

Technology Solutions for Distributed Industrial Operation Management

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Introduction

The Covid-19 epidemic has brought with it the need for social distancing and the need for many staff people to work from home. It has also brought with it the need to isolate people into work cells and, with the rapid decoupling of the supply chain from China, the probable need to work with many smaller suppliers in North America.

In this White Paper, we look at the operational impact of these changes, the management challenges, and how AI and Cloud computing can solve the challenges of managing distributed supply chains in the post-Covid-19 world.

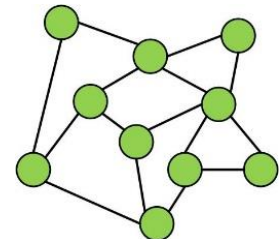
Operational Impact

Just a few short months ago, manufacturing and distribution of products were performed by teams of people working closely together within the four-walls of a factory or warehouse. This is all changing very rapidly into a system where small groups of people, work in relative isolation, in separated locations, to perform part of the supply chain activities needed to make or distribute products to the North American market.

We are changing from Henry Ford's model of making cars from raw materials in one huge "River Rouge" plant to micro-manufacturing plants that perform just a few operations, such as through 3D printing, in the supply chain.

This shift to separate people into small groups working in cells, with a lot of management functions taking place remotely, has been caused by the Covid-19 epidemic. It does not, however, take an accounting genius to realize that this can also result in significantly lower cost of production and much lower overhead cost to manage the same manufacturing and distribution operations.

With high levels of automation, self-organizing work-cells need only have a few skilled people running highly automated machines supported by one or two people to receive and ship materials in their supply network.



This reduces the risk of a supply chain breaking due to infections, or other causes, as I described in my previous white paper " Did Covid19 Break Your Supply Chain? Is it time for Supply Networks instead of Supply Chains?"

Many manufacturing and distribution businesses, with a high level of production automation, now have more people managing the operation than running production machinery. Very few of these support people need to be at the location where manufacturing or distribution takes place to perform their jobs. They can work from home, with an improved quality of life for their families, and less time spent commuting.

Also, with appropriate technology support, it may well be that less support staff will be needed if staff members do not have to spend large amounts of time in coordination and scheduling meetings but can simply focus on their own tasks in the safety and security of their own homes.

But the problem is that, working remotely, they cannot see what is going on. They cannot walk out to the receiving dock to see what has been received or the shipping dock to see what has shipped or the production floor to see the status of a customer order. Instead they have to rely on data provided by the material handlers and machine operators to "see" electronically what is going on. Even more importantly they cannot spot when problems are starting to arise, such as materials piling up in front of a machine, that they need to pay attention to.

Technology Solution to the Distributed Management Problem

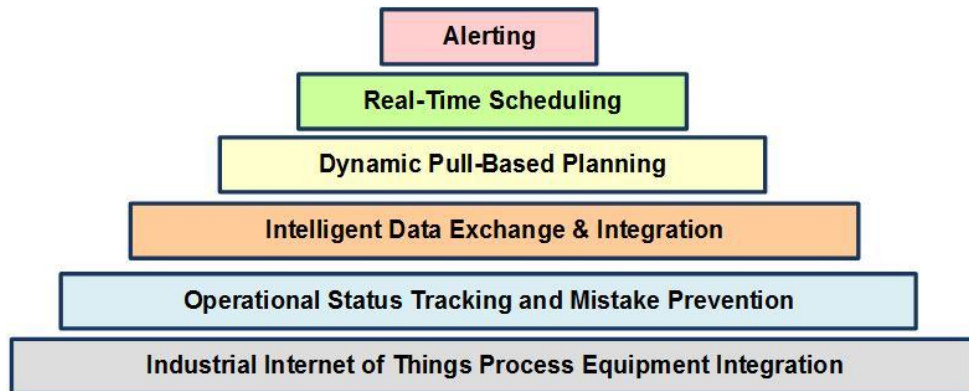


In order to run a manufacturing operation, managers and their staff need to know information, such as:

1. What is the status of my customer orders?
2. What is the status of production jobs?
3. How much raw, intermediate, and finished products inventory do we have on-hand?
4. What materials do we have on-order and what has been received?
5. What customer orders do we need to ship and what has been shipped?
6. What is the status of my machines or other equipment?

Previously, much of this information was gathered by walking the shop floor and interacting with the responsible people. But this is no longer possible, if the managers and staff are working from home.

Fortunately, there are barcode tracking systems, such as BellHawk, www.BellHawk.com, which operate in the Cloud to provide this information in real-time, from geographically separate work cells, stock rooms, and warehouses, to managers and staff, anywhere they have an Internet connection, so they can continue to run their operations remotely.



But, how do machine operators know what to work on and what materials to move, when they can no longer communicate with managers directly? The answer again is systems like BellHawk that automate the planning of materials movement and the scheduling of operations, based on input from managers, to electronically direct people to move materials or what job to work on next, and what to work on next, without needing personal interaction.

The final part of this technology puzzle, is how to determine when problems arise that a manager or staff member needs to pay attention to. Here we use an intelligent-agent based system like MilramX www.MilramX.com to automatically monitor the tracking data, compare it in real-time with the plans and schedules, and then alert managers, by Email or Text message, when there is a situation that they need to pay attention to.

This is much more efficient than having managers and their staff continuously monitoring computer screens, or calling people up, to determine what is happening in a production operation. It is also much better for these supervisory people to get alerts when problems are about to arise rather than getting reports about what went wrong the previous day.

Author

This paper was written by Dr. Peter Green, who currently serves as the Technical Director of KnarrTek Inc. and Milramco LLC. Dr Green obtained his BSEE and Ph.D. Degrees from Leeds University in England. Subsequently Dr. Green was a senior member of technical staff at MIT and a Professor of computer engineering at WPI. Dr Green is an expert in materials tracking within the industrial, medical, and construction supply chains. He is also an expert in using real-time Artificial Intelligence to assist managers with operational decision-making in industrial organizations.

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