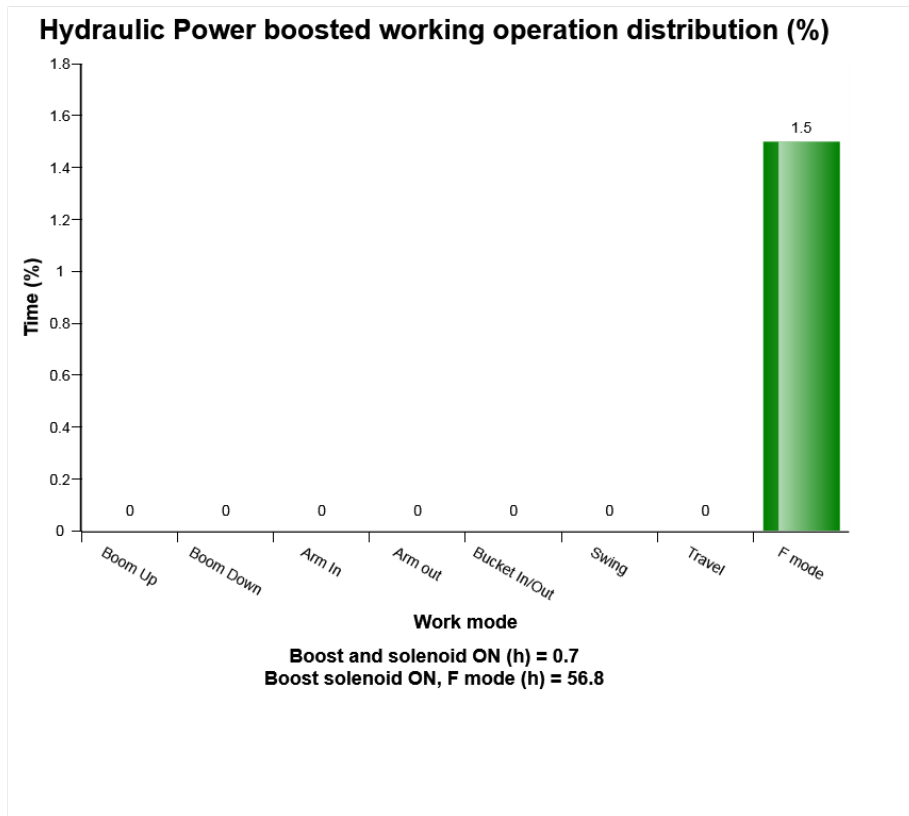
Definition:

T he diagram describes Power boosted operating time distribution, when main relief pressure increases on working operation modes. In this diagram, the sum of time (%) of each working operation mode can exceed 100%. It means that customer has been operated several working operations at the same time.
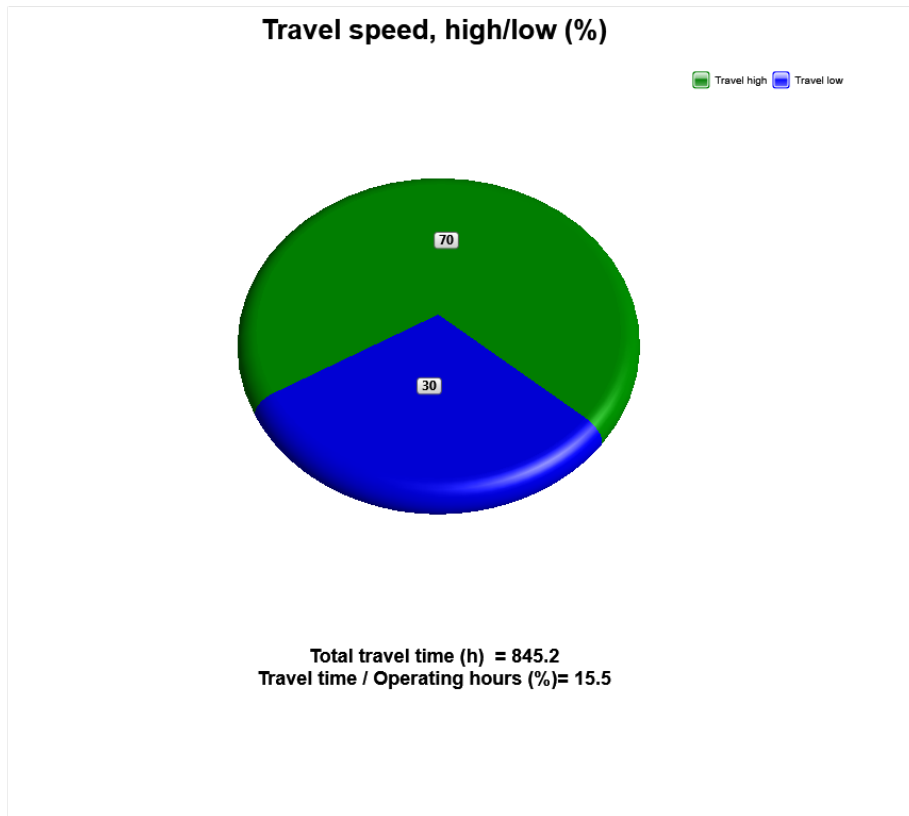
Total operating time with power boosted (hours) in above means sum of the time for Hydraulic Power boosted operation. The base for the percentage calculation is Total operating time with power boost. Time(%) on each working operation mode except travel and F mode above is the time, after the operator press power boost button on the joystick and until main relief pressure is recovered to default pressure.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Travel speed, high/low (%)

