



Monitoring API 610 pumps
Use Case: Refinery



BestSens

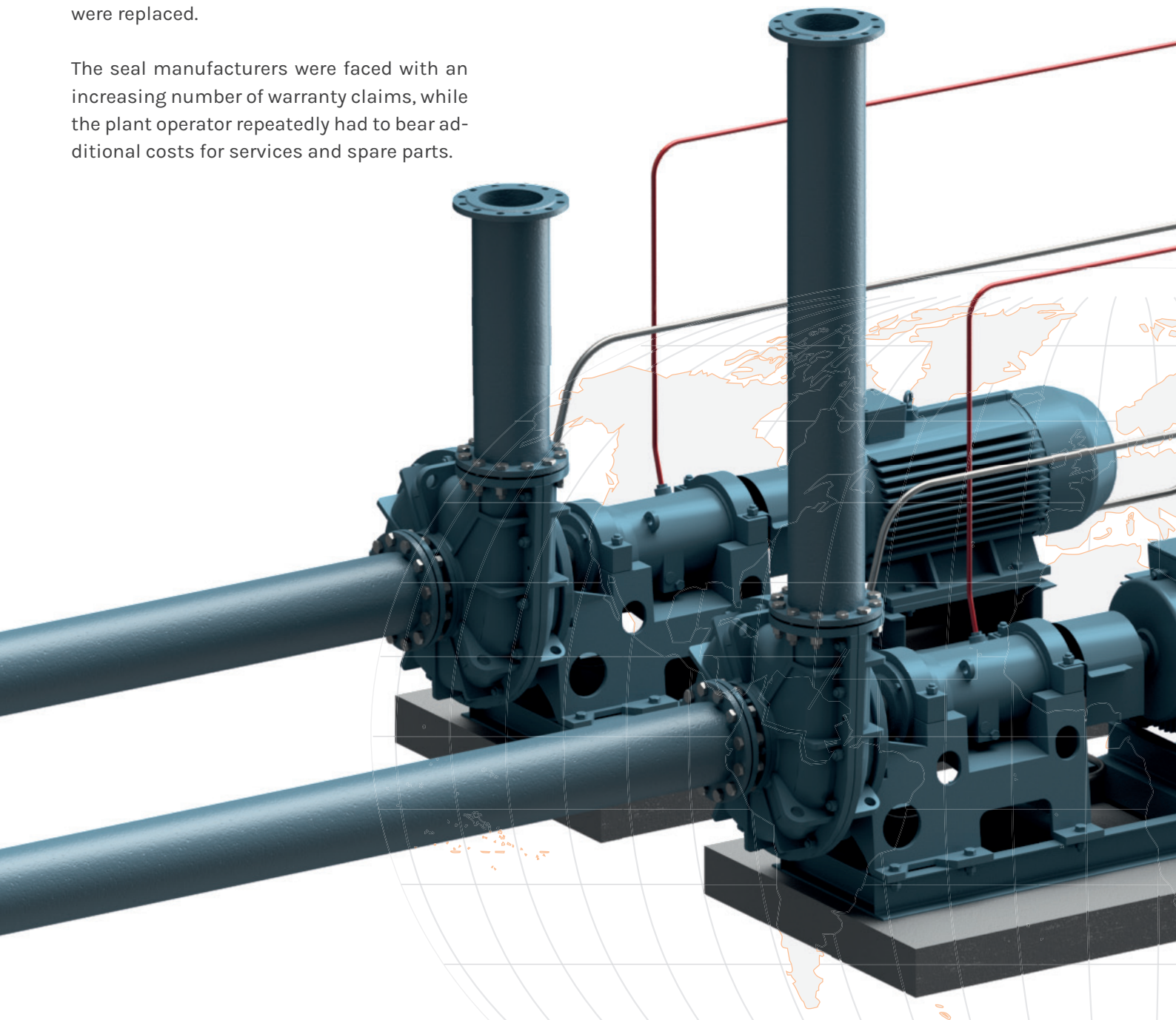
Refinery In Venezuela

The Problem

At a South American refinery plant, failures occurred at regular intervals on the double-acting mechanical seals of two API 610 refinery pumps used to pump crude oil. These not only led to repeated unscheduled maintenance visits, but also to costly production stops. For maintenance alone, the cost of a new mechanical seal was \$20,000 each. The production stoppage even resulted in lost sales in the double-digit millions per day.

