

Engineered
 Simplicity.

Customer Case Study

The Client:
Komatsu America Corp.

THE CHALLENGE: Offering customized solutions is crucial to Komatsu's ability to maintain a competitive edge. The complexity involved in delivering these solutions meant Komatsu was seeing an increase in the number of assembly components, over 300% per frame. They were facing a challenge to:

- Sustain and improve on their high-quality standards.
- Maintain and increase throughput to meet their customers demands.
- Implement changes effectively.
- Control and reduce manufacturing costs.

THE SOLUTION: The Iris Spatial Positioning System (SPS), from Virtek Vision of Canada, combines the use of laser projection technology with 3D vision technology to locate a part in 3D space. The system then quickly locks onto the part's CAD-specified assembly positions and guides the user through the welded assembly process by projecting a laser outline of each component part.

THE BENEFIT: Virtek's Iris SPS system enabled Komatsu to eliminate templates, increase welding assembly speed, save factory floor space, reduce health & safety risks, improve the engineering process and find significant cost and operational savings. **The ROI on Virtek's Iris SPS system was realized by Komatsu in under one year!**



Eliminating defects in assembly by 95%
 using Iris™ Spatial Positioning System.

KOMATSU

Komatsu America Corp. is a U.S. subsidiary of Komatsu Ltd., the world's second largest manufacturer and supplier of earthmoving equipment, consisting of construction, mining and compact construction equipment. Komatsu America also serves forklift and forestry markets.

Summary

Komatsu was seeking to reduce errors in manufacturing, while at the same time increasing their throughput and efficiency to enable them to meet increased demand. They were using aluminum templates to guide workers in welding brackets, stand-offs and studs on large mining truck frames. These templates were costly to manufacture, design and redesign. Additionally, they were cumbersome, presenting Health and Safety risks, and taking up a lot of space to store. By implementing Virtek's Iris Spatial Positioning System (SPS), Komatsu eliminated templates and significantly accelerated their assembly process, eliminating human errors and upholding quality because items are built exactly as designed.

Highlights

Komatsu saw a reduction in errors concerning incorrect parts, part location, and missing parts by 75%, and dimensional mistakes by 60%. The cost of fixing defects in final assembly was dramatically reduced. Komatsu was able to increase their manufacturing efficiency while also streamlining their engineering processes.



The Challenge

To remain competitive, Komatsu had to offer their customers more customized, modular, integrated and autonomous solutions. The complexity involved in delivering these solutions has caused an increase of over 300% per frame in the number of assembly components on electric mining trucks.

QUALITY

Issues led to rework sometimes costing up to 10x more to complete.

Komatsu used templates in their manufacturing process to locate parts on their frames, along with manual measurement. As such, parts were placed incorrectly or missed due to:

- Misalignment of the templates.
- Damage to the templates.
- Incorrect installation because of multiple markup and confusing notations.
- Challenges with revision control of engineering drawings and instructions.



Sample of template error and misalignment.

ENGINEERING

Challenges caused delays in manufacturing throughput as well as quality issues.

Increased complexity of frames was leading to an increase in engineering efforts to make them a reality.

- Engineering changes could take 20 days to 8 weeks to reach the manufacturing floor due to the difficulty in creating and designing templates; and the manufacturing

process involved in fabricating the templates.

- The number of parts and constant development of frames meant templates had to be purchased frequently.
- The rate of revision changes occurred every 15 days at times and as such templates were obsolete before they even arrived at the production floor.
- Communicating and enforcing revision changes to the fabrication teams and manufacturing floor was extremely difficult to manage.

MANUFACTURING

An ever-evolving manufacturing process led to cost and safety challenges.

Komatsu's customized solutions created challenges which were leading to delays in their manufacturing process including:

- Storing templates required a lot of physical space in the plant.
- Multiple "pickoff carts" and their different locations caused an increase in time to find the required templates.
- Templates required constant maintenance and repair, and in extreme cases of damage, they had to be replaced.

The size of the frames Komatsu manufactures were also leading to potential Health & Safety challenges such as:

- The size of the templates meant that it required more than one operator to handle it.
- Welders were not always able to weld in 'optimal positions' due to the way the template was located on to the frame.
- Damage to the templates presented a risk to employees because of sharp edges.



Large quantity of templates no longer required and can be recycled.

The Solution

At Komatsu, Virtek's Iris SPS helps guide welders in the manufacturing of its large-scale mining trucks by projecting precise laser lines for accurate positioning of assembly components on the frame. Iris SPS uses actual measurements from the real part to align the CAD 3D model to the built part, enabling the user to account for any manufacturing deviations and assembly stack up tolerances. This reduces or eliminates errors caused through the typical assembly process.

95% reduction in defects results in a significant cost savings.

By eliminating the use of templates, manual measuring, marking and fitting steps, Komatsu was able to error proof the assembly process.

- Templates don't get damaged and therefore do not have to be replaced.
- Eliminating confusion or delays by no longer having to refer to paper drawings, using the wrong markings or holes on templates, or not having the most up-to-date revisions.
- The costs and delays associated with rework, which are significant and can be up to 10 times the cost of doing it correctly, are almost completely eliminated.

Engineering changes now take hours not weeks to hit production.

Time to engineer changes for templates went from up to 8 weeks down to 2 to 16 hours. The processes are

In the words of the user

“The Virtek team consistently exhibited benefits of the Iris system and we experimented with it on one truck model,” said Mark Manzi, Manufacturing Engineer, at Komatsu. “Once we implemented the first system, it was apparent additional systems would allow the company to realize even greater savings and ancillary benefits. Since the concept was proven, the technology has ramped up and we now have 3 systems deployed across 20 different truck variations.”

repeatable so users can program a job once and run it endlessly.

