

A large blue tractor with a long spray boom is operating in a vast green agricultural field. The scene is captured during a golden sunset, with the sun low on the horizon, creating a warm, hazy atmosphere. The tractor is moving from right to left, leaving a misty trail behind it.

REALIZE UNTAPPED EFFICIENCY IN HEAVY MOBILE EQUIPMENT PRODUCTION

Innovative Solutions to Enhance Productivity, Profitability,
and Customer Satisfaction in Manufacturing

EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE

CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS

VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE
QUALITY EXECUTION

VALUE STEP 3: MATERIAL
SYNCHRONIZATION

VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION

VALUE STEP 5: SALES &
OPERATIONS PLANNING

CONCLUSION

EFFICIENCY IN THE VALUE CHAIN STARTS WITH CHANGE

The ever-shifting landscape of Heavy Mobile Equipment manufacturing, is marked by stringent regulations, volatile market demands, and the impending need for sustainable practices. These factors make it necessary for heavy mobile equipment manufacturers to operate production plants as efficiently as possible to stay abreast of the competition.

There is a prevailing belief even outside of Heavy Mobile Equipment manufacturing that disruption will be a fundamental part of the “new” normal. Hence, manufacturing leaders must consider the lessons learned from the experiences of 2020 and approach challenges from a holistic perspective. Disconnected and isolated silos on the shop floor cannot continue to exist in manufacturing systems, as they contribute to a lack of digital flexibility needed to meet the demands of contemporary business.



EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE

CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS

VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE
QUALITY EXECUTION

VALUE STEP 3: MATERIAL
SYNCHRONIZATION

VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION

VALUE STEP 5: SALES &
OPERATIONS PLANNING

CONCLUSION

CHALLENGES FACED BY HEAVY MOBILE EQUIPMENT MANUFACTURERS

- 1 Absence of coordination between engineering and manufacturing activities across the organization
- 2 Growing complexity in manufacturing processes and ecosystems, leading to complications in both operations and decision-making
- 3 Presence of organizational silos that obstruct visibility and hinder effective collaboration among stakeholders
- 4 Difficulty in managing resources (such as personnel and materials) for project tasks and coping with changes such as escalations, interruptions, and absences
- 5 Absence of an integrated platform, preventing the sharing of best practices essential for efficient execution
- 6 Inability to plan for longer timeframes, essential for building resilience against disruptive events
- 7 Lack of agility and real-time visibility, impeding organizations from promptly responding to disruptions
- 8 Retirement of highly experienced senior workers, resulting in a significant workforce gap
- 9 Rising employee turnover due to high job demands and a shrinking available workforce
- 10 Negative public perception of manufacturing as an outdated and unappealing career choice
- 11 Supply chain disruptions

EFFICIENCY IN THE IE VALUE CHAIN STARTS WITH CHANGE

CHALLENGES FACED BY HEAVY MOBILE EQUIPMENT MANUFACTURERS

VALUE STEP 1: IMPROVE PRODUCTION AND MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE QUALITY EXECUTION

VALUE STEP 3: MATERIAL SYNCHRONIZATION

VALUE STEP 4: PRODUCTION SCHEDULING OPTIMIZATION

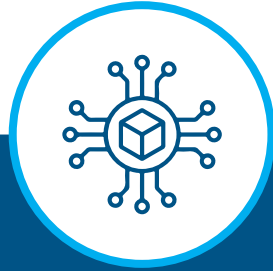
VALUE STEP 5: SALES & OPERATIONS PLANNING

CONCLUSION

In this eBook, you will learn more about:



The five value steps and best practices that enable greater productivity at each phase



How Heavy Mobile Equipment manufacturers can leverage digital tools to realize untapped efficiencies at every value step.