■ Travel high ■ Travel low

70

30

Total travel time (h) = 845.2
Travel time / Operating hours (%)= 15.5

Definition:

This graph shows operating hour distributions on each travel speed for total travel time.

Blue sector: Travel switch in low position

Green sector: Travel switch in high position

Explanation:

Distribution of each travel time is shown on right of its sector in percentage

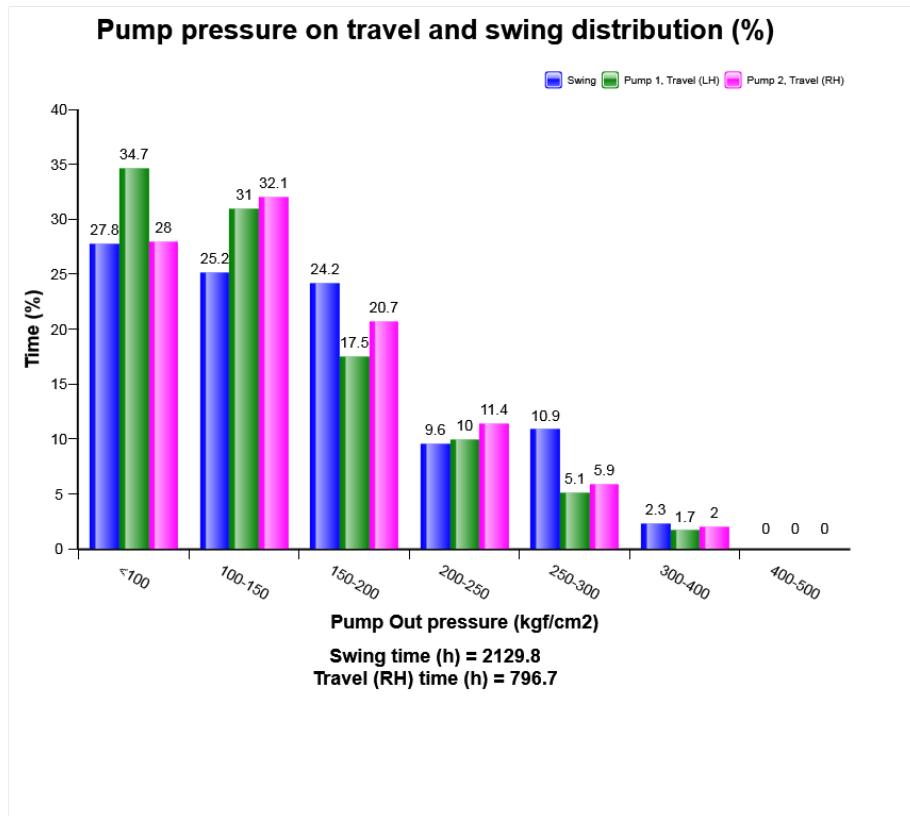The sum of travel time in percentage is 100

VOLVO

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Total travel time is listed below the diagram

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Pump pressure on travel and swing distribution (%)

Legend: ■ Swing ■ Pump 1, Travel (LH) ■ Pump 2, Travel (RH)

