## CONTENTS

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart Devices Optimizing The Human Component</td>
<td>3</td>
</tr>
<tr>
<td>“The potential applications for these devices are limitless”: Q&amp;A with Parsec’s Bill Rokos</td>
<td>4</td>
</tr>
<tr>
<td>What’s So Smart About These Smart Devices?</td>
<td>8</td>
</tr>
<tr>
<td>New Generation of Smart Devices</td>
<td>10</td>
</tr>
</tbody>
</table>
Digital transformation is more than the sum of its parts.
And there are many parts.
Just consider the smart devices being put to use by the smartest manufacturers across industries—data collectors monitoring temperature and pressure and movement, smart coordinators cor-ralling information from all those disparate collectors, networks that aggregate those collectors and servers that serve as the real brains of the whole operation.
There are common applications—vision sensors on assembly lines and vibration monitors on heavy machinery, for example. But then there are some weird, fun devices that push the limits of the data-driven approach. We're now monitoring human personal to protect them from dangerous situations. Smart farmers are tracking cattle movement to optimize their efforts.
The greatest hurdle thus far has been the complexity historically associated with implementing, maintaining and analyzing information from smart devices. This stuff can be confusing...the devices don't speak to one another easily and the data they collect and broadcast is tricky to digest, much less turn into actionable insights.
That hurdle is getting lower all the time. And, increasingly, the smartest among us are recognizing that addressing that hurdle is where the greatest wins can be won.
When complexity is solved—when a process that can be convoluted is made simple—the humans at the helm fully engage.
And that's when things get fun. Processes get optimized. Machines run faster and more consistently. Stuff breaks less often. People develop a deeper understanding of their working environment and have the insights and tools to transform every element of it.
In this report we're focusing on smart devices, and that's an appropriate label for these technologies. But the really smart thing these sensors and data collectors and coordinators accomplish is enabling the human component to perform up to its true potential.

When complexity is solved, the humans at the helm fully engage. And that’s when things get fun.
“The potential applications for these devices are limitless”: Q&A with Parsec’s Bill Rokos

As simple as these Smart Devices are to operate, this is still an emerging technology and questions persist. So, we chatted with Bill Rokos, Parsec’s CTO, to learn more about the applications of Smart Devices, their impact on business strategy, and Parsec’s unique software-provider-to-device-maker evolution.

Take a look…

Smart Industry: Provide big-picture perspective on the state of Smart Devices.
Bill: There are many infrastructure-related challenges with effective data collection, specifically related to more complex requirements such as managing manufacturing operations. Applying our philosophy of “making it as simple as possible,” we’ve designed the Smart Devices to enable a wide range of data-management capabilities with seamless interface with our MES solution platform, TrakSYS. Now, users can address topics such as task management, condition-based monitoring, workflow and data logging with no network or automation infrastructure in place. Our Smart Devices provide functionality for on-premises and cloud scenarios.

Smart Industry: Let’s back up a bit. How do you define a Smart Device?
Bill: The TrakSYS Smart Devices are IIoT hardware that enable users to perform advanced and reliable real-time data acquisition as simply as possible. Nearly any type of physical sensor (such as photo-eyes, temperature, pressure, vibration, encoder, etc.) can be connected to Smart Data Collectors, which relay data to a Smart Coordinator (edge device) where they are then pushed into the TrakSYS software (on-premises or in the cloud) for analysis, visualization, notification, collaboration and decision support.

Smart Industry: Describe some of the varied applications of Smart Devices that you’ve worked with.
Bill: Smart Devices can be used in any situation where real-time values must be gathered from the manufacturing processes. Common uses include condition-based monitoring, time-series data logging, preventive and predictive maintenance, notification and escalation management, KPI tracking, at-line and in-process quality checks, and much more.

Smart Industry: What are we talking about here? What tools fall under the category of a Smart Device?
Bill: There are two physical Smart Devices can be used in any situation where real-time values must be gathered from the manufacturing processes.
components to the TrakSYS Smart Data Collection System: the Smart Data Collector and the Smart Coordinator (the edge device). The Data Collector is a universal data-capture device capable of receiving digital, analog and serial data inputs for standard, off-the-shelf sensors or hardware with serial interface. These devices communicate with each other via an RF wireless mesh network, which eliminates the need for conventional LAN. The Smart Coordinator receives real-time values from the Data Collectors, sorts them and delivers them directly to the TrakSYS software, on-premises or in the cloud. This data is directly stored in the TrakSYS “Smart Data” tables for further manipulation, analysis and consumption.

