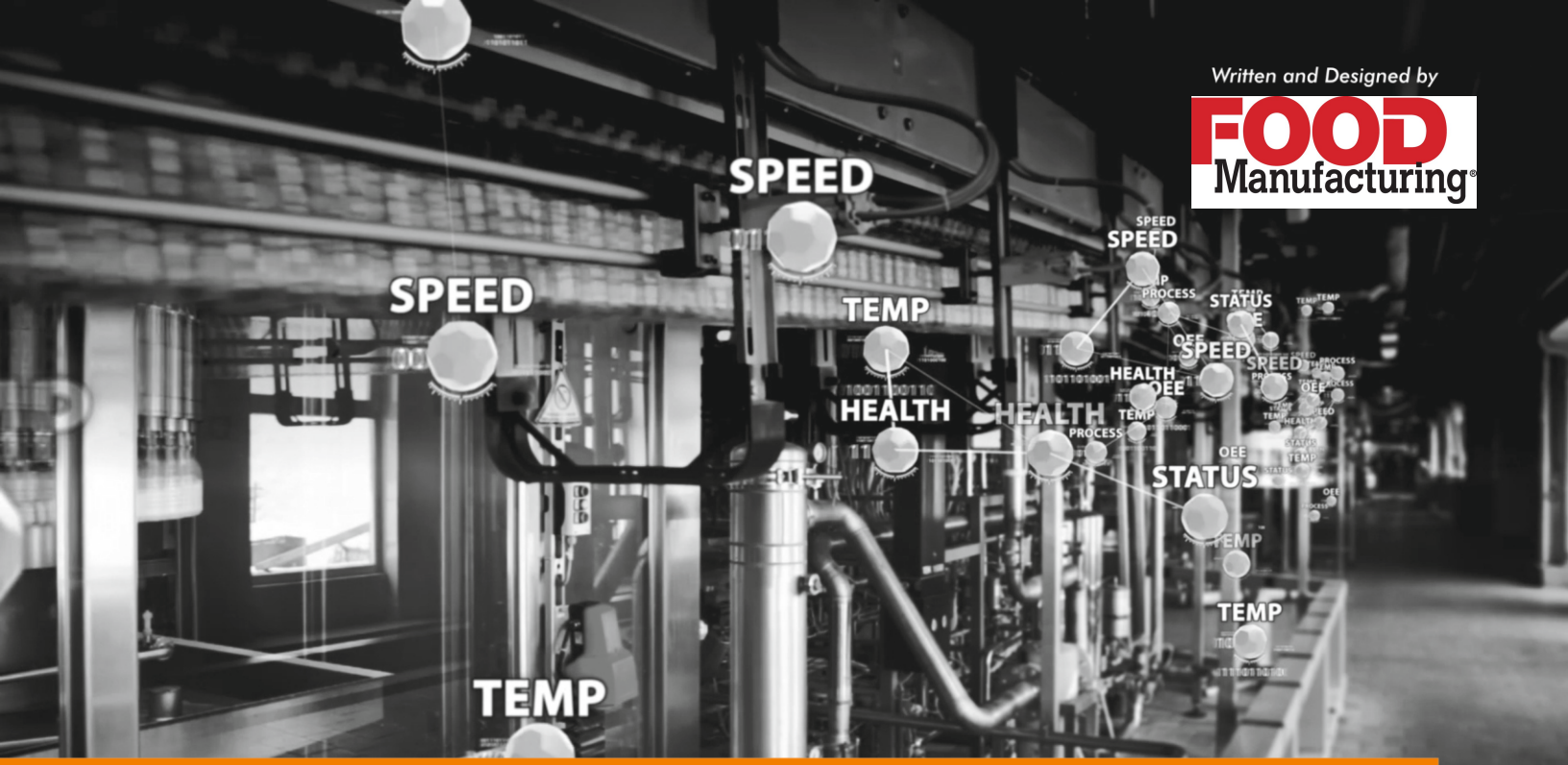

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FOOD Manufacturing

REDEFINING LINE VISUALIZATION FOR PROTEIN PROCESSORS

Whether you're processing meat and protein products or producing batteries for electric vehicles, the basic goal for all manufacturers is to produce the optimal amount of product, at the highest level of quality, while limiting costs. And since the days of Henry Ford's assembly lines, there's always been an ongoing push for continuous improvement.