Pump Out pressure (kgf/cm2)	Swing	Pump 1, Travel (LH)	Pump 2, Travel (RH)
<100	27.8	34.7	28
100-150	25.2	31	32.1
150-200	24.2	17.5	20.7
200-250	9.6	10	11.4
250-300	10.9	5.1	5.9
300-400	2.3	1.7	2
400-500	0	0	0

Pump Out pressure (kgf/cm2)

Swing time (h) = 2129.8
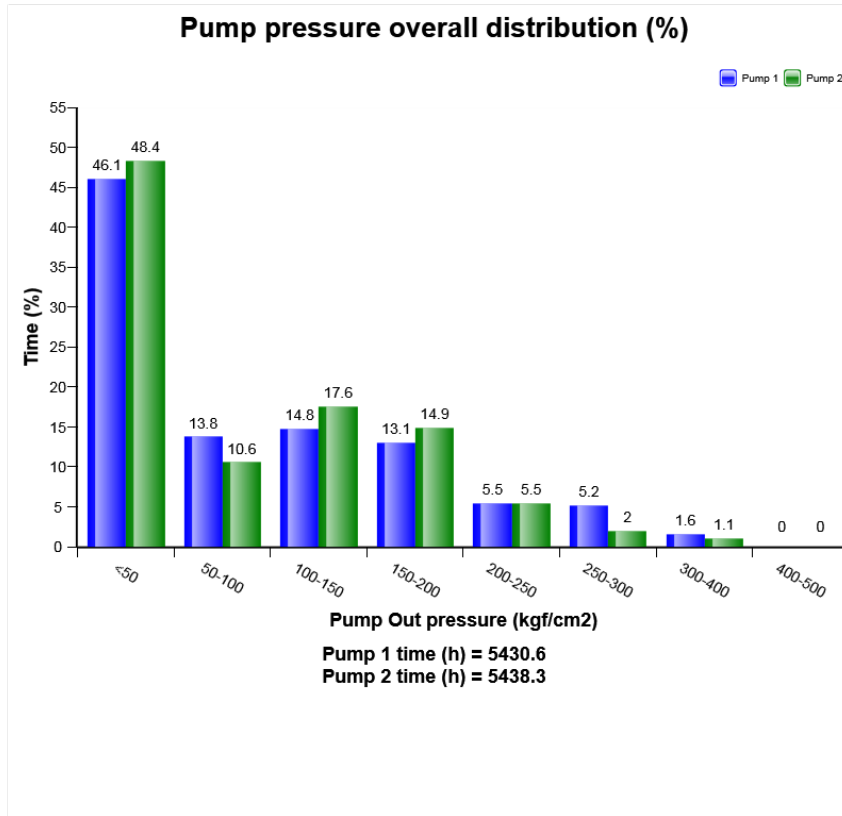**Travel (RH) time (h) = 796.7**

Definition:

The diagram describes Pump outlet pressure of 2 Pumps for travel and swing operation distribution. In case operator use several operations at the same time, this pressure distribution for travel and swing operation can be different from actual operating pressure distribution for travel and swing operation in field.

VOLVO

Pump pressure overall distribution (%)