Keys to manufacturing excellence and generating greater value from your business

EFFICIENCY IN THE IE VALUE CHAIN STARTS WITH CHANGE

CHALLENGES FACED BY HEAVY MOBILE EQUIPMENT MANUFACTURERS

VALUE STEP 1: IMPROVE PRODUCTION AND MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE QUALITY EXECUTION

VALUE STEP 3: MATERIAL SYNCHRONIZATION

VALUE STEP 4: PRODUCTION SCHEDULING OPTIMIZATION

VALUE STEP 5: SALES & OPERATIONS PLANNING

CONCLUSION



VALUE STEP 1: IMPROVE PRODUCTION AND MAINTENANCE EXECUTION

There is an unprecedented desire for change and innovation in the Heavy Mobile Equipment landscape. However, organizations are also looking for options that minimize the risks associated with digitalizing their shop floors. Manufacturing leaders are reevaluating their crisis management strategies, examining their past performance, and charting a new course to support activities like re-shoring and acquisitions.

Adhering to best practices enables manufacturers to enhance operational excellence and increase production throughput. The use of isolated and rigid solutions, tied solely to physical assets as well as localized and transactional applications, is becoming obsolete. Manufacturers who wish to capitalize on opportunities arising from disruptions are looking at a connected, scalable, and sustainable platform approach. Ideally, this approach should be globally collaborative, model-based, and limited only by the creativity and imagination of their workforce.

DELMIA's solutions offer comprehensive and innovative solutions for manufacturers looking to transform their operations and stay competitive in the evolving market. Leveraging a centralized platform, DELMIA establishes a cohesive, adaptable, expandable, and secure foundation for digital transformation. This enables immediate access to crucial manufacturing data, enabling swift and informed decision-making and engendering resilient and efficient operations.

EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE

CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS

VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE
QUALITY EXECUTION

VALUE STEP 3: MATERIAL
SYNCHRONIZATION

VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION

VALUE STEP 5: SALES &
OPERATIONS PLANNING

CONCLUSION

DELMIA's Practical Solution to MOM

DELMIA provides a comprehensive solution for Manufacturing Operations Management (MOM), enabling manufacturers to control and synchronize operations globally by digitalizing the manufacturing process. The suite emphasizes business process management, offering unique global management capabilities and robust data collection from IIoT devices. It supports multiple manufacturing models, from discrete to process, and is scalable for factories of all sizes, catering to both large-scale facilities and smaller niche manufacturers.



Production

- Provides global manufacturing visibility
- Boosts operational efficiency
- Accelerates New Product Introduction (NPI)
- Ability to adapt and shift production to demand across geos, while ensuring process standardization
- Can be configured to meet specific manufacturing requirements



Quality

- Provides global visibility and control
- Enhances genealogy, traceability and containment
- Facilitates continuous improvement management
- Reduces in-house scrap and costs associated with quality issues



Warehouse Management

- Synchronizes material flows to production in real time
- Improves operations performance and reduces inventory
- Reduces material handling costs
- Enables a demand-driven enterprise



Time & Labor

- Optimizes time and attendance tracking
- Enables lean analysis to improve operations by capturing value add and non-value add times
- Eliminates paper tracking and manual data entry



Maintenance

- Synchronizes maintenance across all operations
- Increases equipment uptime
- Improves manufacturing productivity and quality
- Reduces maintenance costs
- Expands maintenance productivity and effectiveness to offline locations

EFFICIENCY IN THE IE VALUE CHAIN STARTS WITH CHANGE

CHALLENGES FACED BY HEAVY MOBILE EQUIPMENT MANUFACTURERS

VALUE STEP 1: IMPROVE PRODUCTION AND MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE QUALITY EXECUTION

VALUE STEP 3: MATERIAL SYNCHRONIZATION

VALUE STEP 4: PRODUCTION SCHEDULING OPTIMIZATION

VALUE STEP 5: SALES & OPERATIONS PLANNING




CONCLUSION



Customer Story:

XCMG Machinery, a pioneer in China's construction machinery industry, needed a solution to long project cycles burdened with huge amounts of complex information.

Objectives:

-  Reduce the duration of project cycles
-  Manage the complexity of the construction machinery industry
-  Deliver large, intelligent, and safe equipment tailored to customers' specific needs

Solution:

[XCMG utilized DELMIA's platform to create a centralized database](#), merging design and manufacturing data and employing simulation features in project management. The platform allows comprehensive simulation and virtual validation of products from design to manufacturing. Defining a precise Bill of Materials (BOM) with detailed work instructions ensured efficiency in processes. Early implementation of highly accurate 3D models enhanced efficiency, and DELMIA software aided in task prioritization, significantly reducing construction timelines.

EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE

CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS

VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE
QUALITY EXECUTION

VALUE STEP 3: MATERIAL
SYNCHRONIZATION

VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION

VALUE STEP 5: SALES &
OPERATIONS PLANNING

CONCLUSION

VALUE STEP 2: INCREASE QUALITY EXECUTION

Lean manufacturing focuses on minimizing waste and maximizing efficiency in the production process, ensuring quality execution of manufacturing activities. Emphasizing continuous improvement, eliminating unnecessary steps, reducing inventory, and optimizing resource utilization, the goal is to enhance overall productivity, streamline workflows, and deliver higher-quality products while reducing costs.

However, new obstacles have appeared as new regulations and technology present new challenges to manufacturers.

Obstacles Preventing Lean Manufacturing Execution



Time

- Enhancing manufacturing processes is a gradual effort demanding commitment and collaboration.
- The timeline for improvement hinges on existing issues but can be sped up with proper resources, efficient systems, clear goals, thorough training, and cooperation across departments.

Resources

- Key resources include Six Sigma or Kaizen training, IT systems, and a dedicated budget for process improvements.
- Software choices are crucial, with Enterprise Resource Planning (ERP) suitable for record management and financial tracking but not well suited for shop floor applications.
- With the advent of Cloud and SaaS (Software as a Service) applications, ERP is no longer limited to larger enterprises, providing a broader scope of companies that can benefit from it.
- Manufacturing Resource Planning (MRP) and Supply Chain Management (SCM) systems are beneficial for planning in manufacturing facilities and can be synchronized with kanban for more effective and lean production.
- Manufacturing Execution Systems (MES) or Manufacturing Operations Management (MOM) systems are vital for ensuring proper execution of processes on the shop floor and collecting key production data, integrating seamlessly with shop floor equipment and ERP to provide key operational insights.



EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE

CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS

VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE
QUALITY EXECUTION

VALUE STEP 3: MATERIAL
SYNCHRONIZATION

VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION

VALUE STEP 5: SALES &
OPERATIONS PLANNING

CONCLUSION



Correct Targets

- Crucial to avoid time wastage in manufacturing.
- Assess the entire production cycle from order initiation to product delivery.
- Identify hindrances and rectify communication challenges between departments.
- Efficient areas should be marked for observation.
- Common problematic areas include inventory, engineering, and quality.
- Thorough analysis is crucial once an issue is pinpointed.
- For example, inventory problems may require updating the inventory control system, while quality issues could stem from machinery calibration problems rather than material or worker skill.



Resistance

- A significant obstacle is a lack of understanding of Lean principles and objectives.
- Lean involves eliminating waste across production processes, material flows, quality, delivery, and costs.
- Areas for improvement range from adopting Just-in-Time systems to optimizing energy use and management practices.
- Managerial resistance can impede progress, often due to a reluctance to relinquish control or fear of job loss.
- Production workers may resist Lean practices, perceiving it as increased workload.
- Addressing resistance requires demonstrating that streamlined production makes work easier. Adequate training is essential for employees to meet increased production targets without compromising quality, making an investment in training vital for reducing resistance and boosting overall efficiency.



Follow Through

- Ongoing vigilance is crucial post-initiation to prevent reverting to old habits.
- The principle of Kaizen, integral to Lean practices, emphasizes continual and iterative improvement efforts.
- Sustained effectiveness demands a consistent and persistent commitment to monitoring and refining processes.

EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE

CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS

VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE
QUALITY EXECUTION

VALUE STEP 3: MATERIAL
SYNCHRONIZATION

VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION

VALUE STEP 5: SALES &
OPERATIONS PLANNING

CONCLUSION



Customer Story:

Hyundai Doosan Infracore, a full service provider of construction equipment, was looking for a platform solution for global production integration.

Objectives:

- ✓ Unify the operations of plants across Incheon, Gunsan, and China
- ✓ Digitize manufacturing data from design to production
- ✓ Link and analyze data within each plant in real time
- ✓ Smoothly integrate into systems while maintaining the current MES solution

Solution:

[DELMIA was integrated with MES solutions across the three locations.](#) The implementation of One-Core management across all factories allows for simple sharing of best practices internationally. The Real Time Tracking System (RTLS) identifies specifications in real time and issues relevant work instructions, increasing efficiency and reducing errors.

