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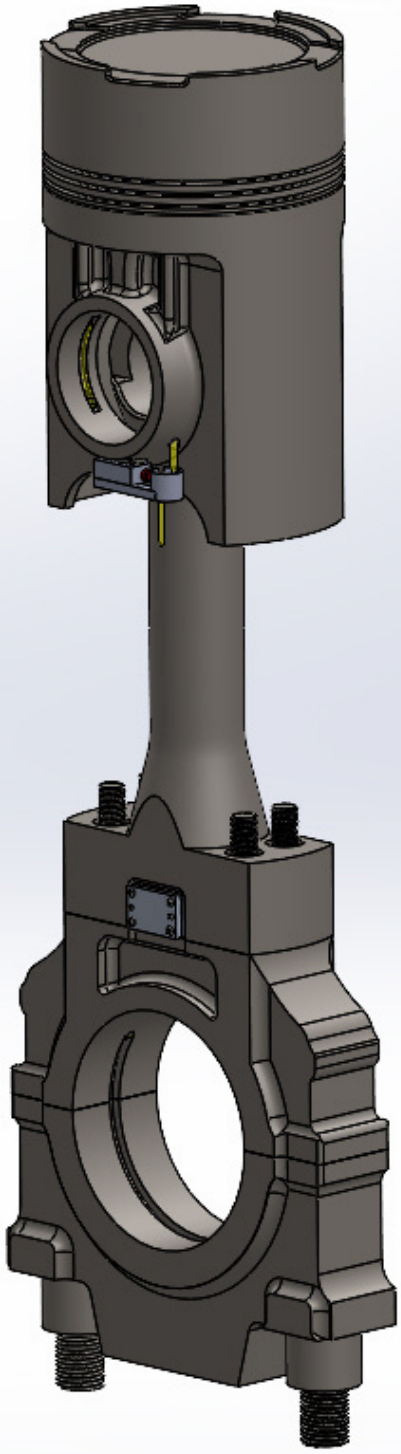

Sense Freely
Self-Powered
Wireless-Batteryless
Sustainable Solution for Industry 4.0

Go Deep Inside the
Industrial Machines

PISTON TEMPERATURE MONITORING

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The Future of Wireless - Batteryless Energy Harvesting Sensing Technologies

ESCOM-ES is the R&D center founded in 2018 and owned by ESCOM Power Plants Engineering Services. We are focusing on and developing Self Powered – Wireless - Batteryless Sensors which is eliminating all wiring and cabling cost and workmanship which can reach many kms in a simple industrial plant. And offering smart and green solutions getting rid of batteries and cables...

No Battery - No Cable - No Wiring

ESCOM-ES offers a wide range of domestic and industrial sensing systems that can be used in harsh environment harvests its own power from ambient sources such as motion, temperature, sunlight, magnetic fields, or where energy is available to scavenge...

Self-powered, wireless sensing technology, combined with engineering expertise and rich analytics provide real-time information for our customer's needs...

