

Expertise: Vision

Industries: Manufacturing

Advanced vision inspection of critical welds



Overview of the partnership

Partners:	A global energy technology company and Consat Engineering
Objective:	To replace an outdated vision system with a modern, reliable solution for inline inspection of critical welds – in an environment with exceptionally high demands on quality, traceability and operational reliability.

In operations where every weld is safety-critical, there is no margin for uncertainty. For a global energy technology company, a new vision system became essential to continue production in line with the industry's highest standards. Together with Consat, a customised solution was developed that remains production-critical today.

Challenge

Exceptionally high demands on quality and safety when inspecting critical welds, combined with difficult surface properties and the need for continuous operation.

Solution

A custom-developed vision system featuring unique triangulation, advanced lighting and camera fusion, integrated inline in production.

The customer needed to ensure reliable inline inspection of welds in a production environment with exceptionally high requirements for quality and safety. The welds are critical to the product's function and must be completely free from defects – any deviation represents a direct risk to production and delivery.

The existing vision system was outdated and no longer fit for purpose. At the same time, the application posed significant technical challenges: the welds had shiny, rough and irregular surfaces that caused strong reflections, making conventional image processing insufficient. To continue production, a new, more robust vision system was required – one capable of handling both surface complexity and the demands of continuous operation.

A pragmatic partner

The high level of risk meant that the approach had to be methodical and verifiable. Early in the project, a feasibility study was carried out in which different technical methods were tested and evaluated. This allowed the customer to confirm functionality and reliability before full-scale implementation.

The established relationship and mutual trust between the parties were crucial. The solution was developed in close dialogue, with a clear focus on proven performance in production rather than standardised off-the-shelf solutions.

The challenge

The welds to be inspected had extremely demanding surface characteristics: shiny, rough and irregular structures that caused significant glare and reflections. At the same time, the requirements were uncompromising – missing a defect was not an option.

In addition, the system had to operate inline in production with very high availability. If the vision system was down, production could not continue, making both precision and operational reliability absolutely critical.

Key outcomes

- Inline inspection of safety-critical welds
- Very high operational reliability over time
- Continuous verification against manual reference measurements
- Production-critical solution with zero tolerance for defects

Summary

- The customer needed to replace an outdated vision system in a safety-critical environment
- Consat developed a customised solution for complex, reflective weld surfaces
- The system was integrated inline and is production-critical
- The result is stable operation and consistently met quality requirements over the long term

The solution

Consat implemented a vision system based on the Optonova platform with a unique triangulation algorithm. By combining multiple cameras and lighting setups from different angles – together with fusion of image data – the system was able to inspect the complex weld surfaces with high accuracy despite strong reflections.

The result

Since installation, the vision system has been production-critical. When the system is running, production continues – if it stops, the line stops.

The solution has delivered very high availability over a long period, with only a limited number of interruptions. It has enabled the customer to maintain stringent quality and safety standards in daily production, year after year.

Value-driven innovations

The project resulted in system-level technical innovation. The triangulation method developed to handle shiny and irregular weld surfaces was unique at the time and required new thinking in both optics and algorithms.

That the solution remains in operation today demonstrates the value of systems designed for real industrial use. At the same time, the case highlights the importance of long-term planning – hardware, electronics and operating systems must be updated over time to meet future requirements.

Contact us

Would you like to learn more about how we can support your operations with vision and value-driven manufacturing? Contact us, we'd be happy to tell you more or arrange a meeting.