Particle

Knowledge is Dollars:

How IoT-driven data is helping
Service Thread reduce costs and
improve efficiencies

Our partners at **Logical Advantage** recently used the Photon and the Particle
platform to deliver customized, IoT-based monitoring solutions to a commercial
thread and yarn manufacturer. Together, Logical Advantage and Particle are poised
to save **Service Thread** millions by reducing operating expenses and informing
better business decisions.

Introduction

Without exception, the more you know about a system, the better equipped you are to manage it. And that rings especially true in the world of manufacturing. On any given production floor, there are typically thousands of moving parts to account for at any given time. In such a complex system, even the slightest hiccup in production or lag in efficiency can result in catastrophic financial losses. To make matters worse, the causes of those inefficiencies aren't always readily apparent.

Unfortunately, not all failures and inefficiencies announce themselves with sparks and bangs. Things like underutilization, unplanned downtime, and overstaffing can all lead to significant losses without ever being fully recognized. Most experienced floor managers will sense when their operations aren't optimized. But until recently, actually pinpointing and analyzing all the specific inefficiencies responsible would require the use of prohibitively expensive technologies (or unrealistic amounts of human labor).

Today, however, the Internet of Things is allowing manufacturers to monitor and analyze their production on the micro scale; and to do so affordably. A small, inexpensive IoT device can now continuously monitor a plethora of variables and instantly transmit the data wirelessly. These capabilities are proving invaluable to companies seeking to increase efficiencies, reduce costs, and fully optimize their production.

The Service Thread Case – Challenges
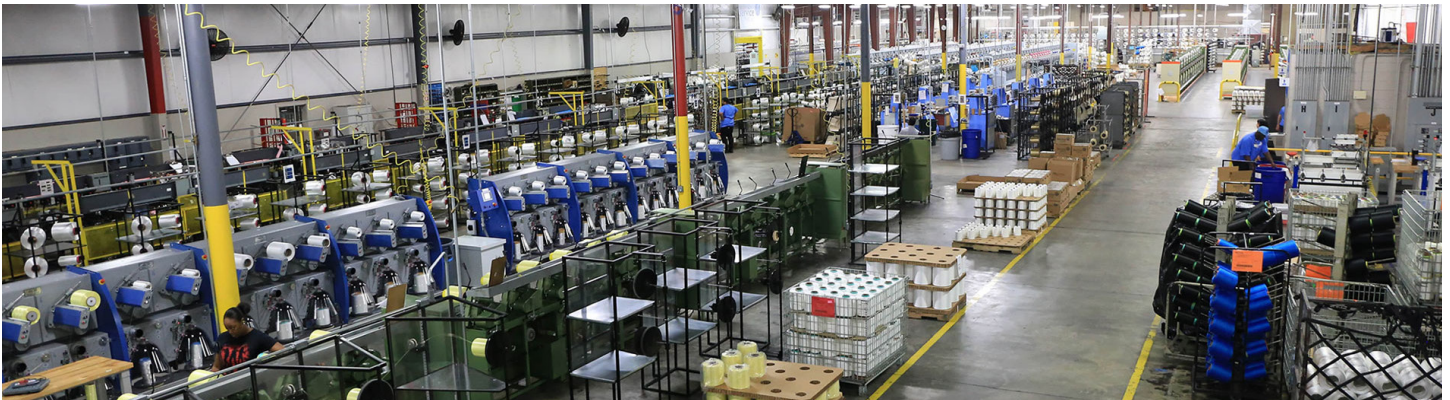
Service Thread is a leading American manufacturer of commercial thread and yarn. Their factory in Laurinburg, NC houses over 3,000 spindles (operating positions) across 115,000ft^2 of floor space and 24 different machine types. In their efforts towards optimization, these variables stood as barriers to Service Thread's effective monitoring and analysis of factory performance.

"We wanted to see, of the installed capacity we have, how often is it running and what is the level of utilization for that capacity," explained Jay Todd, Service Thread COO. "So, if we have 3,000 spindles and they average 1,500 running at any given time – measuring throughout the week, throughout the month, throughout the year – we would get about 50% capacity."

The problem is, in order to determine the actual utilization percentage of their factory, Service Thread had to rely on frequent and selective in-person inspections of the machines.

> ### "A person would go out onto the shop floor and physically count the number of spindles that are in operation," Todd said.

"This would happen 4 times per day, every day that we run. They would log the information into a worksheet that tabulates that for the week, and then extrapolate that from the granular – from the certain machine that we are running – all the way to the global scale of the entire plant or department."

However, the shortcomings of such a system were not lost on Service Thread. Todd estimates that the inspectors would spend approximately 10 hours per week, or 500 hours per year, performing these analyses. Another concern with this method is the possibility for human error, and its impact on overall shop performance. Finally, because the scope of the data was rather limited, their final estimates were not necessarily accurate.

Most of Service Thread's machinery is already equipped with onboard computers (known as PLCs), which can perform some basic functions like turning the spindles on, controlling speed, and recording spindle movement data. What these computers could not do, however, was monitor and record the status of each individual spindle in a centralized location.

