Next Generation of Manufacturing Engineering

What is Manufacturing Engineering?

ME is a discipline of engineering dealing with different manufacturing practices and includes the research, design and development of systems, processes, machines, tools and equipment's. A manufacturing engineer's primary focus is to turn raw materials into new or updated product in the most economic, efficient and effective way possible. From the shoes on your feet to the car you drive, nearly everything you use in your daily life is man-made, or 'manufactured'.

At its most basic level, Manufacturing Engineering is designing things and taking them from concept right through to working products. The reality is more complex, of course, and much more interesting.

Manufacturing Engineers:

- Design the manufacturability of a product,
- Select the best technologies and processes for manufacturing it
- Plan and design the factory that will produce the product
- Oversee the running, management, maintenance and improvement of the factory

It doesn't end there. Manufacturing Engineers also get involved in Supply Chain Management, Material Logistics and Distribution,Quality Management as well as Environmental and Life-Cycle Management.In short, Manufacturing Engineering is the branch of engineering that is concerned with understanding, analyzing and improvingcomplex industrial, manufacturing and infrastructure.

Current State of Manufacturing Technology

With the widespread implementation of solid-state PLC processors in the 1980's, machine operation, process repeatability and accuracy has become increasingly more automated and precise.PLC's also collect reams of performance data, much of which is used to improve machine efficiency as well as become a baseline for the design of future systems:

- Machine Uptime
- Time Running, Time Idle
- Time Blocked, Time Starved
- Mean Time Between Failures (MTBF)
- Mean Time to Resume (MTTR)

Although diagnostics tell us when a particular machine is in failure mode, without post-incident human interaction we may not know WHY the machine failed. Typically, the current use of diagnostics favors reactive productions decisions rather than proactive ones.

By the end of the 20th century, machine controllers have evolved with increased speeds and smaller packaging while able to process and store more data at faster speeds. However, despite these advancements, tools and techniques to collect, digest, diagnose and report machine performance have not advanced at the same pace.

Trending Practices in Manufacturing Technology

The identification of manufacturing trends varies from publication to publication.
However, most concur that development of the following **Six Manufacturing Trends** will have profound effect on the industryin the next ten years.

- E-Commerce
- Advanced Analytics
- Role of Robotics
- Advanced Technologies
- IP Protection & Cybersecurity
- Supplier & Logistics Efficiency

The Internet's large-scale global penetration has spawned an increasingly large number of technology and web-savvy consumers, creating an opportunity for industrial manufacturers.

Manufacturing Business Technology recently wrote "**5 E-Commerce Trends for 2016**" that manufacturers will pursue:

- Seek to increase their share of aftermarket parts sales.
- Seek custom (or specifically tailored) e-commerce solutions.
- Integrate e-commerce systems with IoT (Internet of Things) initiatives.
- Require suppliers to adopt modern parts management systems, and to integrate those systems with their own.
- Sell more parts directly to consumers, even if it's still through their dealer channel

Advanced analytics will be further involved in everyday manufacturing operations. The workplace will become more efficient and safer due to the digitalization of assets, known as digital manufacturing, which allows for digital design and even Distributed Manufacturing.

Manufacturers will be able to improve their inventory due to the information presented by both supply chain and operations data. They are increasingly turning to advanced analytics to predict when a machine on the production floor is going to fail so they can perform preventative maintenance before a failure causes expensive unscheduled downtime.

The **Role of Robotics** in manufacturing trends cannot be understated or ignored. Recently the MIT Technology Review reported that China is looking to retool their own manufacturing industry by heavily investing in robotics, stating: 'China is laying the groundwork for a robot revolution by planning to automate the work currently done by millions of low-paid workers.

Robot sales increased by 29% to 229,261 units in 2014, the highest level ever recorded for one year. The automotive parts suppliers and the electrical/electronics industry were the main drivers of this growth. China expanded its leading position as the biggest market with a 25% share of the total supply in 2014. Between 2015 and 2018, it is estimated that about 1.3 million new industrial robots will be installed in factories around the world. This is an increase of about 48% and a clear sign of the significant rise in demand for industrial robots worldwide

The IFR predicts double-digit growth in robots worldwide between 2015 and 2018, citing implementation of Industry 4.0 as the catalyst. Industry 4.0, linking the real-life factory with virtual reality, will play an increasingly important role in global manufacturing. Trends include:

- Human-robot collaboration will have a breakthrough by 2018.
- Simplified robot integration will increase application potential in all industries including small and medium-sized companies.
- Global competition requires continued modernization of production facilities.
- Energy-efficiency and using new materials, e.g. carbon-composites, require continued retooling of production.
- Growing consumer markets require expansion of production capacities.
- Decline in product life cycles and an increase in product variety require increasingly flexible automation.
- Continuous quality improvement requiring robot systems

Ken Sutphin
Head - Manufacturing Engineering
AllyGrow, USA