This desire for improvement has produced a stream of evolving tools vital in keeping Lean and Advanced Manufacturing strategies running smoothly. Among them are a collection of technologies and developments that fall within the Digital Transformation collective. Similar to the core principles of manufacturing, the underlying goals of Digital Transformation technologies and strategies are not new.

However, rapidly shifting consumer demands, unforeseeable supply chain disruptions and a number of other marketplace shifts have accelerated implementation timelines and transitioned these strategies from offering a competitive advantage, to becoming a necessity. Digital Transformation integration is now vital in order to stay relevant on a constantly shifting landscape.

Within this paper, we'll focus on perhaps the most important aspect of digital transformation for food processors – enhanced asset and line visibility. We'll break down the technologies and strategies vital to optimizing the potential it contains, and the best steps to take in unlocking benefits related to improving operational and supply chain flexibility, cutting extraneous costs, enhancing internal and external communication to eliminate waste, and, perhaps most importantly, optimizing the role and impact of workers.

Defining, or Redefining, Visibility

According to Rockwell Automation, Line Visibility is defined as obtaining clearer insights into production assets via the implementation of infrastructure and software in order to create key competitive advantages. This visibility is realized via various digital technologies and the capabilities they offer.

Tied closely to Line Visualization is Yield Optimization, which is described as resolving production issues or bottlenecks by leveraging connected technologies that allow the enterprise to better support worker output, streamline processes and increase end-product value.

These bottlenecks or production efficiency blockages can include:

- Difficulty obtaining access to correct, relevant and contextual data from all the available drawers in an organization's toolbox. Having the right tools is a great first step, but obtaining true Line Visibility means these tools (i.e., data) are matched with the right users and applications.

- An unruly mix of old and new tools from various suppliers that have competing and incompatible data standards and integration variables. This dynamic can compound the challenges of developing uniform processes and getting everyone looking at the same data sets within the same context, and then applying the information in a manner that benefits the entire organization. This collection of disparate systems often leads to data becoming siloed within one section of the operation, as opposed to being universally accessible.

- Especially common in sectors such as food processing where the transition from paper-based systems has been slower, is the potential for human error to play a larger role, therefore slowing all corrective actions.

- Potentially heightening the impact of these bottlenecks is a lack of visibility related to their source. As the name suggests, Line Visibility ensures that a light is constantly being shinned on these issues so plant personnel are able to take the proper actions as quickly as possible. Whether this requires moving production to a different line, adjusting manufacturing schedules or changing delivery dates, employees are empowered to make informed decisions. A lack of Line Visibility, and keeping these issues in the dark, typically results in increased production costs and lower levels of customer satisfaction.

Before discussing some of the technologies associated with stronger Line Visibility, let's briefly discuss one the most complimentary strategies - Overall Equipment Effectiveness. OEE factors in a number of data sets from labor and equipment, planned and unplanned downtime, and scrap or bad product in relation to production goals. Ideally, the OEE is 100 percent.

Relying solely on manual inputs that are not supplied in real-time could produce misleading results related to OEE, and fail to make issues known as soon as possible. However, implementing and automating data collection, and then making this data visible across the enterprise ensures that any dips become easy to spot, with deeper dives helping to identify the source of the problem and the eventual solution.

The impact of these bottlenecks, or lack of insight into identifying the source of them, is intensified when working in a sector such as food proteins where market evolutions are already fueling a number of unique challenges.

Transformation in a Transforming Market

It's rare that a long-time market staple is faced with an onslaught of muti-faceted change. However, this is the case with the protein sector of the food marketplace. And all of these changes have created new factors to consider when initiating processes and technologies that look to enhance Line Visibility.

Consumer expectations of producers are changing.

This is nothing new to protein processors, but the context is typically relegated to product offerings and their taste or packaging, but the expectations referenced here relate more to the processes than the products.

