Production Process Management Overview

Abstract

Production Process Management is a new way to optimize information management associated with each step in your routing/execution environment. This short overview will provide a high level view of the advantages of PPM and what it could look like in your facility.

Michael McClellan
mm@cosyninc.com

Applying Production Process Management

The information technology in the production environment of a manufacturing enterprise is complex. Besides being the focal point of enterprise value-adding material conversion activities, this is where we launch new products, manage and expend labor resources, manage compliance requirements and identify and support important financial activities, including inventories and costs. Every company uses and generates a large quantity and variety of information; there is no exception that only the correct information can get the job done. The complexity has been unintentionally compounded with many dozens of data-centric silo applications being offered with confusing, redundant and overlapping functionality and significant information gaps. While vendors may see this as an opportunity, the buyer is frequently confused by and disgusted with the cost and effort needed to effectively use these tools and blend them into a truly supportive production system.

While many people talk about level of complexity, the information management gaps, and the general wish for something better, some have identified real improvements including:

- Separate data from the application and invert the historical manufacturing paradigm by bringing the data to the application instead of the application to the data.
- Provide actionable data, trust, and visibility across the supply/value chain.
- Orchestration of standardized decision workflows based on structured adaption and autonomy.
- Deploy applications that can share data, data that can share applications and applications that can connect to applications to achieve horizontal enterprise views and actions.
- Build applications that cross different time constraints and seams, including the supply/value chain.
- Provide applications that do not lose control of state.
- An enterprise level platform to manage and support applications/processes that can be company-wide standards yet specific to the existing local plant information system infrastructure.
- Information tools that can differentiate company performance and provide a competitive advantage through operational and information management techniques.
- Evolvable and plainly easy to understand applications/processes.
- Information management concepts that allow operational processes to be company owned intellectual property.
- An information management infrastructure that is easier to manage, less costly and more supportive of users.
- Computer driven processes that can be supported by manual involvement, fully automatic or a combination of either.

A new and fresh approach to plant information systems has been defined that will offer substantive answers to the objectives outlined above and bring improved clarity and substantial cost reduction to the manufacturing enterprise production environment. This approach is referred to as Production Process Management (PPM). PPM is a vision of manufacturing enterprise information management that is a true holistic convergence of information systems with ubiquitous information availability and usage across the extended enterprise, obliterating the line between the administrative view and the operations view. It is time to rethink our perspective of information application silos. Instead, we must consider the inclusive view of our company processes (how things get done) and view information and its use in a business process sense. Enterprise level systems including Enterprise Resource Planning

(ERP), Product Lifecycle Management (PLM), Supply Chain Management (SCM) and manufacturing plant systems should be seen as elements of the same unit, not as different worlds of a strange universe. We need to orchestrate information into strategic and sustainable competitive advantage processes that support the extended enterprise and include a wide range of stakeholders across the value chain.

Production Process Management (PPM) describes a concept of applying business process management design and tools to the areas of manufacturing plant and supply chain activity management within and across the extended enterprise. The primary idea behind PPM is to center thinking on business functions and activities versus what software package or combination of software packages might be applied. Processes are designed to follow chronological steps of how you want to run the business by connecting and supporting predefined, sequenced events with the correct information in a role-based form for the intended user. A process may be fully electronic, fully or partially manual, or a combination of either. One key thought is that the process is specific to, and alterable to fit, the given business requirement.

Illustrations 1 and 2 provide an overview of the typical application hierarchy in most manufacturing companies today. Illustration 1 shows the usual enterprise level applications, including Enterprise Resource Planning (ERP), Product Lifecycle Management (PLM), Supply Chain Management (SCM), etc. Beneath that is the integration layer made up of mostly custom software intended to bridge the gap between the plant application activities and the needs of the enterprise systems. The next lower level is a symbolic display of plant applications used in manufacturing. These are typically stand-alone, departmental data-centric systems. Beneath that are the machine level programmable controllers, other control systems and sensors. The bottom layer suggests the specific operational requirements of the local plant, which could be based on things like product, tradition or labor agreement.

