Product-Centric Framework for Manufacturing Industries

Sridutt Pawan Gokul
Department of Mechanical Engineering
Indiana University – Purdue University Indianapolis

Today's manufacturing uses a process-centric approach, where the product is considered as an input or output to the various processes. While this approach has been effective and in use for the past decades, it falls short when dealing with complex products featuring a higher degree of versatility. The complexity and the versatility of today's products demand a digital framework that crosses the boundaries of the different phases of the product life cycle. Traditionally, the phases of the product life cycle, such as manufacturing, operation, maintenance and recycling have suffered from severe data flow discontinuities. These discontinuities, compounded with the increasing complexity of the products, are currently impeding the quality of service and an accelerated product enhancement.

This paper proposes a new concept that involves a computing paradigm shift from a process-centric to a product-centric approach. In the proposed framework, data associated with the product flows seamlessly from one phase to the next thereby bridging the traditional data silos in the product life cycle. The innovation in this approach consists of integrating the data from one phase to the next at the product level rather than at the more general process-to-process level. This paradigm shift offers numerous advantages including a) the timely availability of product's data to the different stakeholders b) the flow of data from upstream phases (e.g., design, manufacturing, …) to downstream phases (e.g., maintenance, recycling, …) and c) most importantly the flow of data in the reverse direction from downstream phases to upstream phases. The expected resulting benefits include facilitated end-to-end support over the product's entire lifecycle, improved manufacturing and maintenance services, and rapid development of enhanced products.