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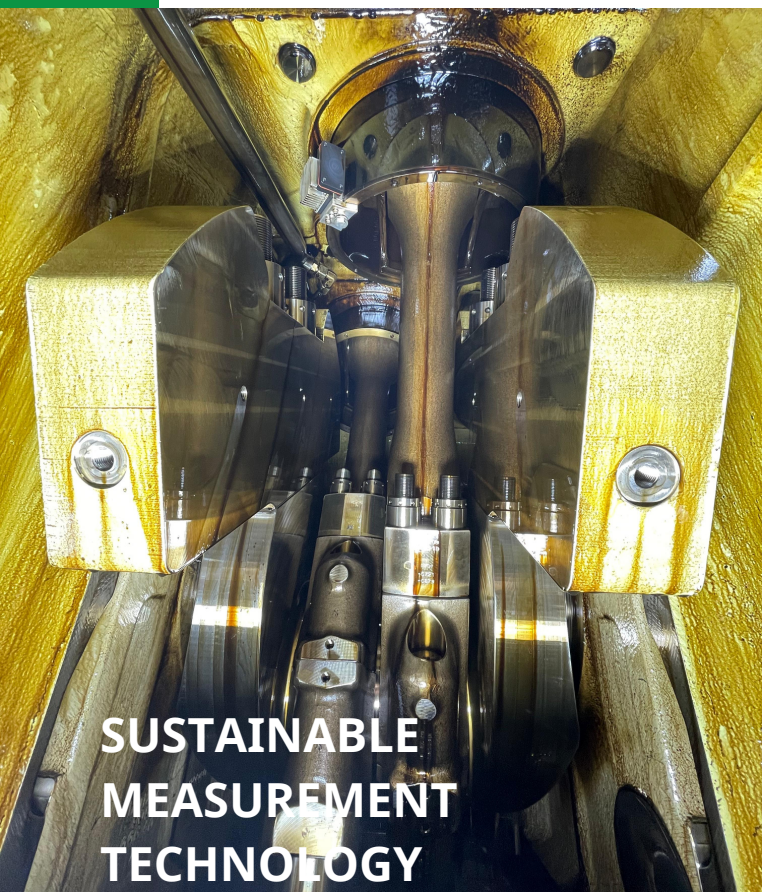
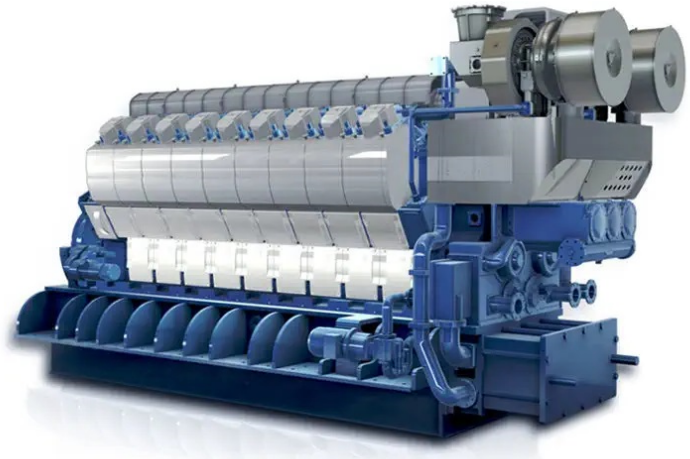
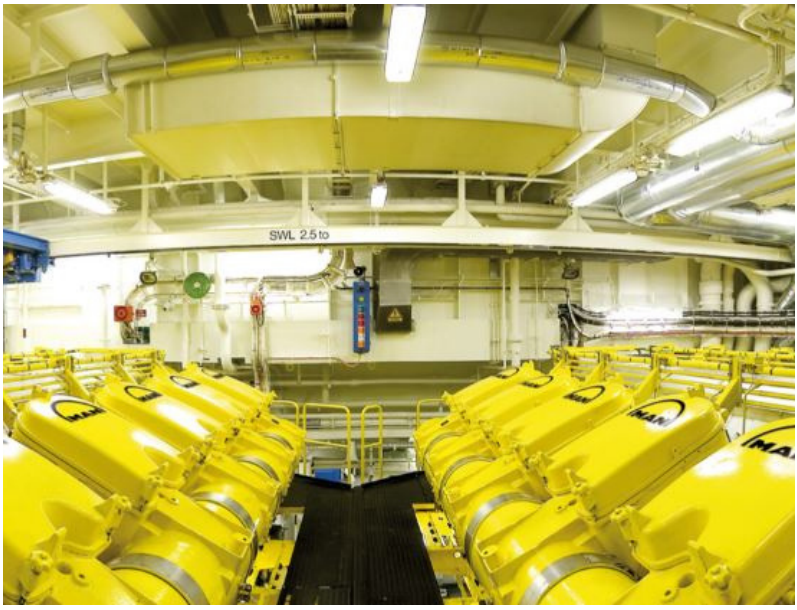


SUSTAINABLE MEASUREMENT TECHNOLOGY





Industry-specific Solutions

We develop and manufacture innovative and economical industrial solutions specific to the problems occurring in internal combustion engines. We ensure that physical information such as temperature, pressure, required in risky areas that are difficult to access in internal combustion engines are received and monitored securely.

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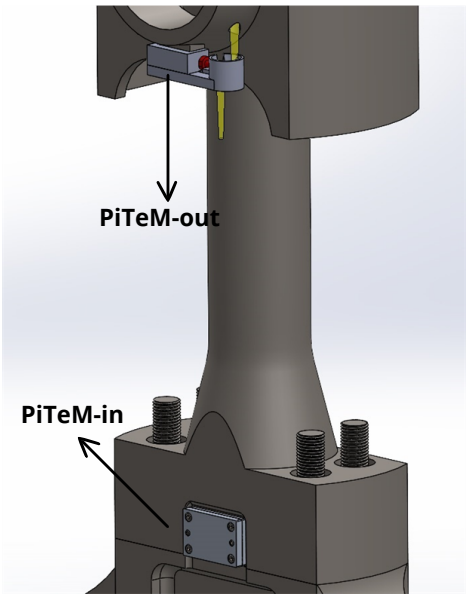
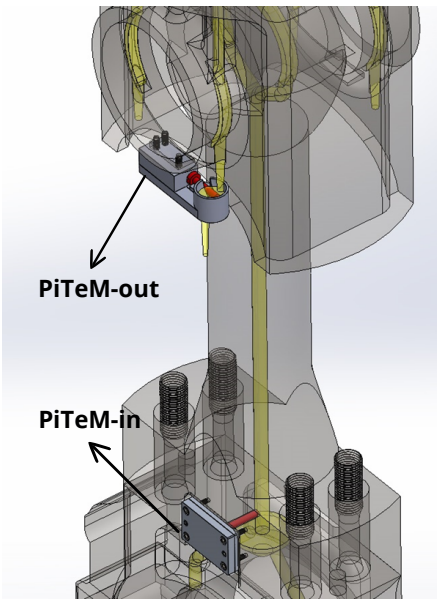
What is PiTeM?