"This is where things would get a little more complex," said Dan Thyer, CEO of Logical Advantage. "We would have had to program each machine's PLC to provide the data and send it through the network to a central location. That would be both over-complicated and time-consuming."

An Elegant IoT Solution

Instead, Thyer and his team decided to design their very own hardware solution using the Particle Photon to gather data from the machines' existing sensors. Logical Advantage's final hardware solution is able to gather data from 16 spindles simultaneously. That data is then passed through the Particle Cloud and onto Microsoft's Azure IoT Hub using Wi-Fi. Logical Advantage then built a simple, mobile app for spindle sensor provisioning.

> ### "As it turns out, [the Photon] was the perfect solution," said Thyer.
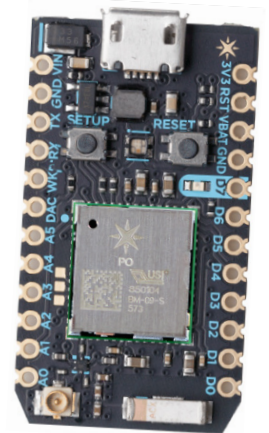
"The Photon is basically a small computer, which meant we could build and deploy software to its memory. And because the Photon is already equipped with a wireless chip, it can attach to a wireless network with ease."

"The Photon is also always communicating with the Particle Cloud. In this case, it's informing it of the state of the spindles; whether they're moving or not. Finally, the Photon allows for Over the Air (OTA) updates. This is critical as we tweak the Service Thread product after being deployed."

From Service Thread's perspective, the final solution proved easy to install, update, and maintain, all while remaining cost effective.

"Ultimately, we can depend on people with a lot of training, or we can try to put in systems that identify the problems automatically," said Todd. "Logical Advantage and Particle provided that system, and as a result, dramatic savings."

IoT Data Delivers Real Value

Ultimately, the success of such a project is dependent upon the business value it provides. And for Service Thread, the initial pilot program – implemented on just 24 spindles across 2 machines – has already proven its worth in significant ways.

"First off, we found in these 24 spindles that we were about 15% off in terms of what we thought our spindle utilization was," said Jay Todd. "The estimate was actually about 15% higher than our actual utilization...That's really important information – information that tells us whether we should buy another piece of equipment, or could we schedule more hours on an existing piece of equipment."

Those capital planning benefits have already come to fruition for Service Thread. Using the insights gained from their pilot program, Service Thread invested in a $400,000, cutting-edge machine which operates a total of 24 spindles. Because of the machine's superior speed, and the relative ease it affords when switching between products, those 24 spindles can replace roughly 75 spindles from an older machine.

> "It's really important that you get information to help you make these types of very expensive capital budgeting decisions," said Todd. "Because there's a lot of risk involved when you spend $500,000 to a million dollars in new equipment."

Todd went on to explain that the very same utilization data can also help them make smarter decisions surrounding labor, sales, supply-chain management, and practically every other

aspect of their operations. What's more, the same IoT devices they are using to assess their overall capacity utilization are also paying dividends in the realm of maintenance.

"With real time information, we get to see, for example, if a spindle is having trouble running consistently," said Todd. "We can identify that problem faster as opposed to somebody saying, 'I give up. I've been trying to run this thing all day and now, I'm going to put in a work order and hopefully get it repaired in the next 24 hours'."

"That's a kind of trailing indicator versus a leading indicator. And this is actually something that we've already found."

Using long-term data collected from the pilot program, Service Thread estimates that this IoT solution will reduce their per-spindle operating costs by at least 50%. Meanwhile, the company anticipates annual savings of approximately $117,000 from reduced maintenance overtime and overhead costs.

"With revenue potential of some departments of more than $800 per operating hour, even a ten percent increase in machinery uptime can make a huge difference to overhead, labor, and operational efficiency," said Todd.

"The IoT spindle project is providing the big data needed to make the right decisions for maximizing our operation."

Conclusion

In a recent survey from Aruba Networks, 62% of businesses in the industrial sector reported already using some form of IoT in their operations.1 Large as that percentage already is, all signs point to it rising considerably in the near future. That can be attributed to the fact that numerous IoT applications have already proven themselves invaluable to the industrial and manufacturing sectors.

When IoT is discussed over the dinner table or on the nightly news, the focus most often lies in its consumer-based applications. Smart thermostats, smart TVs, and smart kitchen appliances tend to dominate the conversation surrounding this exciting new field. And while these applications certainly deserve the interest they've garnered, they are still quite limited in number and diversity.

The consumer IoT space is still most often talked about in terms of tomorrow. But, in the field of manufacturing, the IoT revolution is already happening today.

Looking for more information?   **particle.io/sales • sales@particle.io**

Sources: 1)   "IoT Heading for Mass Adoption by 2019 Driven by Better-Than-Expected Business Results" – Aruba Networks.com [http://news.arubanetworks.com/press-release/arubanetworks/iot-heading-mass-adoption-2019-driven-better-expected-business-results]