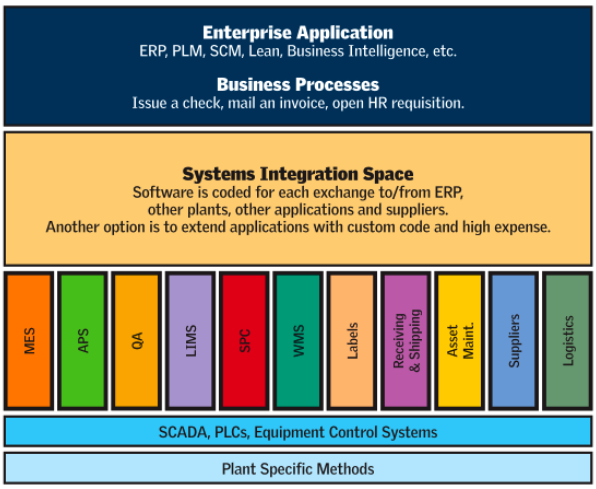

Illustration 1

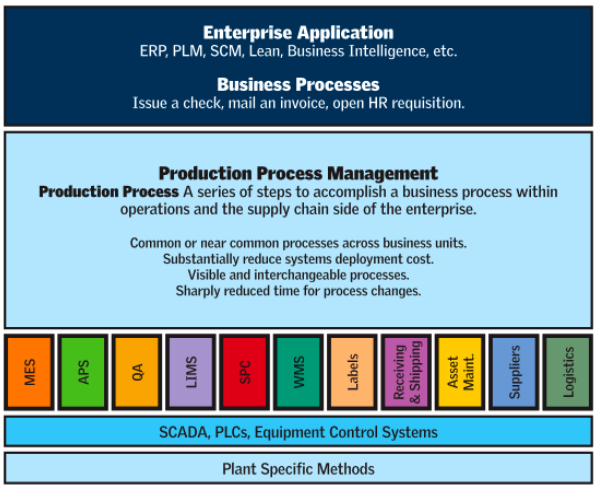

Illustration 2

Illustration 2 shows the same hierarchy except the integration layer has been replaced with a process layer. Instead of using software development tools to create and deploy new functions, process development modeling tools are used to collaboratively develop the process using standard modeling language BPMN 2.0. The modeled processes will be supported by data retrieved from the existing applications as part of the process execution functions.

Illustration 3 shows an example of a simple production process where the task is to retrieve the amount of scrap produced from each plant at the end of each shift and calculate the scrap percentage of the finished product produced on that shift. The plant is required to weigh each item of scrap and collect the

shift total in a scale-mounted PLC. The PPM platform will initiate this process automatically at shift end by collecting the scrap and finished goods data and making the calculation. The information is then sent to the ERP system as part of the financial and metrics measurement administrative processes.

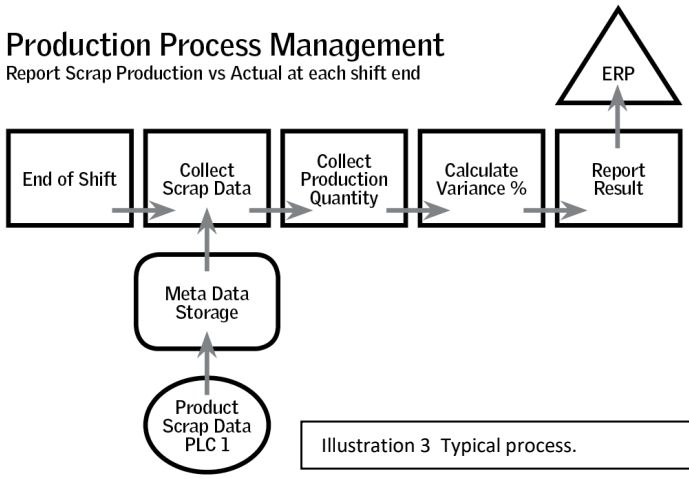

Illustration 3 Typical process.

A major aircraft manufacturer is planning to link its enterprise level applications such as PLM and ERP, and suppliers' enterprise information systems, to the plant floor using process technology. The most obvious advantages include enterprise-wide incremental process deployment and process revision with minimum disruption to the user; the Gartner described build-to-change strategy rather than a build-to-last approach.

