ARGO

CONSULTING

On-time Delivery in an Engineered-to-Order Environment

By James Mourafetis, Scott Timpson, Larry Keeley, Dantar Oosterwal, Craig Black, and Uday Kamat

April 2020

Practical & immediate actions to achieve on time delivery in a highly engineered, high mix, low volume business

Achieving on time delivery in a highly engineered, high mix low volume business is one of the most difficult challenges for any heavy equipment manufacturer.

Whether its locomotives, aircraft, or heavy construction equipment, many of the challenges are similar and they can be overcome. While many executives believe they can pinpoint the problem to one or two functions, the reality is that the symptoms causing late delivery performance stem from breakdowns throughout the entire realization processes. Additionally, it is common for these systemic breakdowns to occur when something in the organization changes such as: sales have led to smaller orders that vary considerably by model or platform; or a situation where a considerably large order significantly strained the organization's capacity to convert the order on time and to budget; or significant changes to revenue that led to significant staffing level changes.

Time and time again, there is a recurring set of interdependent failing functions that continue to plague on time delivery performance and there are specific actions that are required to overcome.

Four common product development factors that reinforce each other leading to overall degradation in lead time

Requirements Clarity - insufficient, incomplete, delayed or constantly evolving requirements information

- Difficult to ask detailed technical questions early in the sales cycle
- Critical design information may be missing in early inquiry or design states….designers make requirement assumptions which may be incorrect and drive rework
- Customer requirements evolve through the development process which drives rework
- Downstream activity (production print releases, parts ordering) may be initiated without clear statements of work
- Design by engineering change requests is common and not used as exception

Design methodology and Processes - process and methods not aligned with 'new normal'- low volume high mix customer demand

- Difficult to comply to existing processes at current order pattern
- Design process- reviews and gates not very effective
- Learning from 1st build and previous designs is not integrated into future designs in a timely manner- belief that the shop floor validation is a necessary part of design cycle; limited focus on reducing shop validation
- Many issues discovered at the customer
- Delayed learning cycles - feedback from other groups and shop floor not integrated with future design techniques such as value engineering, design for manufacturing, life cycle costing etc. not sufficiently integrated in design process
- Designs not optimized for cost

Resource management- low or no visibility of demand or capacity; imbalanced loading with highly fluctuating workloads and priorities

- Poor demand visibility – how do individual orders translate into engineering workload
- Poor capacity visibility at skill level –capacity bottlenecks
- Difficult to make fact-based decisions on order loading and delivery commitments
- No time factored for learning and iterations
- Vouchering system is used as a reporting tool and not as a management system

Organizational structure - organizational structure is inconsistent with how work is actually performed to be successful

- Application and R&D have different goals, but they are handled by same individual in current organization
- Heavy order focus; long term lifecycle approach (product, electronics, software, reliability, safety) not sufficiently represented
- Long term lifecycle approach not sufficiently shielded from revenue and budget fluctuations
- Absence of robust technical succession planning
- Difficult to flex engineering capacity

Immediate key actions

There are three immediate key actions that require corrective action to Engineering processes to achieve quick wins in on-time delivery attainment and bring stability back into Program Management & Engineering.

1. **Establish a Program Command Center**
   - Establish command center with visual management- charts and graphs with program timing, milestones and progress-to-date and countermeasures to existing issues
   - Break-down of initiatives and objectives into work activities. Establish an integrated schedule.
   - Establish daily cadence with key KPI and performance indicators to track progress with resourcing and timing- to visually link the connection among the stakeholders on project progress and early warning indicators to deploy actions quickly & support those involved with the day-to-day implementation and execution.

2. **Create a quote-to-delivery forward capacity view**
   - Review business development tasks and cross-train certain tasks into downstream processes
   - Create bid development framework. Develop a cross functional project checklist to standardize the "what's needed" assessments required for accurate project pricing and development
   - Create a cadenced review template to confirm all input assessments prior to the "Bid/No Bid" phase
   - Implement System Engineering approach for engineering functions and level set on customer forecasting, scheduling for requirements and deliveries.

3. **Reset & communicate Engineering roles & processes to deliver on time error-free design**
   - Root cause analysis for causal factors on the last two years past projects
   - Reduce engineering change order request backlog- prioritize, refresh cad models, eliminate batch processing of redlines, etc.
   - Definition of KPC/ KCC's to simplify inspection & reduce NCR's
   - Develop product development playbook with robust design processes- kickoffs, SOW/ Design reviews, upstream integration events.
   - Conduct Engineering workshops to identify process application areas for efficiency opportunities
   - Institute a cross-functional review process on the next projects progress through the development phases
   - Improve the "first-time right" design release process by appropriating time to conduct system risk assessments and confirm drawing accuracy prior to release
   - Improve effectiveness of design review process

- Expand the usage of the prototype process and investigate new techniques for part creation that do not burden operations
- Define and create producibility training modules to improve “design for manufacturing & assembly”
- Develop KPI’s to track performance for First Right and On-time drawing release
- Develop revised Engineering staffing model: Organization, Ownership, Skills, Work tasks, Headcount

Implementing these three key actions will dramatically reduce engineering re-loops; improve customer requirements understanding upfront; improve engineering throughput leading to accurate & on-time deliverables to the supply chain, manufacturing and assembly enabling improved on-time delivery. These three actions implemented will restore stability to Program Management and the Engineering department.

About the Authors:

James Mourafetis is a Senior Vice President and leads Argo Consulting’s Aerospace & Defense practice. He is a thought leader in Operational Excellence, Lean Product Development and Enterprise Asset Management. J.mourafetis@argoconsulting.com

Scott Timpson, President, is responsible for strategic and client oversight for Argo’s business in Canada, and globally for the Transportation and Natural Resource sectors. s.Timpson@argoconsulting.com

Dantar Oosterwal, Senior Vice President & Partner, is Argo’s Lean Innovation & Product Development Practice Leader. He is highly regarded as a global thought-leader in Lean Innovation & Product Development systems. d.Oosterwal@argoconsulting.com

Larry Keeley is a Senior Vice President at Argo, with more than 25 years of experience in industry and management consulting collaborating with C-level teams from leading companies across industries to help optimize business performance. l.keeley@argoconsulting.com

Craig Black is a Director of Operations at Argo with over 28 years of international experience. He engages from the C-Suite to the shop floor facilitating lean transformations in a wide range of industries. c.black@argoconsulting.com

Uday Kamat is a Vice President at Argo, with more than 15 years of experience operationalizing CEO vision at Public, Private and Private Equity companies across North America, Europe and Asia, with mostly heavy asset unionized industries. u.kamat@argoconsulting.com

About Argo:

Argo is an international consulting firm that delivers operational performance by focusing on business processes, continuous improvement principles, and changes in workforce behavior. With an unrelenting commitment to achieving identified business and financial outcomes, we implement our recommendations to ensure our clients’ profitability and sustainability goals are realized.

Our focus is on Food & Beverage, Industrial Manufacturing, Medical Products, Pharmaceuticals & Life Sciences, Aerospace & Defense, Supply Chain, Transportation, Chemical, Energy & Natural Resources, Industrial Aftermarket, Sales Force Effectiveness, Private Equity & M&A and Turnaround.