Pump 1   Pump 2

Time (%) vs **Pump Out pressure (kgf/cm2)**

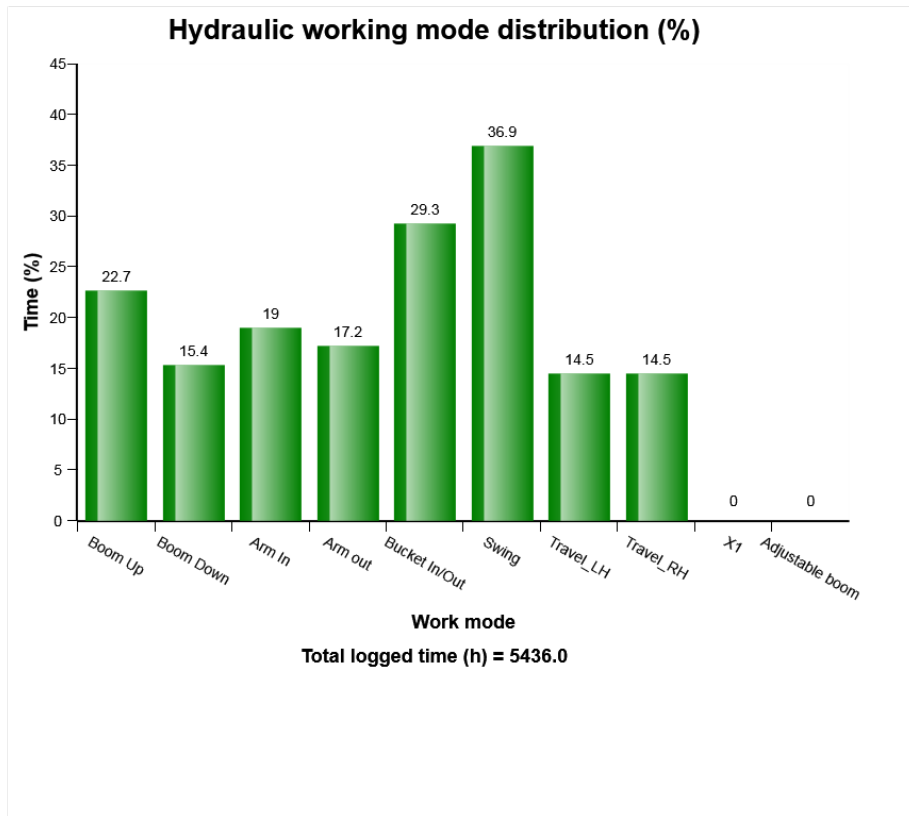| Pressure range	Pump 1	Pump 2
<50	46.1	48.4
50-100	13.8	10.6
100-150	14.8	17.6
150-200	13.1	14.9
200-250	5.5	5.5
250-300	5.2	2
300-400	1.6	1.1
400-500	0	0

Pump 1 time (h) = 5430.6
Pump 2 time (h) = 5438.3

Definition:

The diagram describes Pump outlet pressure of 2 Pumps distribution.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

Hydraulic working mode distribution (%)

Chart: Time (%) vs Work mode

- Boom Up: 22.7
- Boom Down: 15.4
- Arm In: 19
- Arm out: 17.2
- Bucket In/Out: 29.3
- Swing: 36.9
- Travel_LH: 14.5
- Travel_RH: 14.5
- X1: 0
- Adjustable boom: 0

Total logged time (h) = 5436.0

Definition:

The diagram describes hydraulic working operation mode distribution.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

High hydraulic oil temperature
Total number of occurences = 0

Op hours	Year	Month	Day	Hour	Minute	Duration (sec)	Extreme (°C)
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0
0	2000	0	0	0	0	0	0

Definition :

This type of table shows the latest occasions when a specific event has occurred. When a specified criteria is fulfilled a registration is made. Each table row corresponds to one occasion. Operating

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

hours is displayed in the first column, followed by year, month , day , hour and minute to show when an event has occurred.

The rows are not ordered chronological (The latest event may be in the middle).

Only one event per minute is registered.

Over the table the total number of events is displayed

Duration :

The duration of each event is shown after the timestamp of the event.

The duration is counted as long as the criteria is fulfilled.
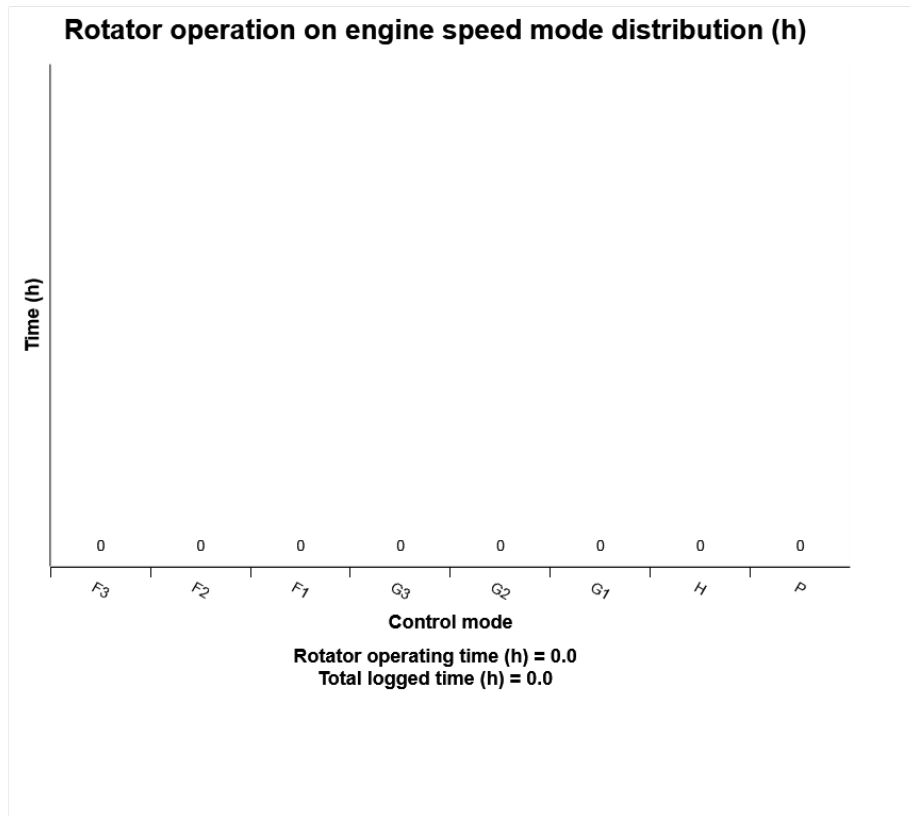
Extreme value :

