

HOW A MAJOR CAR MANUFACTURER AVOIDED LOSING \$0.5M IN UNPLANNED DOWNTIME

A CASE STUDY IN WIRELESS EQUIPMENT SENSING

Automotive OEM stamping plants encompass millions of square feet and may house more than a dozen stamping lines. These lines usually operate 20 shifts per week and produce parts that are shipped to numerous other facilities

\$1M/Hr
Lost
Revenue

across the United States and around the world. But if a stamping line unexpectedly ceases operations, the revenue lost by the OEM can quickly escalate to more than \$1M per hour.

These stamping lines also are significant capital resources, each costing upwards of \$40M and having an expected operational life of more than 20 years.

Costing
upwards
\$40M

Given the extreme stresses the machinery is repeatedly subjected to, the risk of equipment failure increases over time. Since much of the older equipment does not have embedded sensors, an engineering manager cannot know the actual health of the equipment.

Operational life
of more than
20 Years

Because of this, machinery may be down for maintenance more often than necessary—and unforeseen equipment problems can result in unplanned downtime and injury to personnel.

Reducing costs means minimizing downtime. A system that provides accurate assessments and predictions of machine health allows production facilities to maximize equipment life while minimizing the risk of equipment failures. Grace's data-driven prognostic health monitoring system did this for a major car manufacturer's stamping plant, preventing losses of \$0.5M in under six months.

SPOT EQUIPMENT FAILURE BEFORE IT HAPPENS

GraceSense™ systems provide powerful data-driven decision support tools for asset managers, engineers, and operations and maintenance teams who need to make

operational decisions based on real-time information. Our integrated system of wireless sensors, cloud-based storage, and advanced analytics delivers actionable information to improve business maintenance processes and to help avert potential failures.

Our product's flexible architecture, combined with our deep technical expertise, has already been proven in some of the world's most challenging operating environments – from long-span bridges to US naval warships – and allowed for easy and cost-effective customization to meet automotive specific needs.

END-TO-END MONITORING AT THE STAMPING PLANT

The automotive stamping plant requested a staged deployment plan that would demonstrate end-to-end system health monitoring before deploying a system with full prognostic capabilities. The pilot project was deployed on two tandem stamping lines and was designed to:

- Provide real-time temperature and electrical current information from the electronics control panels that run two stamping lines
- Send alerts directly to the appropriate maintenance team should sensor values fall outside of user-specified limits

The stamping plant operates 24/7, and alerts can be triggered at any time—including when engineers are unavailable. The GraceSense™ system was configured to provide alert recipients with remediation instructions so that a less experienced person could address the issue independently.

When an alert condition occurred, an email and/or SMS was sent to each recipient. The message contained a link to a web page that provided detailed information about the alert, including resolution instructions. Personnel reported that this feature greatly improved their ability to respond to issues.

PILOT PROJECT PREVENTS EXPENSIVE LOSSES

Nearly 14 million data points were gathered during the 12-month pilot project. Other than an issue with a necessary third-party service in mid-January 2017, essentially no data points were lost over the duration of the project. More importantly, the system provided alerts that prevented two probable downtime incidents, saving \$0.5M in losses—almost ten times the cost of the project.

Saving
\$0.5M in losses
in under 6 months

On one occasion the manufacturer was alerted that a robot controller cabinet had an excessive temperature. This alert prompted the team to investigate the condition and they quickly discovered that the door to the cabinet was not completely closed, disabling the limit switch that turns on the air conditioning unit. This find would have typically gone unnoticed until a catastrophic failure occurred. Instead, the maintenance team was able to correct the issue immediately and restore the correct operating temperature to the cabinet.

On another occasion, an alert was triggered for excessive cabinet temperature. Personnel used the troubleshooting steps outlined in the GraceSense™ alert message which enabled them to quickly detect an abnormality with the air conditioning unit. Upon further inspection, the air conditioning unit was deemed to have prematurely failed. The GraceSense™ system once again allowed the stamping plant to preemptively react to an abnormality before it became a major issue.

Because of the great success of the pilot program, the GraceSense™ system at the stamping plant is slated to expand to a plant-wide deployment, covering all stamping lines and several related, ancillary systems. In addition to monitoring temperatures and currents, the expanded scope includes monitoring hydraulic systems (fluid levels and pressures) and vibrations in transfer lines and conveyor belts.

The major car manufacturers' stamping plant and Grace Engineered Products are also discussing additional opportunities within the facility, including monitoring

assembly equipment, monitoring energy consumption (including assessing power factor), and other related applications.

NEW INNOVATIONS ON THE HORIZON

As the deployment at the stamping plant continues, Grace has responded to customer feedback by introducing new enhancements to the GraceSense™ system. The first of these enhancements allows us to provide “virtual channels.” A virtual channel is a user-defined channel created from one or more inputs to provide additional functionality. For example, a cooling fan that is not operating is cause for concern—but only if the main motor is operating. By creating a virtual channel that logically combines the data from the main motor and cooling fan channels, alerts will only be triggered when the main motor is operating and the cooling fan is not.

Prognostic capabilities are the most innovative system update currently in development. The GraceSense™ system will soon enable trending on all channels. You will be able to associate alerts with data trends, providing plant personnel with indications of future expected behavior. Prognostics will provide additional warning time so that your personnel can respond to a potential problem much earlier.