

# Case Study

## Reduce Nitrogen Plant unplanned downtime

### Project background

An international special gases manufacturer delivered constant Nitrogen supply to a semiconductor client. If a generator failed, an automatic back up system vaporised liquid nitrogen at additional cost.



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### Problem

Management were concerned at the additional cost required to maintain the same quality, pressure and flow of vaporised liquid nitrogen when Nitrogen gas supply failed.

A Lean Six Sigma was set up. The team discovered that Nitrogen gas supply downtime was running at 0.5% and the objective was a 60% reduction with no individual interruption to exceed 8 hours.

The team was set up across 4 sites so that buy-in could be obtained for solutions as they developed.

The team discovered incidences of malfunction in both purification and cold box processes.

Purification issues were caused by malfunctioning valves and regulators and blocked check valves.

The team found that cold box issues were caused by incorrect level measurements and plug gauges. There were also excessive fire risks and power supply interruptions.

### Solutions

New spare parts and filters were fitted.

A preventive maintenance programme was set up to minimise recurrences of incorrect level measurements.

Sensors were added to allow for predictive maintenance and new standard operating procedures were developed for operators.

Fire protection was added along with new power supplies, cabinets and automatic start-up procedures.

Control plans were developed for air compression, error messages, pressure and temperature input control, parts per billion carbon dioxide content and control of maximum specifications of other chemical impurities.

### Business benefits

Downtime was reduced, saving \$140K per annum in one site. The solutions were replicated in 3 other semiconductor sites.