DELMIA also enhances existing quality control processes by providing quick action and analysis for quality abnormalities. It addresses potential oversights in manual data entry by incorporating control sections and utilizing 2D/3D photos. This digital information not only aids in immediate responses but also serves as valuable data for future quality improvement initiatives.

Moreover, DELMIA extends its impact beyond quality control to the logistics operation, digitizing and sharing information across material warehousing, picking, and shipping. This comprehensive digitization enables real-time responses aligned with customer delivery needs.



EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE

CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS

VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE
QUALITY EXECUTION

VALUE STEP 3: MATERIAL
SYNCHRONIZATION

VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION

VALUE STEP 5: SALES &
OPERATIONS PLANNING

CONCLUSION



VALUE STEP 3: MATERIAL SYNCHRONIZATION

In an ever-changing and complex landscape, Heavy Mobile Equipment manufacturers are adapting to global shifts, including a focus on climate change and the adoption of new power technologies like electric and hydrogen. The demand for autonomous equipment and unique product configurations adds complexity, intensifying the pressure to transform global operations. Fierce competition ensues as companies vie to innovate and stay ahead, with those that swiftly adapt to industry trends positioning themselves for market leadership.

However, organizations face challenges in managing growth, labor shortages, supply chain disruptions, paper-based tracking inefficiencies, and poor inventory management. The landscape is further shaped by geopolitical events and climate-related hazards, presenting both challenges and opportunities for forward-thinking manufacturers leveraging the right solutions.

EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE

CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS

VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE
QUALITY EXECUTION

VALUE STEP 3: MATERIAL
SYNCHRONIZATION

VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION

VALUE STEP 5: SALES &
OPERATIONS PLANNING

CONCLUSION

New Opportunities with Material Synchronization

To solve this problem, DELMIA has created a seamless workflow solution called **Material Synchronization** which enables manufacturers to elevate their production process with new capabilities.

DELMIA's solution to disruptions targets the gap between production and warehouse management, where there is traditionally a disconnect that causes a weak link in the value chain. DELMIA enables a seamless workflow called material synchronization by coordinating production orders and manufacturing bills of material with inventory management inside plants and across the supply chain. This connects and improves the inbound material flows, line-supply, and outbound material flows, realizing increased production line availability.

Eliminate inventory buffers and obsolescence

- Supports pull-based (demand-driven) and one-piece flow production
- Eliminates buffers, shortens lead times, and reduces the amount of scrap generated if defects or non-conformance are found
- Supports multiple inventory management techniques, such as:
 - o First In, First Out (FIFO)
 - o Kanban
 - o Product-specific kitting
 - o Revision controlled inventory
 - o Inventory with short shelf life or time sensitivity requirements
- Improves First Time Right by helping ensure all required components are available when and where they are needed in the manufacturing process



Realize Just In Time and Sequence (JIT/JIS) Manufacturing

- Gives operators visibility into inventory and materials needed by generating the pull signal and tasks from the final assembly
- Determines the timing, sequence, and individuals needed to perform manufacturing tasks through business processes
- Drives “trigger-based” kitting, guiding material handlers to pick product-specific kits for specific stations based on assembly takt time and material handling time, reducing lineside inventory
- Material flow automation ensures sub-assemblies and right parts arrive when they are needed for production and assembly, eliminating downtime



EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE

CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS

VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION

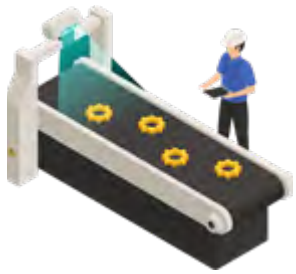
VALUE STEP 2: INCREASE
QUALITY EXECUTION

VALUE STEP 3: MATERIAL
SYNCHRONIZATION

VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION

VALUE STEP 5: SALES &
OPERATIONS PLANNING

CONCLUSION



Lean manufacturing

- Provides necessary technology to drive lean manufacturing principles and achieve sustainability and profitability objectives
- Enables paperless systems and best practices such as the Kanban framework
- Reduces excess inventory, overstocking, and shortages with full real-time visibility and control over material flow
- Improves process consistency by enforcing improved processes defined in Kaizen events