The replacement seals from leading seal manufacturers repeatedly failed after a few months of operation, despite the most careful maintenance. Instead of correcting the root problem, only the damaged seals were replaced.

The seal manufacturers were faced with an increasing number of warranty claims, while the plant operator repeatedly had to bear additional costs for services and spare parts.



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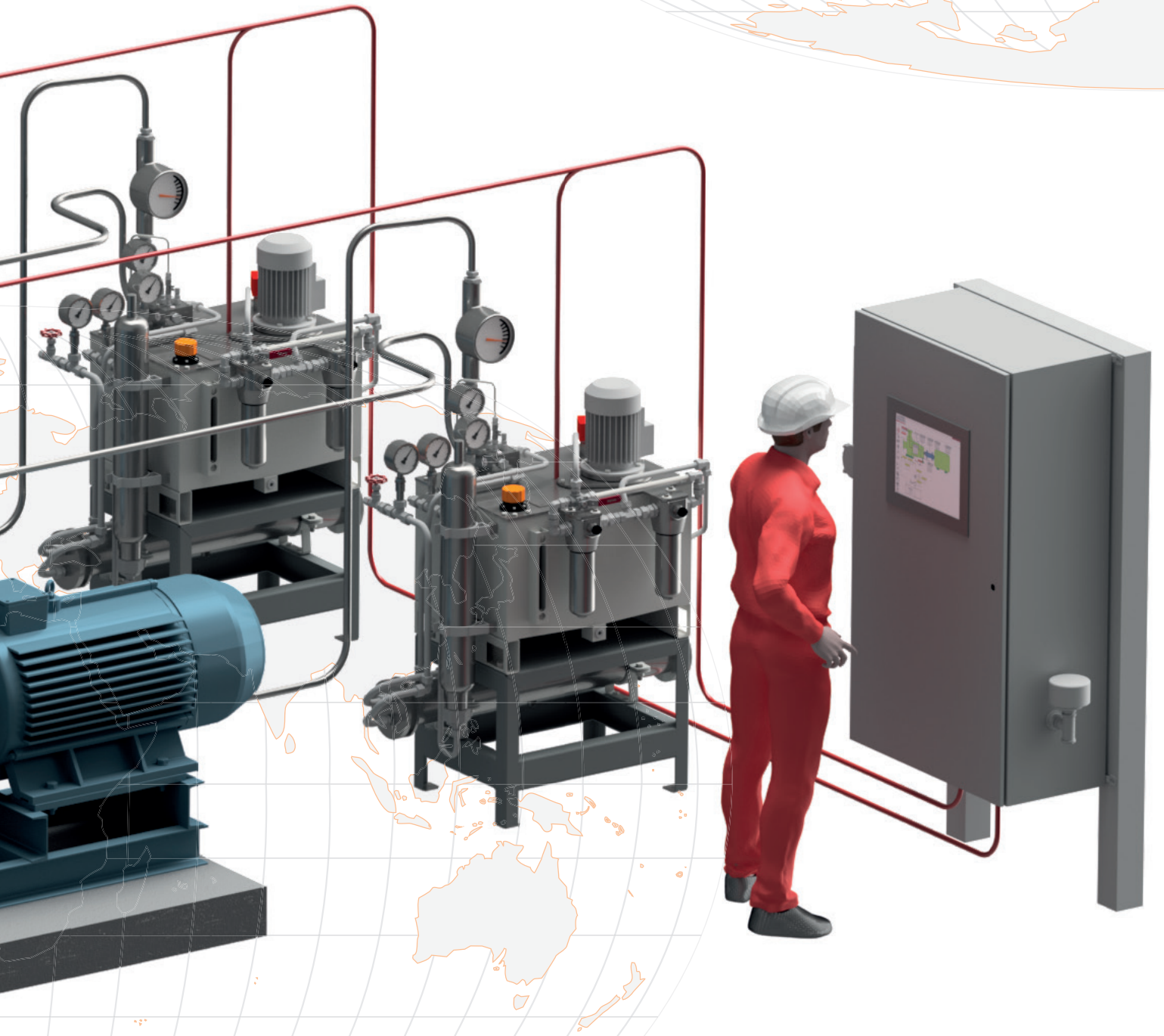
estimated losses