The Information Resource Layer

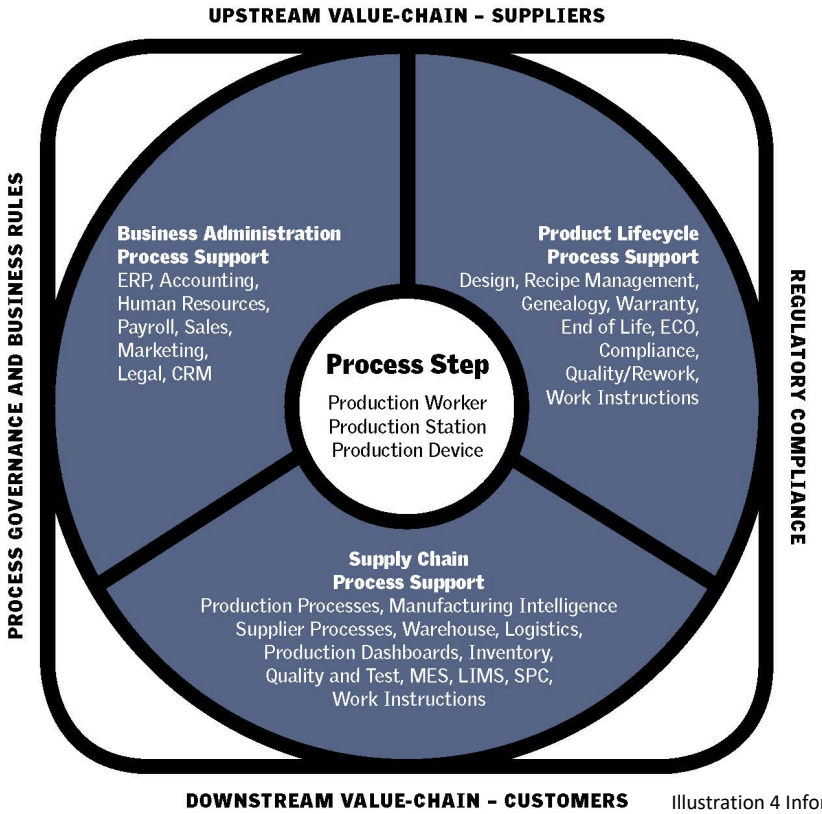

Illustration 4 Information resource layer

An important part of the PPM philosophy is that **any** data element required by the process be available in the proper context. Consideration should be given to the best available source meaning ease of access, security, reliability, etc. without particular regard to where the data is located. In the following illustrations this is illustrated as no less than five sources including enterprise ERP, PLM, supply chain management (SCM) applications and other parts of the supply chain including upstream and downstream value stream participants.

PPM Justification

In multi-plant, multi-product companies, there is a strong need to blend managerial responsibilities and information management techniques into a systems network as a set of dynamic but consistent processes. PPM answers these needs with effective results.

- System management through a process layer environment is less disruptive for system users. No more rip and replace to upgrade plant floor or supply chain applications as processes can be deployed incrementally and at the enterprise level or plant level.
- Applied business processes are enterprise global standards with granular changes at the business unit and/or plant level.
- Processes provide an individualized user interface that is capable of compliance and validation confirmation.
- A **less costly** method to accomplish information exchange without direct systems integration, providing optimization of business processes within and between entities and easy couple/decouple information sharing.
- The production process layer is proprietary to the user company, providing the basis for building a sustainable competitive advantage through production process design and execution.

Applying PPM

A major food products company has recently launched a PPM initiative to connect the enterprise ERP system to 80-plus manufacturing facilities. Each facility has the usual complement of application silos (OEE, scheduling, MES, maintenance, etc.) but the PPM objective is to build value through processes that can be deployed to a number of plants rather than developing integration code and one-off information tools for each facility. In another food company PPM is planned to build a recipe package by retrieving data from four enterprise system sources. The ERP system begins the process by assigning a production order to a plant. Based on the product and the plant location, the PPM is to retrieve the correct production information specific to that instance of production from four enterprise systems, and download the recipe package to the plant. Later PPM versions will see production parameters (i.e. oven temperature, conveyor speed) directly loaded to devices and production manager's devices.

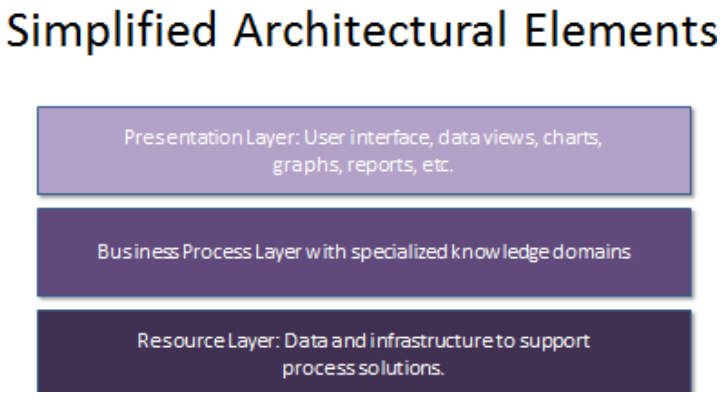

Illustration 5 A simplified architecture is less costly and easier to manage.

This brief overview of PPM is just a starting point. Other documents in this series will discuss the rising importance of all data within the extended enterprise, the use of business process modeling and management systems, how to transform your company from data-centric to process centric and some strong business reasons for embracing this new vision.

Call CSI to get more information on how Production Process Management will help in your digitization efforts and bring a new level of manufacturing information management.

Author

Michael McClellan

Michael has over 30 years of experience serving and managing manufacturing enterprises. He has held a number of positions in general management, marketing, and engineering, including President and CEO for companies supplying capital equipment and material management systems. In addition to numerous articles and white papers on manufacturing systems, he has written two books: Applying Manufacturing Execution Systems, which defines and explains manufacturing execution systems and Collaborative Manufacturing: Using Real-time Information to Support the Supply Chain, the first definitive examination of collaborative manufacturing concepts. He is also a major contributor to a new book on business process management titled, In Search of BPM Excellence. Mr. McClellan has served over six years on the Manufacturing Enterprise Solutions Association (MESA) Board of Directors. He can be reached at mm@cosyninc.com.