For reasons that can include health, ethics, allergies or simply personal preferences, consumers have demonstrated a growing need to understand not only what is in the food they're consuming, but where all the ingredients have been sourced. The farm-to-table movement is credited with playing the most prominent role in this consumer push, and processors need to be ready to respond, but on a much grander scale than previously experienced.

Initial farm-to-fork platforms emphasized local sourcing, which is still a key consumer demand that many protein processors emphasize in their sourcing strategy. However, this was just the beginning. Sourcing visibility has now been expanded to include more of the company's offerings, regardless of how locally or globally they're produced.

In order to make supply chain and sourcing data readily available, the producer needs to invest in the applicable tools. One example is track-n-trace software that talks to the packaging, distribution, logistics and manufacturing business units in real-time. This data needs to not only be available and transparent throughout the enterprise, but flowing in a manner that immediately accounts for any changes or disruptions.

Addressing unique sourcing concerns can also lead to producing a wider breadth of products, but in lower quantities. This means accounting for smaller batches, which equates to more production and packaging changeovers that can eat into profits. Ideally, this desire to meet consumer demands results in automation, sanitation and safety equipment investments, all tied to an ERP or MES. It's this level of connectivity that allows for realizing true Line Visibility internally, so the relevant data can be shared externally.

From a product perspective, the protein industry is also seeing an influx of demand from plant and lab-grown offerings. According to Vantage Market Research, the plant-based food market, which comprises proteins, will exceed $78B by 2028. The result is additional visibility challenges in tracking new suppliers and supply chains.

This is where another key element of Line Visibility strategies come into play – using all this data to become more agile and flexible on the plant floor and throughout the enterprise. Adapting to changing preferences will also require new packaging, new preparation and storage concerns, as well as a degree of consumer education.

Being able to access, share and add to all the relative data from a sourcing, production and distribution perspective will allow for greater agility as processors respond to changing demands, unforeseen disruptions, or simply identifying better strategies and approaches. But, again, in order to capitalize, the necessary investments in automation, software and employee training are vital.

Embedded operational agility and flexibility will not only make it easier to respond to changing market demands, but in responding to a number of other impactful events, such as:

The Competitive Fuel

While there are a number of internal benefits driving Line Visibility advancements, what distinguishes stagnate digital transformation projects from those progressing towards large-scale implementation are the competitive benefits. Progressive manufacturers make the connection between advanced Line Visibility on the plant floor and increased sales on the store shelf.

Not only do these capabilities meet a consumer demand, but they set a product apart from the competition, especially with lower-cost or commodity-type offerings. QR and blockchain codes that can illustrate product custody during production and distribution, as well as similar data for each ingredient, demonstrates a forward-thinking approach to customer service, and transfers those same qualities onto the entire brand.

But again, the only way these technologies work with the consumer, is if the complimentary investments are made at the enterprise level.

Competitive advantages can also be realized beyond the retail environment. One the biggest challenges facing all segments of manufacturing is finding and retaining quality workers. According to NAM (the National Association of Manufacturers), U.S. manufacturers reported that finding the right talent is now 36 percent harder than it was in 2018, even though the supply of available workers has nearly doubled. Additionally, 77 percent of manufacturers said they expect ongoing difficulties in attracting and retaining workers.

While automation is often seen as a way to reduce headcount, the reality is that expanding these technologies allows for optimizing employee participation. The worker is able to put all of their skills on display and know that they're playing as big a role as possible in helping the company to be successful. In allowing the worker to optimize their abilities, and focus less on repetitive or mundane tasks, the company benefits from improved performance and greater return on the investment in wages, training and benefits.

At the end of the day, both parties benefit from employees being trusted to utilize cutting edge solutions that make their jobs, their company, and the work environment a source of pride. Examples of such connected technologies can include:

- Augmented Reality (AR) platforms that allow for simulating production and maintenance processes in identifying the best possible approaches.
- Robotics and automation that removes strenuous activities and minimizes safety concerns. This frees up workers to focus their experience and skillsets on improving processes and reinforcing quality controls.
- CMMS platforms that provide access to in-depth analytics in forming predictive maintenance strategies. This allows younger maintenance workers to combine the organic knowledge of more experienced "machine whisperers" with the ability to log and compare greater sets of current and historical data.