Main purpose of PiTeM is to succeed receiving and monitoring temperature data directly from engine connecting rod, piston pin bush bearing, piston crown, piston rings; so that to provide an EARLY determining of ;
continuos control & monitoring of piston cooling efficiency
connecting rod upper bearing shell condition
piston pin bush bearing condition
any seizing between the piston rings and the liner
Excessive firing temperature
by Wireless & Batteryless Sensing Node with Energy Harvesting System, and transferring all data via Wi-Fi or BLE to the Main Control Panel to establish preventive, informative and protective early warning system and try to minimize the Connecting Rod Bearing and Piston Failures encountered in diesel engines.





PiTeM consist of two sensors; PiTeM-in and PiTeM-out;

PiTeM-in measures the temperature of lube oil flowing upward from the back side of the ConRod upper bearing shell going to the piston skirt and then the piston crown
PiTeM-out measures the temperature of lube oil spill out from the piston skirt

PiTeM-in

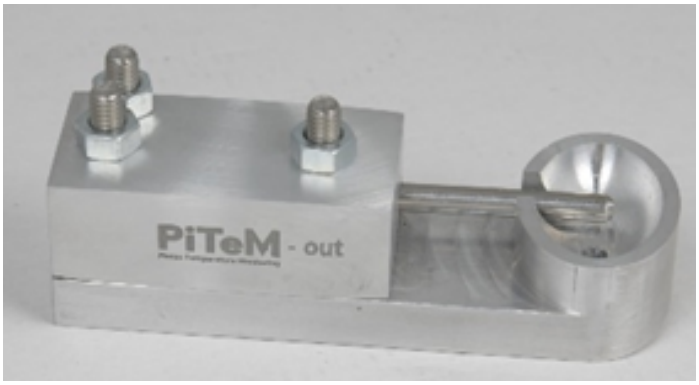
The temperature of Lube oil flowing upward from the ConRod upper bearing shell going to the piston skirt is measured by a PT100 sensor, which is the inlet of lube oil to piston pin bush and piston crown.

PiTeM-out

PiTeM-out, measures the lube oil temperature spilling out from piston crown by a PT100 sensor.
The temperature difference between the inlet and outlet of piston crown will give the data about the piston cooling efficiency.

Evaluation of PiTeM data

(ΔT = PiTeM out – PiTeM in)
The variation (decrease) in ΔT is an indication to decrease in Piston cooling efficiency.
Increase in PiTeM-in, is an indication about ConRod upper bearing shell temperature.
Increase in PiTeM-out, is an indication about Piston Pin Bush bearing OR seizing of piston rings and the liner temperature OR excessive firing temperature.



Advantages of PiTeM

- PiTeM is a system that has not been developed until now in diesel engine technology, and is able to obtain data directly from the piston and conrods.
- PiTeM will give us faster and more accurate data, early warning before the failure happen comparing to existing temperature (Splash Oil Monitoring) or Oil Mist Monitoring systems
- Wireless, battery-free, able to generate its own energy.
- PiTeM will provide proactive approach and preventive maintenance ability by continious monitoring

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Existing Splash Oil Monitoring System is to receive data from the splashing oil unclear from where it has splashed at that moment will give us a common alarm and needs to be checked whether a failure in the liner, piston rings, or skirt, or connecting rod bearing or any.
SPMS or OMD is able to give alarm right after the failure happened. But PiTeM will give us data directly from the source and will establish a much better, safer and faster analysis opportunity before the failure

As per the maintenance instructions, checking the piston crown COOLING EFFICIENCY is DONE BY dismantling one piston and measuring the thickness of carbon deposit in cooling chambers in every 10K to 15K op'n hours. If the deposit layer thickness exceeds 1mm, all the pistons need to be dismantled , cleaned, checked and reassembled.
The difference between 2 conditions makes a big trouble while;

- planning the maintenance time,
- stand still time,
- spare part ordering ,
- manpower organization,
- cost of maintenance

Thanks to PiTeM-in and -out , by this very specific continuous measurement, we will have a chance to minimize ;

- the possibility of malfunction of connecting rod bearing,
- piston pin failure,
- piston crown cooling efficiency,
- seizing of piston rings, or liner scratching,
- the cost and time fluctuations of the maintenance

with a preventive, predictive and superior technological approach, which causes large work and production loss, very high repair, spare parts and labor costs, which are frequently seen in diesel engines.