10.000.000 \$

lost sales per day

20.000 \$

loss per seal



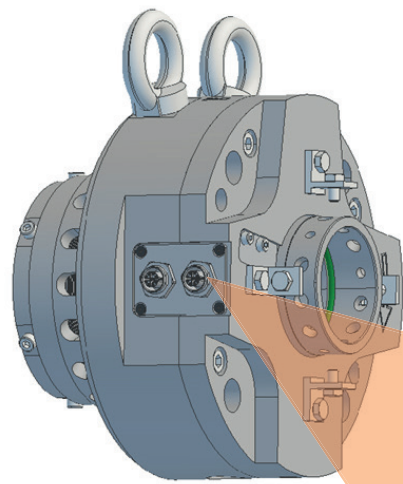
Refinery In Venezuela

The Solution

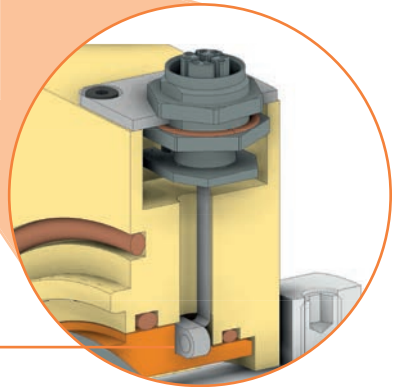
The plant operator turned to METAX USA, partner of METAX Kupplungs- und Dichtungstechnik GmbH. Who commissioned BestSens AG to supply a pump monitoring system with integrated mechanical seal monitoring to monitor two API 610 pumps to identify and eliminate the causes of failure.

In the course of this, the design of the seal was revised and this double-acting mechanical seal with matching locking system was installed in the pump. The seal was designed with the special requirements of the plant operator in mind and is also equipped with the integrated sensor solution for pump monitoring from BestSens AG to enable conclusions to be drawn about seal condition in the future and to make downtimes a thing of the past. In addition to monitoring the seal, BestSens AG's complete pump monitoring solution, the Pump Monitor, was installed in the South American plant.

The Pump Monitor checks two API 610 refinery pumps, their seals and bearings, as well as both pumps temperature, vibration, and pressure level and flow of the barrier system. The sensor measures temperature and lubrication state on the seal faces. On the software side, the Pump Monitor is equipped with a dashboard that outputs the plant overview, which can be used by service personnel on site to identify and troubleshoot potential problems. In addition, the data is transferred to the refinery's control center, where staff can remotely obtain an overview of the pump status.



