

Finding the Knowledge in Process Manufacturing

As process manufacturing plants journey along the road to digital transformation, the information gained accrues to form a vast knowledge bank that can be used to support new efficiencies and performance improvements. This organizational knowledge and harder-to-find tacit knowledge – information that is not written down but resides in the experience of an operator – can be captured into job-specific insights. By utilizing AI, this data can be processed and becomes a significant advantage for workers.

Process manufacturing plants generate many thousands of data points every day— more than any human could ever sift through. But embedded in all those data points are answers to critical questions that can help employees do their jobs faster and more accurately. Questions may be:

- What previous events may have occurred on the last shift that relates to today's equipment performance?
- How does a performance of a specific piece of equipment compare to its historical performance?
- What may have caused a product quality issue, and what recommendations may there be to correct it?

Traditionally, tacit knowledge transfer was communicated in person with no formal process for capture. Seasoned employees were experienced in the ins and outs of the equipment they handled and the workarounds to make sure it operated properly. This process was workable but became problematic when there were interruptions in communications due to sick leave, vacations, or other unexpected events.

While informal communication is helpful, it can be detrimental from a procedural point of view if operators haven't been privy to all the informal communications that had been taking place over time. Therefore, it is not surprising that more and more plants are digitizing their operations and knowledge transfer. Strategic PPM solutions are now collecting all information pertinent to operations, maintenance, and plant performance in one centralized digital database. This way whoever needs to know what actions are to be performed when an issue occurs, can access



the one source of truth – the centralized digital database.

Implementing a digitized PPM system plays an important role in a digital transformation for process manufacturing plants. By digitizing shift handover, equipment records, and other key data that reside in a central data repository, information can be easily and transparently shared across shifts, teams, and other areas of responsibility. This enables vital organizational knowledge to remain accessible as experienced workers move on or retire. It also gives new employees a quicker and easier way to learn how to optimize important processes, yielding to better and safer outcomes.

Too often the magnitude of information con-

tained in a PPM system can create challenges for operators and users that access it. For instance, questions may arise regarding what information is most vital for the task at hand. Additionally, it can be troubling to figure out how to search through all the data to determine which information could best solve the issue at hand. Time and time again, operators grope with trying to find the answers to the specific questions they have at any specific time.

However, the next generation of technologies to emerge are aimed at addressing many process manufacturing issues. AI tools like NLP and ML are transforming PPM from a passive information repository into a smart, reactive knowledge system that provides actionable insights.



HOW TO BUILD AI INTO PLANT PROCESS MANAGEMENT

Once AI tools are integrated into PPM applications systems, they become more responsive to human needs and priorities. Expect AI-powered PPM to transform plant operations in positive ways such as by conducting smart searches on all the data in the repository. Employees are able to extract the information they need using natural human language by conducting a smart search powered by NLP. The operator no longer needs to look up individual process records and spend hours searching through the history files to find solutions to issues that may arise. Instead, they can simply conduct a smart search to call up the specific data points and/or information needed. It can be as simple as typing into the system, "When was the last time the color of the product was out of specification?"

A Smart Search engine using AI would instantly filter through all the data pulling up only pertinent information from search results and thus save lots of time and money. It puts the information they are most likely to need in front of them right when they need it. With a Smart Search engine, day and night shifts have access to all relevant historical knowledge. It helps eliminate any problems with communications between the shift handovers and can provide teams with answers to their questions within seconds. AI will also help to diagnose issues with equipment, processes, or products and then suggest solutions based on what has solved similar problems previously. For example, a problem that may seem novel may be identified as having precedents due to AI's ability to quickly uncover within the maintenance or operational records common anomalies. Smart search also comes to the rescue in helping operators narrow down where they need to look and what questions they should ask. A solution suggestion system powered by ML can also sort through years of history—even history across plant locations—to identify patterns and suggest potential solutions. As new issues and their resolutions are logged, that data then becomes part of the knowledge bank for future inquiries.



THE SMART FACTORY IS PEOPLE AND MACHINES WORKING TOGETHER

Industry 5.0 is the promise of moving far beyond Industry 4.0 to provide solutions to empower people. With the power of AI in a PPM system, people and machines can work together to improve operational efficiency, quickly solve emerging problems, and accelerate the pace of improvement. These systems have the power to capture the full organizational knowledge of the workforce across multiple systems and sites and can make that knowledge easily available to others in the way they need it.

As AI tools continue to evolve, they will energize smart PPM applications to help workers make quicker decisions, solve problems faster, and optimize the performance of equipment and processes. This leads to safer, more resilient, more transparent, and more efficient plant operations.

Process manufacturers will benefit from implementing smart knowledge management systems to meet future challenges. As plant systems and organizations have grown in complexity, the industry is also facing an exodus of experienced workers who are reaching retirement age. PPM solutions embedded with AI will facilitate the capture and documentation of important tacit knowledge. Hence, AI-powered PPM will allow companies to quickly get new team members up to speed and maximize the effectiveness and contributions of every worker. An AI assist will support the efforts of companies to stay safe, productive, and competitive while continuing their journey as they adapt to the new advantages of Industry 5.0.

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DEFINITION:

Artificial Intelligence (AI) is a type of software that mimics aspects of human intelligence to perform tasks without direct human instruction.

Natural Language Processing (NLP) is a form of AI that allows computers to understand and respond to natural human language in text or speech.

Machine Learning (ML) is a form of AI that allows algorithms to learn and adapt behavior without explicit instructions by looking for patterns in large data sets.



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