Smart Industry: How does this technology influence larger business strategy?
Bill: In today’s digitally focused business, data plays a critical role in making informed decisions. Quite often, lack of infrastructure and automation will constrain the ability to collect and leverage the data that is necessary to effectively manage the broader supply chain. Smart Devices (in most cases) remove hurdles associated with connectivity and data visibility. These devices may be deployed not only in factories but also up- and downstream with the supply chain partners’ operations, which creates an unprecedented opportunity for collaboration, efficiency, and fact-based decision making.

Smart Industry: How does Parsec’s background in software influence its approach as a device-maker?
Bill: As a software company, our focus is the transformation of data to make it as simple as possible to run the business more effectively, in real-time. Looking at the challenge of connectivity and data visibility, we recognized a gap in what was available to simply, non-disruptively, and economically access the myriad data sources to feed the execution engine that would process the raw data. We made the decision to make our Smart Devices facilitate the “feeding” of TrakSYS. The devices were a means to a broader goal. Using our expertise in software, we have simplified and optimized the setup and configuration of these devices, especially when compared to the common challenges experienced with deploying other IIoT devices.

Smart Industry: Is this normal among device-makers?
Bill: This is not normal. Most IIoT device-makers are hardware focused. Drivers and setup/configuration UX is not their forte. And, as mentioned before, most device-makers must support a large variety of unknown software platforms, causing the UX to have many different connectivity settings and options, which leads to a more complex setup process.

Smart Industry: Is the manufacturing world fully aware of the capabilities to optimize processes using smart devices?
Bill: Smart Devices are relatively new. There are many uses for them that have to be explored and explained. We’re getting the word out. However, the most effective
way of explaining the benefits is by demonstrating through actual use cases. There are a number of early adopters that will pave the way for broader adoption of these devices. We expect major impact within manufacturing operations and for the supply chain activities that require more reliable and timely data visibility.

**Smart Industry: Is the relationship between software and hardware changing?**

**Bill:** There are many significant advantages to having a hardware device built specifically for the software platform: performance, ease of setup/maintenance, features on either side that work together. We have already seen examples of concepts in the software driving new features in the hardware and vice-versa. For instance, instead of having different types of Smart Devices (as we began with), we now have one universal Smart Device that is software-configurable to accommodate different types of sensors and data sources. This makes life a lot easier for those who install, configure, and maintain the systems.

**Smart Industry: Describe your mesh network? How does this approach optimize the process?**

**Bill:** In many cases, the challenge with data accessibility is not limited to a lack of automation. It has to do with the lack of networking...
We’re able to close the loop on actionable information—in real-time—to more effectively manage digital supply chain operations.

mechanisms to move data from the sources to where it will be consumed. RF mesh network is a wireless way of creating a communications network made up of radio nodes organized in a mesh topology. In the case of TrakSYS Smart Data Collection System, individual data collectors form the interconnections and relaying of the data—via a Smart Coordinator—to TrakSYS. This happens automatically with no setup or configuration. The mesh network increases the effective range and reliability of the Smart Device network. By utilizing a self-healing mesh, dead zones, interference, and latency are greatly reduced. This also allows easy addition and removal of devices without reconfiguring or rebinding, which boosts uptime.

Smart Industry: Are costs related to smart devices dropping? What does that mean for end users?
Bill: These devices are a fraction of the cost of traditional automation systems. The fact that, in many cases, there is no need for deployment of costly automation and networking infrastructure is already a significant economic driver. So, the cost and barrier to entry is very low to begin with. However, as with any new technology introduced, costs could drop with further innovations and iterations of the technology.

Smart Industry: Where are Parsec smart devices most commonly used?
Bill: The devices may be used in a variety of applications. Most often, they’re deployed within manufacturing operations to gather data from sensors, systems, and equipment that don’t have a standard way to communicate data. Our Smart Devices represent a cost-effective way to create a powerful data-acquisition strategy.