Instead of scraping and measuring the deposit layer thickness formed in the cooling chambers, we will have a continuous control and monitoring of cooling efficiency of piston crown by measuring
(ΔT = PiTeM out – PiTeM in)

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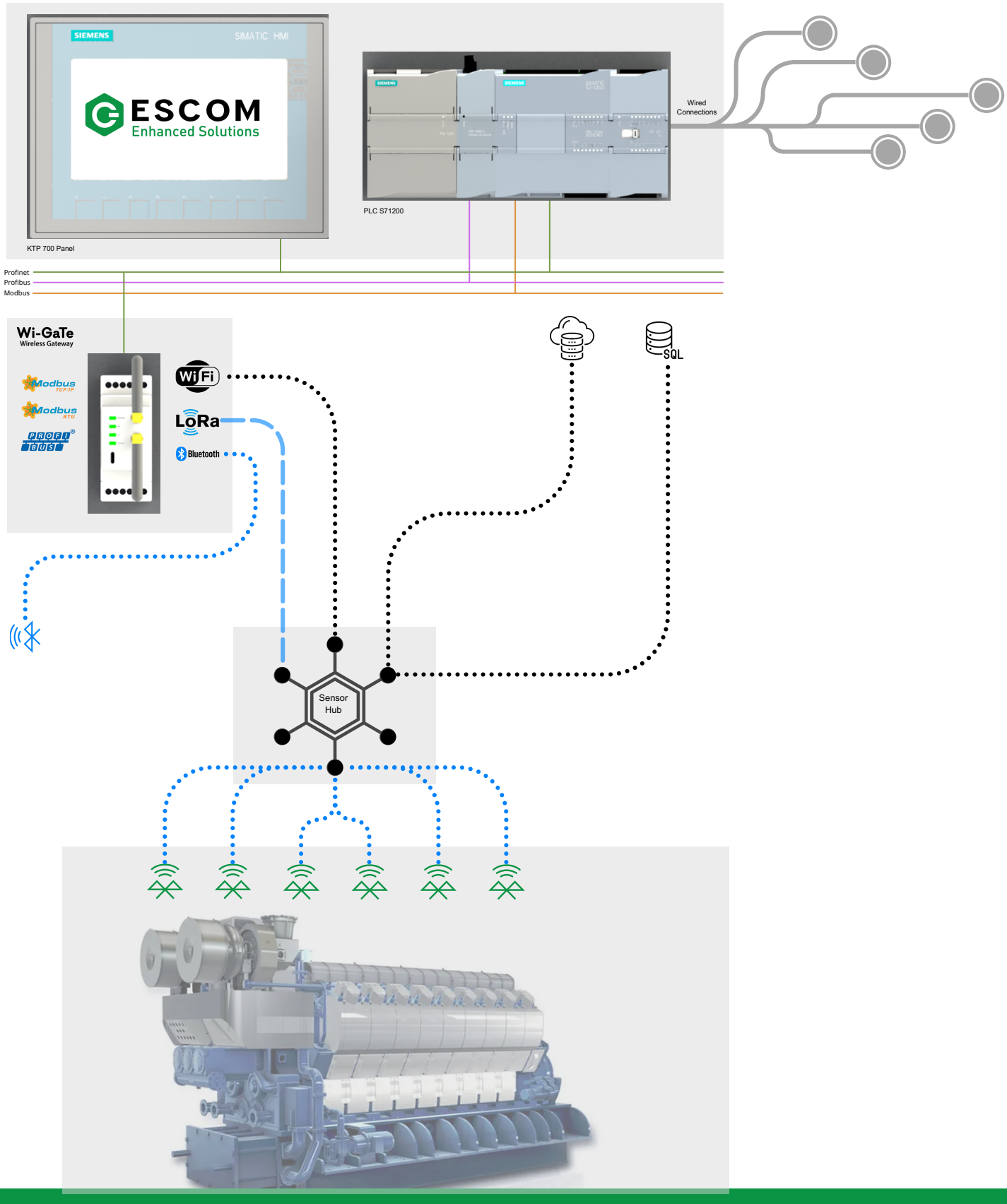
INDUSTRIAL IoT

Wireless BatteryLess Sensors & Network



innovative

ideas

development

imagination

technology

vision

inspiration

teamwork

research

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