Double acting mechanical seal with integrated sensors



Attachment of the sensor to the counter seal ring

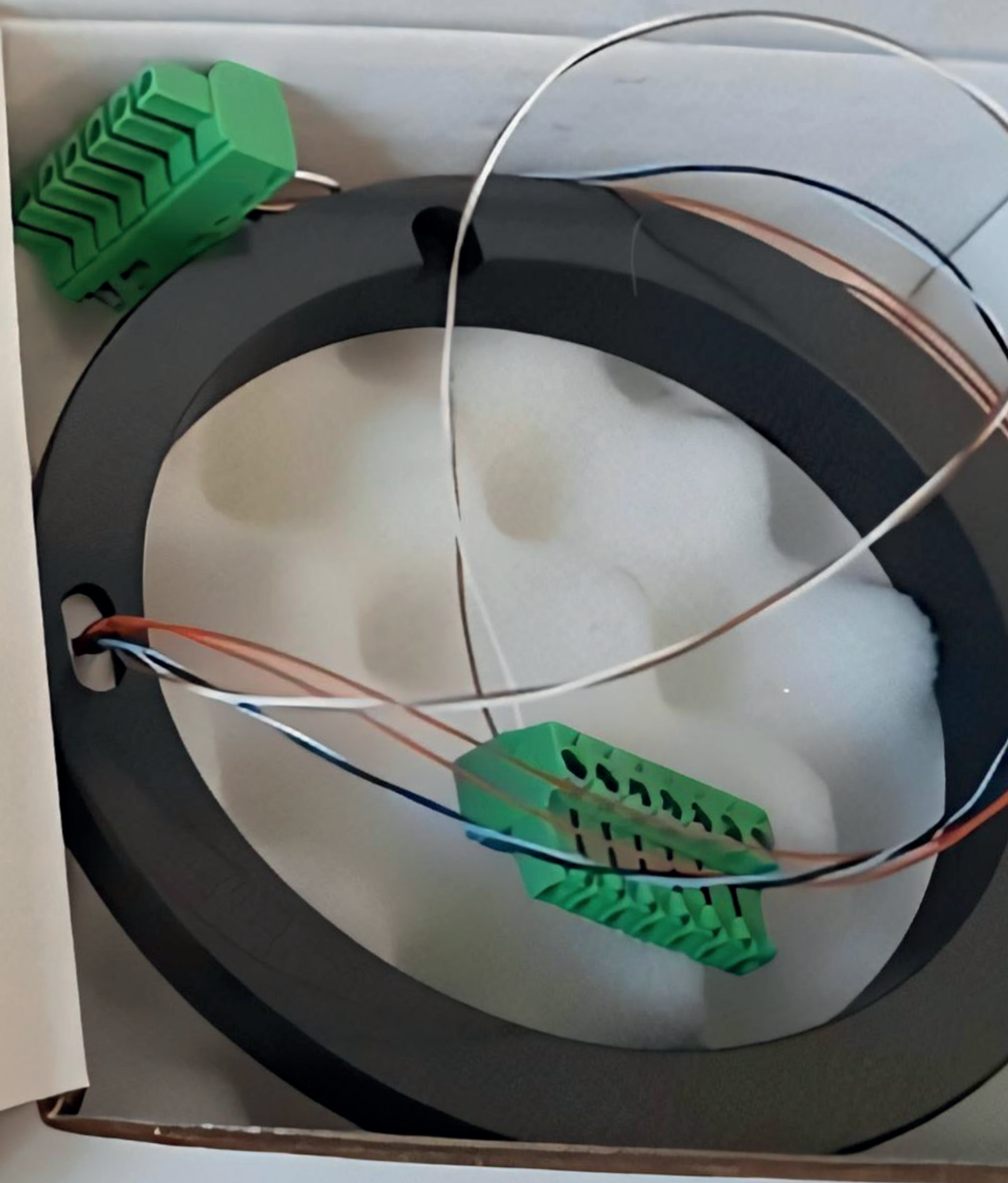


M3G Multisensor

**A seal,
which itself
tells you,
when failures
occur.**



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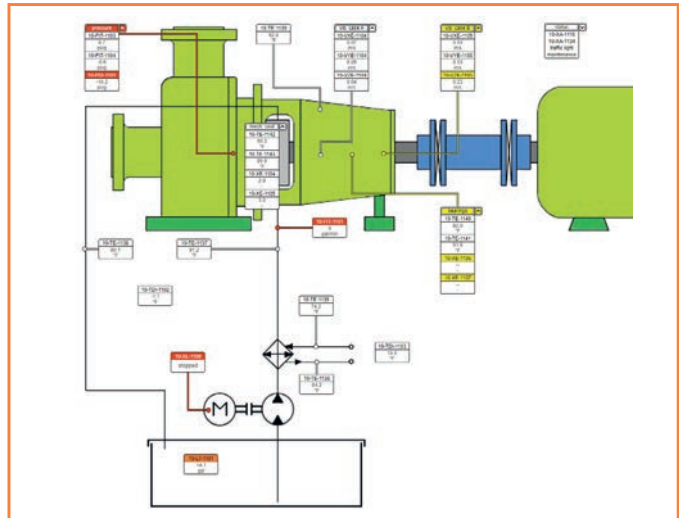
Parts of the double-acting mechanical seal with integrated BestSens sensors as an intermediate step in production.

Refinery In Venezuela

The Benefit

With the measurement system, we were able to prove that the design of the new seal was optimally suited for the application. By analyzing the measurement data collected during the initial start-up of the pumps, it was possible to identify errors in the operation of the barrier systems, especially after the pumps had been switched off. Furthermore dried running of the bearings after the initial startup was detected, which led to the replacement of those bearings.