- Engineering and manufacturing are working much closer together.
- Engineering can be more responsive to their customers (both internal and external) by implementing design changes in a much shorter space of time.

Manufacturing is performed more safely and accurately.

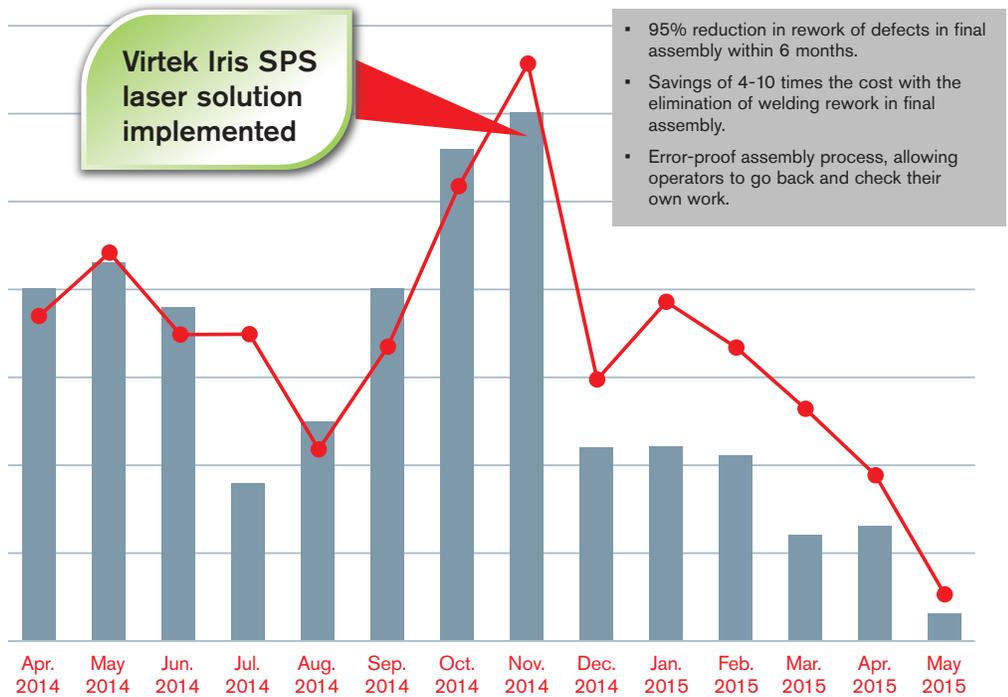
The Iris SPS user interface requires no prior experience. Visual cues guide operators through each action and project text indicators that identify part numbers for accuracy. The operator rarely needs to leave his workstation and set up time is minimal. Where workers were performing dangerous lifting techniques of heavy parts overhead, the laser has been used to project those parts at other locations where they can be placed safely.

- Increasing manufacturing throughput by no longer having to wait for templates having to be manufactured.
- Work or weld instructions and part numbers are projected on the frame making it easier for welders, ensuring they use the right parts.
- Subsequently, training the operators is now much simpler.
- Space savings by eliminating having to store large quantities of templates.
- Time savings by not having to look for and find the right templates to use on a frame.

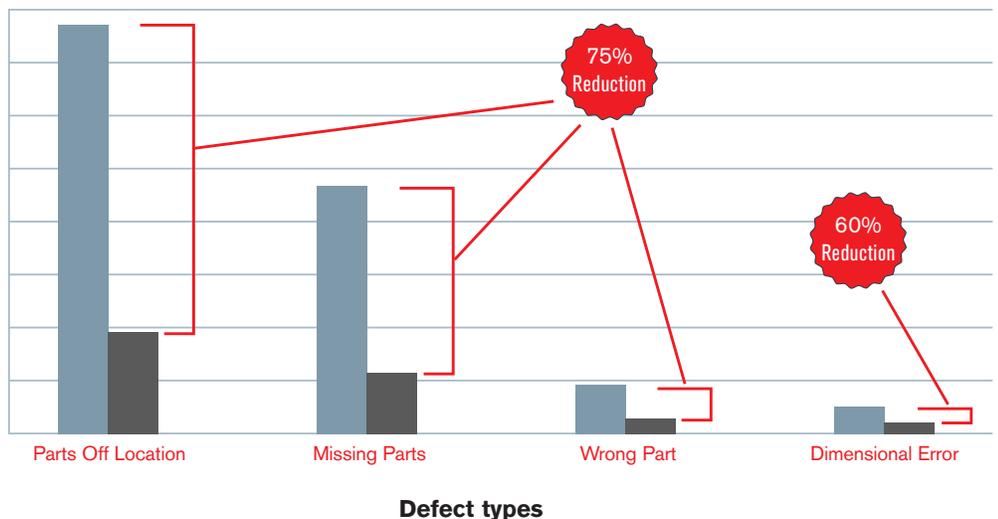


Laser projection showing part placement with Iris SPS.

Defects Rejected in Assembly Charged Against Welding



Reduction in defects before and after implementing Iris SPS



Defect types



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ABOUT VIRTEK

Virtek is the global leader in laser projection and inspection solutions, providing exceptional expertise and engineering for manufacturers around the world. Our solutions improve productivity, increase accuracy and optimize quality in aerospace, wind energy, heavy industries, pre-fab construction and sheet metal fabrication.

From composite ply layup, paint masking and precision placement of components to quality inspection and reverse engineering tasks, our tailored technology solutions – featuring Iris™, LaserEdge®, LaserQC®, TrussLine® and others – give customers the competitive edge needed to succeed in their fields.

Founded in 1986 and today a part of Gerber Technology LLC, Virtek is based in Waterloo, ON, Canada and has sales and service coverage in the Americas, Europe and Asia Pacific.

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