Accurate inventory replenishment

- Coordinates multiple sub-assembly and material kitting operations with main assembly processes
- Allows synchronization of material replenishment based on production status and material handling requirements
- Ensures accuracy and full control with configurable business rules to cut down material handling and delivery errors



Better traceability and quality assurance

- Labels, electronic tags, and automatic tracking technologies (RFID, barcodes, and more) ensures quality, traceability, and genealogy



Minimize shipping and receiving errors

- Real-time error proofing for print, packaging, and labeling inventory in shipping and receiving
- Enables shipping in sequence based on a specific order set required by the customer demand signal



EFFICIENCY IN THE IE VALUE CHAIN STARTS WITH CHANGE

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VALUE STEP 1: IMPROVE PRODUCTION AND MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE QUALITY EXECUTION

VALUE STEP 3: MATERIAL SYNCHRONIZATION

VALUE STEP 4: PRODUCTION SCHEDULING OPTIMIZATION

VALUE STEP 5: SALES & OPERATIONS PLANNING

CONCLUSION

VALUE STEP 4: PRODUCTION SCHEDULING OPTIMIZATION

Global health crises have left a lasting impact on supply chains globally, as well as giving rise to new issues. In this new landscape, discrete manufacturing companies such as those found in the Heavy Mobile Equipment industry need to be able to precisely and flexibly forecast demand and planning capacity. Balancing the seemingly contradictory goals of meeting customer needs while minimizing costs necessitates an integrated and optimized business planning process which also allows important stakeholders to collaborate simultaneously.

Hence, manufacturers, SMEs, and large corporations are looking for short-term scheduling optimization capabilities that enable made-to-order or inventory-based production flows. However, as many as 70% of all supply chain transformation projects fail due to both internal challenges and external disruptions.

How Manufacturers Can Deal with Planning Challenges



Increasing project and program predictability

With financial demand planning, also called integrated business planning, manufacturers should be able to understand what customers are likely to want in advance of design work or orders coming in.



Reducing supply vulnerability

Supply planning is necessary; manufacturers need to look at the supply chain holistically and balance opportunities against the limitations of supply, as well as look to the long term to secure contracts to get supply when it is needed.



Optimizing workforce planning

Efficient and effective allocation of the workforce ensures that components and skilled labor are available to execute tasks when they are needed.

EFFICIENCY IN THE IE VALUE CHAIN STARTS WITH CHANGE

CHALLENGES FACED BY HEAVY MOBILE EQUIPMENT MANUFACTURERS

VALUE STEP 1: IMPROVE PRODUCTION AND MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE QUALITY EXECUTION

VALUE STEP 3: MATERIAL SYNCHRONIZATION

VALUE STEP 4: PRODUCTION SCHEDULING OPTIMIZATION

VALUE STEP 5: SALES & OPERATIONS PLANNING

CONCLUSION

How DELMIA Solves Planning Challenges

DELMIA revolutionizes Manufacturing Execution Systems (MES) with advanced planning, scheduling, and production solutions. Going beyond traditional MES, it integrates constraint-based, finite-capacity resource optimization, and production flow synchronization. This empowers manufacturers to optimize resource utilization, address daily issues, and enhance service delivery. The solution facilitates agile and responsive operations, aiding in the seamless integration and visibility of demand, supply, and operations.

DELMIA identifies manufacturing bottlenecks, enables schedule modifications, and conducts what-if simulations for improved Detailed Scheduling and Master Production Scheduling (MPS) processes. Enhancing responsiveness and visibility reduces cycle times, inventory, and lead times, offering high-speed optimization for multi-variant problems. The solution minimizes manual work and errors through accurate scheduling at finite capacity, dynamic short-term scheduling, and rescheduling, fostering synchronized production flows, shorter lead times, increased production rates, and improved operational efficiency.

By integrating into your manufacturing cycle, DELMIA provides comprehensive digital continuity and AI-driven decision support across the manufacturing spectrum, from raw materials to finished products.



**EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE**

**CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS**

**VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION**

**VALUE STEP 2: INCREASE
QUALITY EXECUTION**

**VALUE STEP 3: MATERIAL
SYNCHRONIZATION**

**VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION**

**VALUE STEP 5: SALES &
OPERATIONS PLANNING**

CONCLUSION



Customer Story: JAKSCHE Technology, a Bosnian thermoset plastic components manufacturer, develops and manufactures tools and heavy-duty fiber-reinforced plastic parts used in some of the most demanding settings like water tanks and machine housing, roof shells and vehicle panels.

Objectives:

- ✓ Unify disjointed company departments
- ✓ Ensure First Time Right quality
- ✓ Solve inefficient planning routines and provide better visibility

Solution:

[DELMIA provided a central platform for R&D](#), procurement, and production, facilitating more effective communication between themselves and customers. Virtual modeling enabled JAKSCHE to consider all aspects of the product development lifecycle from the beginning. DELMIA also reduced the time needed to plan production to just 30 to 45 minutes every few weeks.

EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE

CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS

VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE
QUALITY EXECUTION

VALUE STEP 3: MATERIAL
SYNCHRONIZATION

VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION

VALUE STEP 5: SALES &
OPERATIONS PLANNING

CONCLUSION

VALUE STEP 5: SALES & OPERATIONS PLANNING

As the fifth value step, Sales and Operations Planning (S&OP) serves as a strategic tool for aligning business objectives with operational capabilities. S&OP is a critical process for Heavy Mobile Equipment manufacturers, serving as the bridge between strategic planning and operational execution. The ability to define demand scenarios is essential for manufacturers to anticipate market fluctuations, respond to changing customer needs, and align production capabilities with expected demand. By importing these scenarios into the S&OP process, manufacturers gain a comprehensive view of the entire supply chain, ensuring that production plans are aligned with market dynamics.

Optimizing the corresponding supply plan is a key outcome of the S&OP process. This involves balancing production capacity, resource availability, and lead times to meet demand efficiently. Manufacturers aim to achieve high on-time delivery (OTD) rates, a crucial metric that reflects the percentage of deliveries made on time out of the total number of deliveries. A well-optimized supply plan not only enhances the OTD percentage but also contributes to overall customer satisfaction and loyalty.

Inform Decisions with a DELMIA S&OP Solution

DELMIA leverages comprehensive data from sales, marketing, finance, and operations, offering valuable insights for informed decision-making. With advanced modeling and in-memory optimization capabilities, the platform empowers users to simulate various "what-if" scenarios throughout the S&OP cycle. DELMIA addresses crucial questions related to production, procurement, transportation, and storage, providing strategic guidance on what, where, and when to take action.

This solution facilitates the development of tactical plans, allowing users to strategically direct and continually enhance all aspects of integrated business planning. By harmonizing data and planning across diverse business functions, including sales, marketing, development, manufacturing, sourcing, and finance, DELMIA drives a competitive advantage. It establishes a single source of truth through an integrated planning dataset, offering consistent planning views tailored for each role, department, and planning use case.



EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE

CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS

VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE
QUALITY EXECUTION

VALUE STEP 3: MATERIAL
SYNCHRONIZATION

VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION

VALUE STEP 5: SALES &
OPERATIONS PLANNING

CONCLUSION

DELMIA enables the following capabilities:



Manage configurable and diversifying product portfolios

- Performs comprehensive analyses of demand for both your existing and upcoming product portfolio
- Foresees the assessment of demand across various configuration options, range offerings, and portfolio profiles
- Uses this understanding to generate precise forecasts for demand, supply, and cost evolution



Integrated AI & data analytics

- Enhance forecast accuracy, streamline data validation, and expedite issue identification and root cause analysis using integrated descriptive and predictive AI models
- Advanced analytics
- Customizable collaboration interfaces



Deliver multi-objective financial optimization

- Maximize profitability
- Utilize multi-KPI optimization
- Strike the right balance between sourcing, production, inventory, and transportation costs
- Prioritize customer service while meeting business needs



Implement integrated planning

- Optimize sourcing, manufacturing, and distribution decisions
- Enhance supply chain resilience, production efficiency, and environmental sustainability
- Develop ongoing plans in the short, medium, and long-term
- Evaluate and implement effective contingency and mitigation strategies

EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE

CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS

VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE
QUALITY EXECUTION

VALUE STEP 3: MATERIAL
SYNCHRONIZATION

VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION

VALUE STEP 5: SALES &
OPERATIONS PLANNING

CONCLUSION

CONCLUSION

Identifying and optimizing value steps are necessary to streamline processes, eliminate waste, and enhance overall efficiency. This process of transformation is needed to ensure the production process keeps up with the growing demands of customers. More importantly, this transformation is already taking place in the Heavy Mobile Equipment industry. Companies looking to stay competitive should seriously consider adapting their processes before they fall behind.

The integrated capabilities of a comprehensive unified platform, as well as the suite of solutions provided by DELMIA, will enable Heavy Mobile Equipment manufacturers seeking change to seize key opportunities and realize untapped potential at each value step.

For more information, visit: <http://www.3ds.com/products-services/delmia/>



**EFFICIENCY IN THE IE
VALUE CHAIN STARTS
WITH CHANGE**

**CHALLENGES FACED BY
HEAVY MOBILE EQUIPMENT
MANUFACTURERS**

**VALUE STEP 1: IMPROVE
PRODUCTION AND
MAINTENANCE EXECUTION**

**VALUE STEP 2: INCREASE
QUALITY EXECUTION**

**VALUE STEP 3: MATERIAL
SYNCHRONIZATION**

**VALUE STEP 4:
PRODUCTION SCHEDULING
OPTIMIZATION**

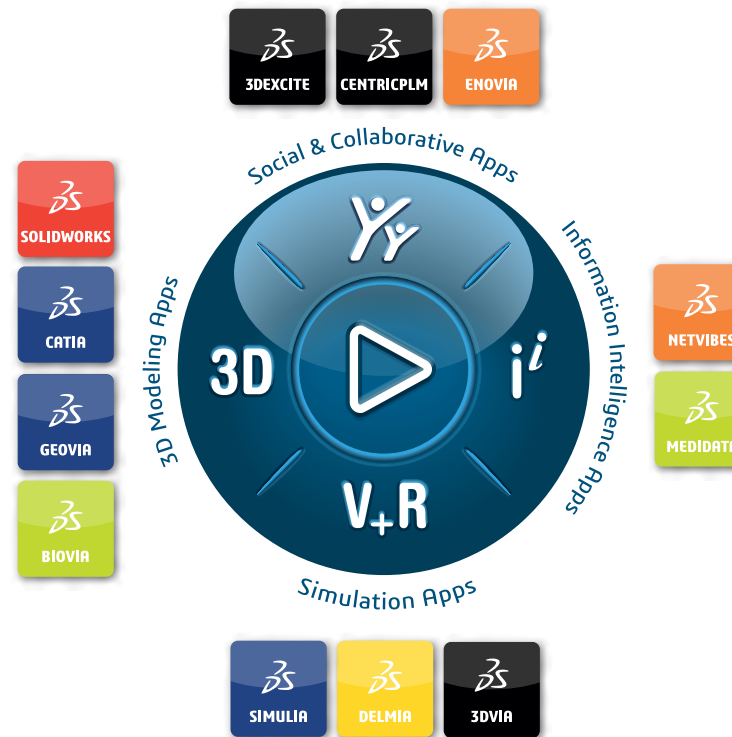
**VALUE STEP 5: SALES &
OPERATIONS PLANNING**

CONCLUSION

Our **3DEXPERIENCE®** platform powers our brand applications, serving 12 industries, and provides a rich portfolio of industry solution experiences.

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EFFICIENCY IN THE IE VALUE CHAIN STARTS WITH CHANGE

CHALLENGES FACED BY HEAVY MOBILE EQUIPMENT MANUFACTURERS

VALUE STEP 1: IMPROVE PRODUCTION AND MAINTENANCE EXECUTION

VALUE STEP 2: INCREASE QUALITY EXECUTION

VALUE STEP 3: MATERIAL SYNCHRONIZATION

VALUE STEP 4: PRODUCTION SCHEDULING OPTIMIZATION

VALUE STEP 5: SALES & OPERATIONS PLANNING

CONCLUSION