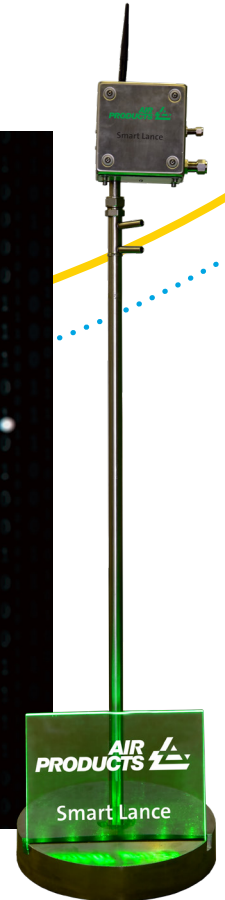


Smart Nitrogen-Methanol Lance

High performance process intelligence



Benefits

- Reduces rejects and rework
- Allows preventative maintenance
- Supports a reliable, homogeneous atmosphere over time
- Improves methanol cracking
- Allows Industry 4.0 integration



Air Products' Smart Nitrogen-Methanol Lance keeps you informed in real time about pressure and temperature. By knowing the status of your lance, maintenance can be scheduled proactively, reducing downtime and keeping your system running at peak performance.

In carburizing and hardening processes, as well as in annealing applications of steel, a constant atmosphere composition with a low amount of oxidizing components is required. Both types of typical atmosphere supply modes, endo-generated atmosphere and nitrogen-methanol, have these oxidizing components due to thermodynamic reactions. However, in nitrogen-methanol, the creation of H_2O and CO_2 can be reduced by proper methanol injection and adjustment of the lance inside the furnace. This helps to provide a more consistent atmosphere, reduces the usage of enrichment gases like propane, and prevents lance blockages due to cracked residuals.

Uncontrolled blockage or damage leads to a non-uniform carburized load and, therefore, to rework or scrap metal. In addition, an unpredicted shut down of the furnace means a loss of production and high labor costs for repair.

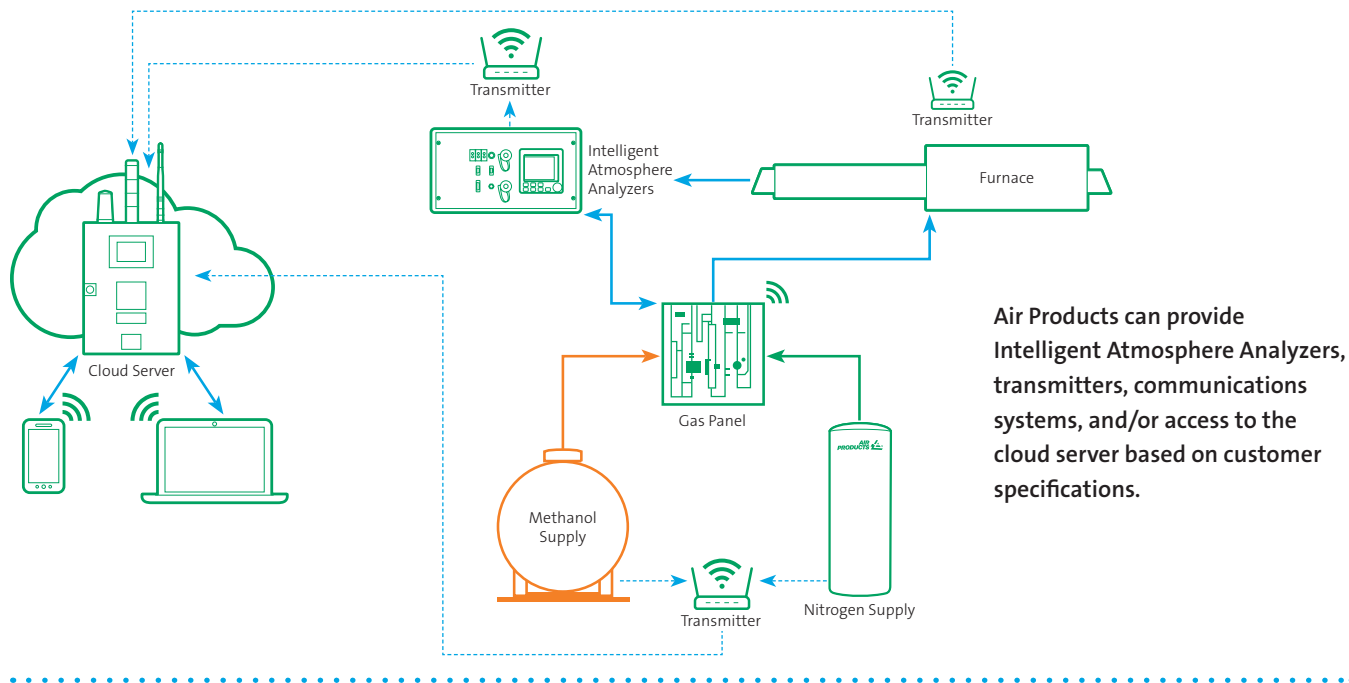
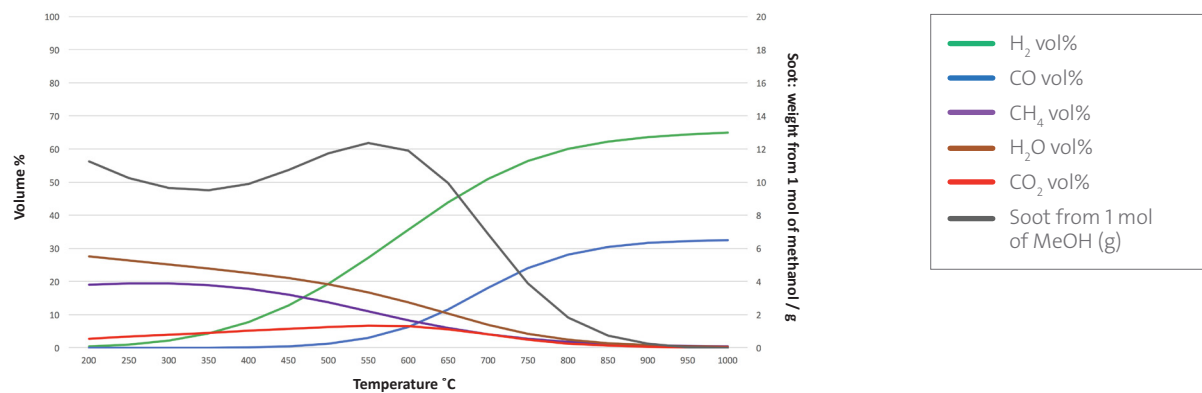
The aim of the smart lance, featuring Air Products' Process Intelligence, is to optimize the carburizing atmosphere, as well as to help operators monitor the operation of their furnaces and, thus, the operating costs.

Features

- The Air Products smart lance measures the pressure and temperature of nitrogen and methanol inside the lance
- The new smart nitrogen-methanol nozzle creates a fine methanol mist for perfect cracking results

The Smart Nitrogen-Methanol Lance innovative design ensures that the methanol cracks in the furnace, not in the lance. The lance design keeps the liquid methanol temperature at a level that prevents soot formation (see figure below), and the nozzle atomizes the liquid to very fine droplets (diameter <math><100\mu\text{m}</math>). Thus, the generated furnace atmosphere contains the desired combination of nitrogen, hydrogen, and carbon monoxide, and almost no soot. Sooting could occur in the lance due to impurities in the methanol; in this case, the pressure sensor alerts the operator to check if the lance requires maintenance.

Methanol Cracking: Vaporization and cracking of methanol below 750°C causes significant sooting



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