NEW REGULATIONS OR COMPLIANCE MEASURES

While changes or additions to national or regional operational standards or safety guidelines come with a fair amount of forewarning, compliance with customer or supplier standards are not always easy to anticipate. The ability to quickly respond to these changes offers competitive advantages and, at a minimum, can help preserve vital business relationships.

Of particular note for those producing or exporting protein products to the U.S. is the ongoing challenge of ensuring compliance with the Food Safety Modernization Act. Initially enacted in 2011, the FSMA places greater focus on the processes surrounding the prevention of food contamination, and the potential health issues that can be realized by the consumer.

This collection of regulations stress greater supply chain transparency and accountability. They also present the industry, potentially, with a number of challenges in being able to not only validate the safety of their products, but respond in a timely manner if contamination or quality issues are discovered once the product enters the marketplace.

Without the tools and processes encompassed within the Line Visibility strategies outlined in this paper, realizing compliance with the FSMA will be nearly impossible. These dynamics are compounded when realizing that the FSMA has proven to be a living document, with frequent updates impacting numerous facets of processor visibility, data sharing and corrective action.

SUPPLY CHAIN DISRUPTIONS

The most obvious example is the COVID-19 pandemic that locked many businesses down for prolonged periods of time. In addition to the impact on production and purchasing, the pandemic crippled supply chains and helped spawn current levels of uneven supply and demand, inflation and escalating gas prices – all of which impact a number of cost centers. We can also group natural disasters, unrest like wars and political conflicts, as well as accidents like the spike in container ship incidents, amongst unplanned supply chain disruptions.

ENSURING FOOD SAFETY

Whenever we discuss data transparency and safety, the primary focus is on responding to recalls. And while the ability to quickly identify quality issues is essential in promptly informing consumers and removing bad product from the marketplace, the impact on food safety goes beyond recalls. Once these issues are identified, the embedded agility realized from digital technologies and greater Line Visibility means corrective actions can be put in place much sooner in preserving profits and getting production up and running more quickly.

ENHANCING DATA SECURITY

Everyone in protein processing is familiar with the hack that rocked JBS in 2021, and reportedly cost the company $11 million in order to resume production. While Line Visibility doesn't necessarily focus on IT security, the ability to get back up and running as quickly as possible after addressing a security breach can only be realized by implementing the tools, technologies and strategies that are inherent to advanced levels of Line Visibility.

The End and The Beginning

Understanding the need to enhance Line Visibility is really the end of one digital transformation phase and the beginning of another. After arming yourself with a better understanding of your goals and the benefits you want to realize, the time has come to select a vendor and begin the implementation process.

While the mentioning of such steps can conjure images of frustration and planned downtime, there are steps that can help alleviate some of the pain and offer a positive perspective on the process:

- Senior leadership has to be onboard. Executive management's participation ensures the organization is committed to the process in terms of time, money and resources. This will permeate throughout the company to include all involved with using the new technology and strategies.
- Integration strategies and timelines need to avoid complications. Training and progression should be guided by reasonable expectations that account for unforeseen challenges. Choosing suppliers who understand this all-important dynamic will be key to a smooth transformation.
- All elements of the implementation should be done with the entire enterprise in mind. Line Visibility needs to be shared by everyone. The tools and technology utilized should be focused on sharing data from all business units, avoiding the data silos and inaccessibility that created may of the initial problems.
- Integration needs to focus on both the technological solutions as well as the people who will be utilizing them. Failing to ensure that dashboards, devices and HMIs are set up according to the preferences of the people using them will not only stall implementation, but lose overall project momentum. If people lose their desire to push Line Visualization strategies forward, no technology in the world will meet your goals.

There are numerous concepts key to realizing true Line Visibility. As protein processors look to take this step in their digital transformation journey, it will entail an ongoing desire to meet the very basic manufacturing goals mentioned at the beginning of this paper, and combining those goals with a knowledge of new and evolving technologies and strategies. Ideally, the end result will be a more efficient, competitive and responsive organization primed for the future.

MORE INFORMATION ON LINE VISIBILITY AND DIGITAL TRANSFORMATION FOR PROTEIN PROCESSORS CAN BE FOUND AT ROK.AUTO/PROTEIN