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AHEAD OF THE CURVE

Honeywell Users Group 2024

The editors of *Control* report breaking news and session highlights from the 47th HUG

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Honeywell

TABLE OF CONTENTS

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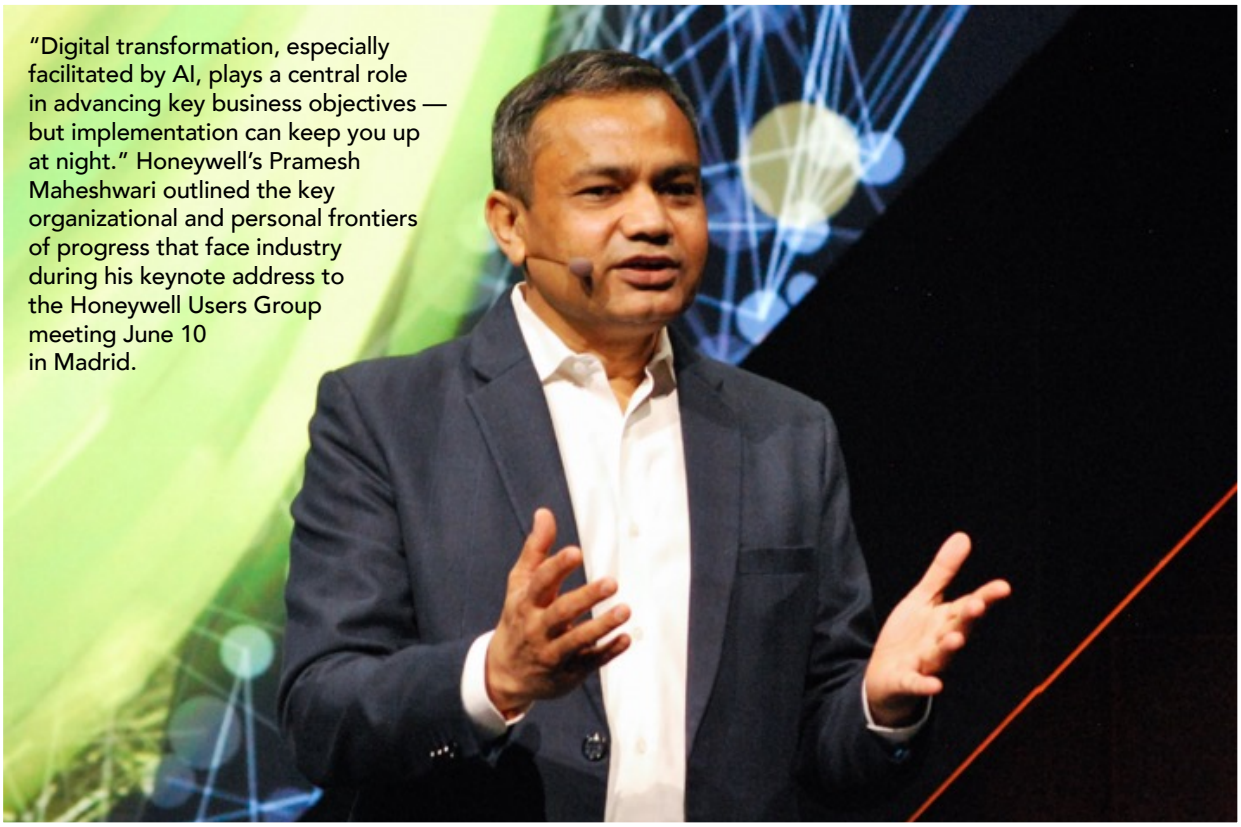
HONEYWELL TO KEEP USERS 'AHEAD OF THE CURVE'

by Keith Larson

At today's keynote session to mark the opening of the Global Honeywell Users Group (HUG) meeting in Madrid, Pramesh Maheshwari, president, Honeywell Process Solutions, outlined the company's commitment to keep its customers a step ahead of the array of challenges that face industry today—as well as those sure to emerge down the road.

His message fit well with the meeting theme, "Ahead of the Curve," on which Sonia Sulis, HUG Customer Steering Committee Chairperson and advanced control and alarm management supervisor for the Saras Group, congratulated the event's steering committee, as she welcomed the more than 1,100 registrants from 54 countries to the 47th gathering of this seminal industry group.

"Ahead of the Curve means staying ahead of the challenges we face, as well as the passion and vision to tackle those ahead," explained Maheshwari. "As you plan your activities these next several days," he challenged attendees, "ask yourselves: what is it you and your organization need to move your business forward?"



"Digital transformation, especially facilitated by AI, plays a central role in advancing key business objectives — but implementation can keep you up at night." Honeywell's Pramesh Maheshwari outlined the key organizational and personal frontiers of progress that face industry during his keynote address to the Honeywell Users Group meeting June 10 in Madrid.

Maheshwari said that the HUG 2024 agenda has been built around three key aspects of Honeywell's development efforts that are key to industrial progress: AI, cybersecurity and energy transition.

"Digital transformation, especially facilitated by AI, plays a central role in advancing key business objectives—but implementation can keep you up at night," he said. "How do you ensure that AI systems are integrated consistently, scalably and holistically?"