Smart Industry: What is the most unusual application/location of a Parsec solution?
Bill: These devices are meant to go beyond the factory. They can be used anywhere data acquisition is needed. More and more, we find these devices outside the factory within the supply chain. For example, customers are using these devices for data collection when goods leave the suppliers’ warehouses, monitoring conditions during transit, keeping an eye on the environmental variables in storage, and even within retail centers.

Smart Industry: What most excites you about the near future of the use of smart devices?
Bill: The potential applications for these devices are limitless. Where customers had resigned themselves to not being able to take advantage of digitalization across their assets and properties, we’re now regularly finding ways to deploy Smart Devices to enable intelligent data acquisition with an eye going beyond monitoring. We’re able to close the loop on actionable information—in real-time—to more effectively manage digital supply chain operations.
What’s So Smart About These Smart Devices?

By Phillip McMullen, Parsec Smart Devices Lead

For years we’d witness important projects get stopped due to poor infrastructure, both from automation and connectivity perspectives. The cost of building up the infrastructure to a level adequate for the execution of data-centric and mission-critical projects was simply too high. Rollouts for important projects (even after promising launches) failed.

But we learned a few things throughout these failures. And we recognized the opportunity to address three important topics:

1. Getting data from various sources without the need for costly automation
2. Achieving connectivity without conventional local area networks
3. Making configuration, set up and the data transit as simple as possible (both on-premises and in the cloud)

These imperatives prompted us to develop the TrakSYS Smart Data Collection System. And that has proven to be a game-changer.

The Smart Devices that make up our system are universal; they can gather many types of data (e.g., digital, analog, serial) using the same hardware—no need to stock various types of Smart Data Collectors. And these data sources may be, well, just about anything you can imagine. Using the universal Data Collector, you can readily collect information from thermocouples, pressure transducers, encoders, flow meters, vibration sensors, scales, photo eyes, cameras and many other sources.

The devices are software configurable. They are designed for plug-and-play. They’re simple to set up, to use and to own. Simply put, they’re smart.

WHAT THE HECK DOES “INFRASTRUCTURE FRIENDLY” MEAN?

Our approach is all about simplicity—very little infrastructure is required for automation and network connectivity, and that means cost is reduced and adoption of solutions can be sped up, particularly with those solutions that rely on the availability of real-time data to manage operations.

Very little infrastructure is required for automation and network connectivity.

That simplicity minimizes set up and configuration requirements. It eliminates the need for high-level expertise. And our mindset has always been to make our Smart Devices compatible with most standard, off-the-shelf sensors and data sources. The connections are clear and intuitive. The connection to TrakSYS is native and organic, which means there are no costs and obstacles to set up communication protocols and drivers.

In short, infrastructure friendly means that you get set up and ready to run in minutes.
Similarly, we wanted to make sure TrakSYS Smart Devices can leverage what’s already in place. Not only can you overcome challenges due to lack of automation and connectivity, but you can also drive more value through the utilization of existing sensory devices to speed up adoption and beneficial use.

And considering the fact that in most factories, the infrastructure isn’t uniformly available across all areas and systems, we wanted to make sure our Smart Devices cover the gaps within those types of infrastructure to capture the critical data throughout the operations.

How smart is that?
New Generation of Smart Devices

By Phillip McMullen, Parsec Smart Devices Lead

The new generation of smart devices deliver capabilities that were unthinkable just a few years ago. With Parsec’s TrakSYS-Powered Smart Devices, manufacturers now have extensive capabilities for not only collecting data, but also to leverage that data for real-time operations management. They can get this done quickly, economically, and effectively, regardless of infrastructure. Our Smart Devices can be used in conjunction with a wide variety of standard sensors to capture data for analysis, decision making, and managing manufacturing activities.

SMART ARCHITECTURE
The system includes IIoT data collectors and a coordinator, and auto-configuration software, to make it as easy as possible to set up and manage the TrakSYS Manufacturing Operations Management system in virtually any environment, regardless of existing infrastructure.

