Tech Mahindra

LineSight

Optimize assembly-line operations with AI and video-analytics

Background

The introduction of Assembly Line-based manufacturing in 1913 by Henry Ford kickstarted a revolution of cheap, mass-produced goods. The concept of breaking down a complex assembly process into standardized work of installing parts in specialized workstations to create a continuous output of finished products dramatically increased productivity and reduced the cost of goods produced.

But now, a hundred years later, technology has grown leaps and bounds. Still, once a revolutionary concept, the assembly line has had minimal optimization over the years and is reeling with low productivity and high cost of quality.

The Challenge

Hidden bottlenecks slow down entire assembly lines. Variations in cycle times cause an increase in Takt times and missed production targets. Missed/ Wrong assembly steps, if identified in EOL testing, require rework and, if identified after reaching the customer, require expensive root cause analysis and remedial actions. Rework and failure analysis increase the cost of quality of products.

Several approaches have been used to address these issues to date but have the following drawbacks:

- Time studies with stopwatches to quantify step times and cycle times suffer from observation bias and limited dataset.
- Newer techniques such as MOST estimation provide no insight into variations in cycle times observed daily.
- Digital Work Instructions combined with assembly verification methods using machine vision cameras and barcode scanners to ensure the quality of products slow down the assembly process.

Hence, there is an urgent need for a better tool to improve productivity and reduce the cost of quality in an assembly line.

The Solution

LineSight, developed by Tech Mahindra, uses AI-based video analytics to monitor each workstation in an assembly line continuously.

Video feeds from cameras installed on each workstation are provided to a neural engine that outputs continuous, unbiased, accurate time and motion study data. Running 24x7, it can produce large data sets that capture all possible variations in step and cycle times.

An industrial engineer can use this data to improve the assembly line, derive insights about factors causing variations in step and cycle times, and take necessary remedial actions.

A Quality Engineer can use stored video data of how each unit was produced, tagged with serial and batch numbers, to perform root cause analysis in case of field failures/customer rejects. This drastically reduces the time taken for analysis and provides data to backup insights.

An assembly operator is alerted in real-time in case of missed/wrong steps so they can be rectified immediately instead of reworked after EOL testing failure. This reduces wasted time and effort.

The Benefits

LineSight, with its automated, accurate time and motion study data and video data of all units produced in an assembly line, can provide:

~10%

Increase in productivity

~10-20%

reduction in the cost of quality

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