COVID-19 and Manufacturing: Digital Twins

June 16, 2020 11:00 am - 12:00 pm
Dr. Anthony has over 25 years of commercial, research, and teaching experience in product realization. His research and product development interests cross the boundaries of manufacturing and design, computer vision, acoustic and ultrasonic imaging, large-scale computation and simulation, optimization, metrology, autonomous systems, and robotics. His teaching interests include the modeling of large-scale systems in a wide variety of decision-making domains and the development of optimization algorithms and software for analyzing and designing such systems. He has extensive experience in market driven technology innovation, product realization, and business entrepreneurship and commercialization at the intersection between information technology and advanced manufacturing.

Dr. Anthony spent the first part of his career as an entrepreneur. He developed and directed the development of products and solutions for the industrial and scientific video markets. His products fueled corporate growth from startup to dominant market leader. He won an Emmy in broadcast technical innovation.

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**The Vision:** With the proliferation of digital technologies and a rapidly changing global market, manufacturing paradigms will shift from automated to autonomous operations with more flexible flow chains. This in turn enables a more rapid realization of products from concepts in commercially viable ways, shorter time to market and faster throughput.

The digital thread of sensors, data, computation, and information is required to fully realize the potential of digitally-native production systems, with high-value, customized, products.

The digitally native production system includes digital twins of the product, materials, manufacturing process, supply chain and production line.

A full framework of digital twins assist in simulating and integrating sensor data for data analytics. Digital twins enable greater throughput, early identification of bottleneck processes, supply chain issues and identification of novel process and production level opportunities.

**And Demystified:** Digital twins are, simply, physics-based and data driven models. They are design and decision tools. Let's explore some examples.