SMART DATA COLLECTOR
Housed in an IP65-rated enclosure, the Smart Data Collector connects to standard third-party sensors to gather production data via a lightweight RF mesh network.

SMART COORDINATOR
The TrakSYS Smart Coordinator is an edge device that aggregates data from Smart Data Collectors and shares that input with a TrakSYS server — on-premises or in the cloud.

CONFIGURATION SOFTWARE
Configuration is done through a web-based interface that allows you to set up and monitor the coordinator, individual data collectors, and the system’s connection to TrakSYS.
WIRELESS NETWORK

Data Collectors are designed to work with one another, all sending data to a Coordinator. The Coordinator acts as an intermediary between the Data Collectors and the TrakSYS server.

MESH NETWORK

As multiple Data Collectors are connected to the Coordinator, a mesh network is created and increases the effective range of the Coordinator.

OTHER THINGS TO KNOW

1. Analog
   0-20 mA, 4-20 mA, 0-5 VDC. Analog inputs gather 4,000 values per second and return the Maximum, Minimum, Average, and Instantaneous readings. Aggregation allows for sampling quick-changing values for uses such as vibration, temperature, and pressure analysis.

2. Digital
   High/low logic based on a 0-30 VDC input. Digital inputs return a running count, blocked/unblocked state, counts per second, counts per minute, and milliseconds between counts. Values captured from this type of input are commonly used for counters, flow meters, encoders, and tracking the on/off state of equipment.

3. Serial
   Up to 19200 bits per second. Data can be captured from a wide range of devices with serial interface (e.g., scales, instrumentation, gauges, analyzers, etc.).

4. CE/FCC Certified
   All Smart Devices are now CE/FCC certified according to the Radio

5. Universal Data Collection
   New Universal Data Collector (TS.SDC.U) combines all interfacing capabilities into one unit (e.g., digital, analog, frequency, pulse, serial...)

6. Serial Capabilities
   Support for TTL serial at up to 19,200 Baud.

7. Faster Configuration and Transfer
   50,000x faster processing capabilities, meaning seamless configuration and instant data transfer.

8. High Speed Sampling
   Digital inputs now support 6000 counts per second, allowing sampling from high-speed sensors. Analog Aggregation capabilities at 4KHz sampling allow vibration severity analysis and much more. □
1. **Single Instance Multi-Site (SIMS)**
   Wish to manage data from across several factories within a single instance of TrakSYS? Done! The Smart Devices may be used with TrakSYS Single Instance Multi-Site deployment architecture to bring you even more scalability, convenience, and value.

2. **KPIs**
   TrakSYS enabled Smart Devices can interface with an array of data sources, with proper contextualization, to manage your key performance indicators (KPIs) in real-time. Go beyond simply capturing data and get into deeper analysis, reporting, and decision support.

3. **Alarms and Notifications**
   Our Smart Devices can be used for condition-based monitoring to create actionable and timely alerts and notifications targeted at the right personnel.

4. **Task Management**
   Trigger defined tasks based on monitored conditions, schedules, roles, and responsibilities. Ensure completion of critical assignments with a clear escalation workflow.

5. **Quality**
   Manage quality-related activities based on in-process information, captured date, and observed attributes to ensure consistent adherence to standards and targets.

6. **Maintenance**
   Handle both preventative and predictive maintenance through the monitoring of equipment-related data and behavior to improve uptime and avoid unscheduled production stoppages.

7. **Historian and Reporting**
   Capture time series data from multiple data sources throughout your factories, then leverage TrakSYS for deeper insight through analysis and reporting.

8. **Collaboration**
   In order to improve your manufacturing operations, you need accurate, timely, and consistent information. The TrakSYS enabled Smart Devices will make this possible. Once the data has been collected, sorted, and contextualized, TrakSYS powers cross-functional collaboration for effective resolution of problems and helps to promote on-going innovation for continuous improvement.

Gain unparalleled insight into your operation, using real-time production data. Then take what you learn and put it into action, using the built-in management features of TrakSYS.
REACH OUT!

To learn more about the ways Parsec can help you run your manufacturing operations more efficiently using real-time data, contact me at any time. I look forward to hearing from you.

Sincerely,

Jason Corder
jcorder@parsec-corp.com
714-278-4505