CalemEAM

Best Practice Guide

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Using Meters as Asset Run Time for MTBF and OEE

Calem can take an asset's run time from an hour meter instead of the calendar, so MTBF and availability reflect the hours the asset actually ran.

By default, Calem treats every day in the period as operating time. That works for equipment that runs around the clock. For a standby generator, a seasonal pump or a one-shift press, calendar time overstates run time many times over, and MTBF looks far better than it is. A pump that ran 120 hours in a month and failed twice has an MTBF of 60 hours, not the 369 that calendar time gives.

With an operating-time meter, the hours on the meter become the run time. Calem uses them in the monthly asset KPIs and in the MTBF and reliability dashboard charts.

How it works

Two asset fields switch it on: the asset's operations meter (`meter1_id`) and the OEE meter flag (`is_oee_meter`). With the flag on, the run time for a period is the meter usage recorded in that period.

- **Usage, not the reading.** Each meter reading stores the increase since the previous reading (`usage_reading`). Calem adds those increases, so a cumulative hour meter going 1,010 → 1,025 counts 15 hours, not 1,025.
- **The meter's unit sets the scale.** Calem looks at the meter's reading unit, as below.
- **No usage means calendar time.** If the flag is off, or the meter recorded no usage in the period, Calem uses calendar time for that asset.

Meter reading unit	Read as
HOUR (`uom_hour`)	hours
MINUTE (`uom_minute`)	minutes
Any other unit, or none	hours

MTBF is then run time divided by the number of failure work orders in the period. Availability is run time divided by run time plus unplanned downtime.

Setting it up

Five steps turn an asset's hour meter into its run time.

1. **Create a meter group for run time.** Set the reading type to Absolute (a cumulative hour meter) or Usage (a usage meter such as a trip meter in car) and the reading unit to HOUR. Use MINUTE if the meter counts minutes.
2. **Add the meter to the asset.** A new meter takes its reading type and unit from the meter group. For a meter created earlier, check its reading unit on the meter itself.
3. **Set it as the asset's operations meter.** Choose it in the asset's operations meter field (`meter1_id`).
4. **Turn on the OEE meter flag.** Check `is_oee_meter` on the asset. To get monthly KPIs, the asset must also be included in the KPI run: enabled for OEE or MTBF (`is_oee` or `is_mtbf`), or set to an included priority. By default, priorities 1 and 2 (`ap_p1`, `ap_p2`) are included, through `kpi_month_by_pri` and `kpi_month_pri_inc` in `asset_conf.php`.
5. **Record readings.** Enter them from a work order, mobile, an import, or automatically through MQTT or OPC-UA. Regular readings give the most accurate monthly split.

Worked example

A cooling-water pump on an hour meter ran 120 hours in October, so its MTBF is 60 hours instead of 369.

Reading time	Meter reading (h)	Usage (h)	Counted for October
Oct 31	5,000	35	yes
Oct 16	4,965	45	yes
Oct 8	4,920	40	yes
Sep 30	4,880	—	no, September

The pump had two failure work orders and 6 hours of unplanned downtime in October.

KPI	Hour meter	Calendar time
Run time	120 h (7,200 min)	738 h (744 h less 6 h downtime)
MTBF	60 h	369 h
Availability	95.2% (120 ÷ 126)	99.2% (738 ÷ 744)

Calendar time hides that the pump fails roughly every 60 running hours. That is the interval to plan preventive maintenance around.

Where you see it

The same rule applies in the monthly KPIs and in the live dashboard charts, so their MTBF figures agree.

Where	What uses the meter run time

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Monthly asset KPIs (`cm_asset_kpi_month`)	Run time, planned time, availability, OEE, MTBF and failure rate per asset per month
Monthly failure KPIs (`cm_asset_failure_month`)	Run time and MTBF per asset and failure code
MTBF and reliability charts by asset	The asset's meter hours, or calendar hours without them
MTBF and reliability charts by categorization	The sum of each asset's hours: meter hours for OEE-meter assets, calendar hours for the rest

The monthly KPIs are rebuilt by the daily KPI task for the current month and the recent months in its window. Inactive assets (returned, OEM-retained, voided or scrapped) are left out of the categorization totals.

Tips and gotchas

- **Read the meter often.** All the usage in a reading counts toward the month of its reading time. A reading on November 2 that covers late October lands in November, so read near month end or more often.
- **Set the unit.** A meter with no unit is read as hours. A minute counter must have MINUTE as its unit, or its run time comes out 60 times too high.
- **Enter readings in time order.** A reading dated before the meter's latest reading records no usage, so it adds no run time.
- **Idle months use calendar time.** If the meter shows no usage in a month, Calem falls back to calendar time for that asset. Check MTBF for assets that sat idle all month.
- **Changing the flag changes history.** When the KPI task rebuilds recent months, it uses the asset's current flag and meter. Turning `is_oee_meter` on or off changes those months too.
- **Use a time meter only.** Mileage or cycle-count meters should not be flagged as the OEE meter; they would be read as hours.