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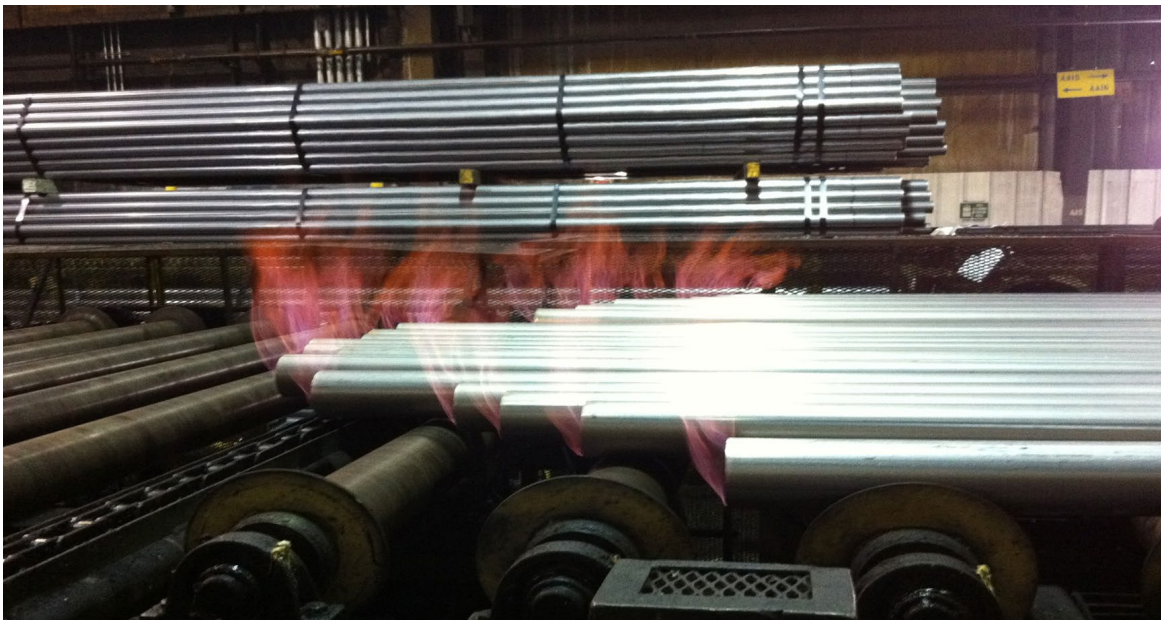
Moisture Measurement for Metals in Harsh Environments

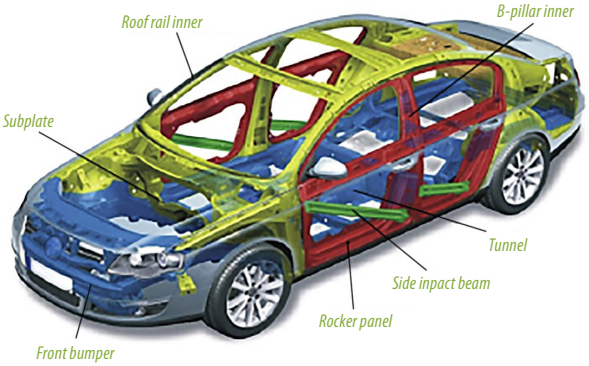
HOW XENTAUR'S XTDL SOLVES THE PROBLEM



Heat treatment processes for metals represent harsh environments for the measurement of blanket gas constituents. Ambient conditions in the furnaces have high particulate levels, acid gases and other compounds either outgassing or being burned off of the metal components being processed.

These issues, combined with high temperatures, make chemical measurement of the furnace environment extremely difficult. However, the chemical composition of the ambient environment inside the furnace has a significant impact on the results of the heat treatment process. The blanket gas composition is critical to the oxidation or reduction reactions at the metal surface, which also impacts the absorption of compounds into the metal structure. The moisture levels in the blanket gas are one of the major contributing factors impacting these processes.

Over the past few years, the hot form hardening process has been adopted for many structural components in the automotive industry. The attributes of this process allow the use of thinner, stronger metal alloys meeting the vehicle weight reduction goals of the industry while at the same time improving vehicle crash test performance. The hot forming process of tailored rolled blanks (varying the wall thicknesses of the component) yields parts 300% stronger than conventionally produced parts (cold stamping). With three times stronger material, thinner sheets of metal can be used to build parts achieving the desired weight savings.



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"…the electro-chemical sensors do not recover quickly enough from wet up conditions when furnaces are open to external ambient conditions. These issues have all been solved by the introduction of the COSA Xentaur XTDL moisture analyzer."

Along with other metal parameters, surface coatings are used that can react with ambient moisture, making moisture measurement and control even more critical to the process. Historically, moisture measurement in the hot form hardening process has been unreliable. Electro-chemical type moisture sensors cannot withstand the process temperatures combined with the high particulate level and acid gases. The surface of these sensors becomes contaminated and chemically altered causing the measurement to drift and finally stop working. IR (infrared) and chilled mirror methods have a similar issue with the particulate level impacting the measurement. Furthermore, the relatively slow response of these technologies requires a sensor at each measurement point meaning that multiple sensors and electronics are required. In addition, the electro-chemical sensors do not recover quickly enough from wet up conditions when furnaces are open to external ambient conditions. These issues have all been solved by the introduction of the COSA Xentaur XTDL moisture analyzer.

This analyzer was specifically developed for the heat treatment environment using patented Tunable Diode Laser Absorption Spectroscopy/Wavelength Modulation Spectroscopy (TDLAS/WMS) technology from Physical Sciences Inc. In independent plant level studies by a major automobile manufacturer in 2014, the XTDL out performed 5 other moisture measurement technologies and was the only method to provide continuous, consistent, and accurate measurements on a 24 hour, 7 day per week basis. The high speed of the XTDL measurement means that one instrument can monitor multiple points in the furnace, providing better process control data.

COSA Xentaur's XTDL is based on the patented WMS laser technology that employs a back scatter technique with no active optical components in the sample gas stream. Particulate or acid gases have no impact on the measurement making the unit virtually maintenance free. The XTDL comes factory calibrated with a proprietary tuning process requiring no field calibration. Simply hook-up the power, connect to the gas stream, and start the moisture measurement. As stated above, due to the speed of measurement, multiple points can be monitored with an optical stream selection manifold. The XTDL is the only reliable solution to continuous moisture measurement and control for hot form hardening and other heat treatment processes.

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