The extreme value column displays the most extreme value during the event.

Criteria :

Logging is performed when, Alarm high hydraulic oil temperature , is active.

Rotator operation on engine speed mode distribution (h)

Rotator operating time (h) = 0.0
Total logged time (h) = 0.0

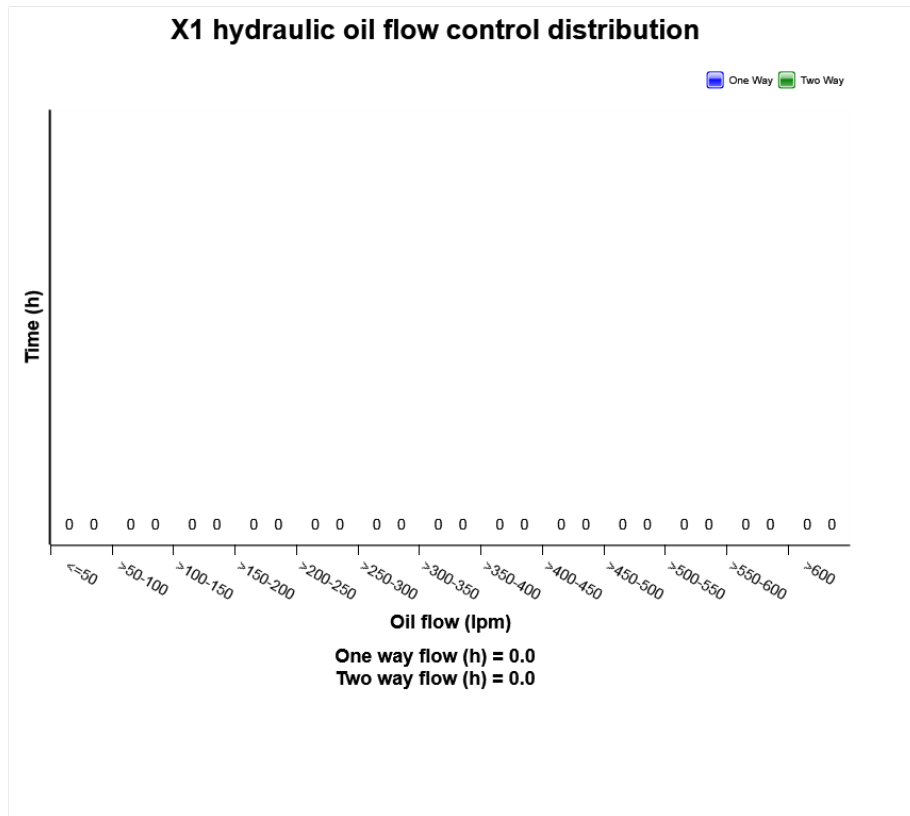## Definition:

The diagram describes the distribution of Rotator operating hours on mode.

Machine model	SerialNo	Operating Hours	Reading Date
EC220D	210769	5438	6/13/2018

X1 hydraulic oil flow control distribution

One way flow (h) = 0.0
Two way flow (h) = 0.0

Definition:

The diagram describes X1 hydraulic oil flow control distribution of the machine while machine operates.