

AI Technologies – Artificial Intelligence, Real Results

Problem / Opportunity Statement:

Identify and eliminate operating wastes such as scrap, rework, and tooling set-up that increase cycle time and limit operating effectiveness and efficiency. These waste challenges are faced daily across all industrial sectors.

Technology Description:

Artificial Intelligence (AI) rapidly analyzes massive quantities of data (“Big Data”) using the speed of Cloud Computing to discover hidden patterns of waste that constrain productivity and throughput. AI Neural Networks are being successfully used to instantaneously compute all possible sequences (potentially hundreds of thousands) for machining numerous part numbers while identifying the optimal sequence with the lowest total setup time waste. Total number of tooling change-outs are significantly reduced while also lowering the probability of defects (i.e. scrap and rework) and improving process capability (C_{pk} quality metric). AI dynamically computes remaining process lead times (PLT) throughout the router of each part number in production; thus, allowing for suitable countermeasures using real time work-in-process (WIP) data to ensure on time delivery of parts and components. These capabilities are now possible with the application of AI in manufacturing enabled by Cloud Computing.

Technology Development Status:

An AI Proof of Concept has been prototyped and successfully demonstrated at Kessington Aerospace in Elkhart IN, a manufacturer of high precision machined parts for aircraft engines and landing gears. The AI solution is being further optimized for larger scale applications. At Kessington AI has enabled improvement of on-time delivery from 52% to >95%, despite Kessington’s preponderance of low volume, high mix parts ... like, but on a smaller scale as compared to larger aircraft maintenance depots. Before application of AI it was unknown that the low volume parts, which accounted for only 19% of total parts volume, were in fact responsible for 75% of all factory setup time ... consuming as much time in setup (waste) as in value-add machining and responsible for almost all late customer deliveries.

Supporting Data for Performance Claims:

Again, overall on-time delivery has improved from 52% to >95%. Overall costs have been reduced by 23%, scrap reduced from 8% to 3%, and operating profits improved from -3% to >20% in less than 18 months. We know these results to be highly transferable to many manufacturing environments, both Commercial and DoD.

Next Steps / Potential Benefits:

Artificial Intelligence will equip manufacturing, supply chain and logistics leaders with a most formidable weapon for achieving greater production capacity and throughput, on-time delivery and profitability. AI can be effectively deployed with fundamental Lean Six Sigma (LSS) methods and tools (e.g. pull systems) to achieve the following:

- Production capacity increase of >20% with no manpower increase
- Cycle time reduction of >30%, and
- On-time delivery-to-promise date >90% with no increase in inventory