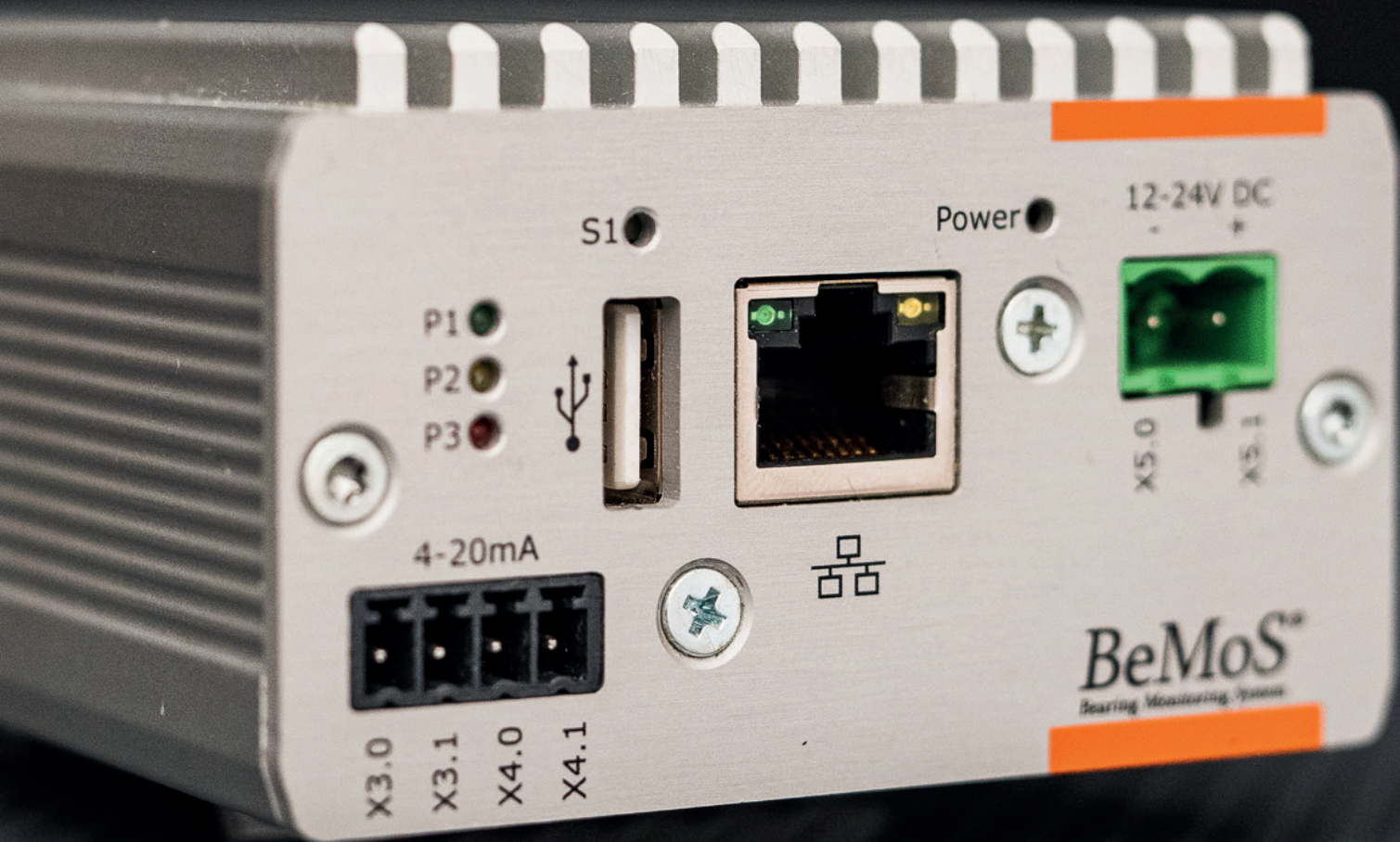
Highly heated crude oil, which is present in the pipes and volute casings even when the pump is at a standstill, that heats up the bearing bracket and the seal beyond the permissible operating range of the seal, resulting in a demonstrably reduced service life of the mechanical seal. With BestSens AG's sensor solution, a warning message could be generated to indicate possible overheating to service personnel. In addition, the service personnel were sensitized to the issue and trained to be able to rectify any problems that may arise in the future. This includes that the barrier system must continue to be operated even when the pumps are at a standstill in order to protect the seal from overheating. Since commissioning, the data has been checked regularly, harmful conditions for pumps, seals and components have been avoided. The installation of the BestSens Pump Monitor has been found useful by the plant operator after a very short time, whereupon they ordered two additional Pump Monitors to surveil further pumps. Before the installation of the Pump Monitor, the pumps failed repeatedly over the course of a few months. Thanks to the continuous pump monitoring with BestSens ultrasonic technology, now they are able to be aware of their pumps' condition and take maintenance actions on time.



Pump Monitor dashboard showing levels and alarms

**Smart Seal:
Downtimes are
a thing of the
past!**





BeMoS controller, heart of the Pump Monitor