AI TO AUGMENT MORE EFFECTIVE WORKERS

Also, with a nod to the pandemic-spurred uptick in retirements, Maheshwari stressed the importance that AI plays in how we are to train and accommodate industry's next-generation workforce. "AI is a tool to facilitate that training, to augment human capabilities," he said. "Imagine predictive abilities that allow workers to envision future developments and intervene proactively," he said. This technology holds the potential to revolutionize the productivity and effectiveness of workers whether they be in maintenance, operations and engineering roles.

Many AI capabilities already are available in Honeywell's current products, Maheshwari added. "And we're bringing AI to other core capabilities to make plants run better and more safely and for organizations to respond more quickly."

And as AI and digital transformation increase the level of automation, cyber risks are also increasing, he continued. "It's not just an IT issue; it's a core business priority," he said.

The final HUG focus area is the challenge of energy transition, one Honeywell faces together with its customers. "We have targets, too, including carbon neutrality by 2035, which we declared in 2021," Maheshwari said.

Among the energy transition initiatives that Honeywell is actively pursuing is the reduction of emissions. "And not through monthly estimates," Maheshwari explained, "but in real-time: including detection, measurement, monitoring and reporting." Honeywell is also investing in battery storage technology to facilitate industry's energy transition, he said.

"It's a complex journey with many hurdles and milestones," concluded Maheshwari. "But imagine a world of unprecedented industrial productivity that is safer; that is cyber-secure; that advances the energy transition and is ultimately a better place to live. We have to stay Ahead of the Curve."

HONEYWELL INNOVATIONS TARGET ENTIRE AUTOMATION LIFECYCLE

by Jim Montague

When it seems like everything from dodgeballs to meteors are streaking towards your head, it's good to have a friend who can tell you when and where to duck—and even how to turn what looks like disadvantages into advantages.

"We're driving differently than years ago with sensors, connectivity and analytics that alert us when we're drifting out of our lanes or when there's a traffic jam ahead. In the same way, industrial plants are more connected than ever, and are gaining similar autonomies," said Jason Urso, CTO Industrial Automation at Honeywell. "Digitalization is changing the ways all plants operate, and we're keeping them ahead of the curve with capital project executions in less time and with lower risk by automating digital twins during commissioning to improve reliability; continuous evolution to achieve new benefits while simultaneously protecting decades of existing investments; and superior operations that let every user work like a 30-year expert and make every day their best day of production."

Users can achieve these unprecedented gains by implementing the Experion PKS Highly Integrated Virtual Environment (HIVE), which is now faster, simpler, lower risk, less costly, more reliable, and uses new software tools to streamline migration projects. Urso reported that mass standardization can be achieved by using Honeywell's Universal I/O modules and marshalling and Universal Process Cabinet (UPC) products, which simplify engineering due to standard wiring and controls that reduce or eliminate many traditional tasks. Likewise, they can interact with their Experion PKS Control HIVE and I/O HIVE counterparts in production areas to eliminate process engineering effort.

"Control HIVE delivers comprehensive flexibility by allowing any module to communicate with any controller," explained Urso. "It also reduces project risk with a digital twin, allowing users to better manage operational flows, reduce factory acceptance tests (FAT) times, and reduce alarm rationalizations and control tuning tasks."

Urso and host of Honeywell Process Solutions (HPS) colleagues presented their traditional and comprehensive technology overview on the opening day of the 2024 Honeywell Users Group in Madrid.

"We'll use AI to identify gas-plume dynamics and calculate in real-time the amount of gas released." Honeywell's Jason Urso shared that a real-time handle on fugitive emissions is among the many benefits that Honeywell is delivering in its latest generation of digital tools.

SWARM OF HIVE SUCCESSES

Beyond its gains with Universal I/O and marshalling, Experion PKS HIVE has also been buoyed by the recent release of the Control Network (CN) 100 module for Series C I/O HIVE, OneWireless access points, and other new CN modules, according to Brian Reynolds, CTO of project automation solutions (PAS) and Honeywell Industrial Automation at HPS. He added that many of these Honeywell products will soon be supporting the Ethernet Advanced Physical Layer (APL) specification for classified areas.

"For instance, we recently worked on a greenfield polyethylene plant that had 28 C300 controllers and 83 Universal process cabinets on a fiber-optic, star-based network," said Reynolds. "We found this plant was able to reduce its controllers by 50% by using Control HIVE, cut its fiber-optic and network infrastructure by 90%, and reduce its control cabinets by 80% by using UPCs and associated technologies."

Traditional systems are costly because they're designed ahead of time and then modified repeatedly as process designs change. Experion PKS HIVE lets users configure I/O and controls using software, giving users much more freedom with their projects. "If the need arises for more I/O, they can just add it to Experion HIVE, which can also reduce risk and unplanned downtime."

Reynolds added that Control HIVE also has self-healing functions, which let users automatically spin up secondary back-ups and maintain more autonomous operations and recovery functions. "This allows users to replace components when it's convenient and cost-effective for them," he said. "Because its software is decoupled from its hardware, Experion PKS HIVE lets systems evolve without requiring large migrations. This is also how it provides faster project execution, lower costs, simplified project engineering and reduced project risk."

CONTINUING MIGRATION SUPPORT

Though it's already devoted years to helping users migrate from their legacy TDC3000 controls to Experion, Urso reported this procedure is also getting easier. Introduced last year, users can upgrade stations to Experion TPS, and swap HPS boards to Enhanced High-Performance Manager (EHPM), EHPMX or C300PM modules.

"C300PM is an EHPMX, but it's also a C300 controller that has the same functions as EHPM. However, it preserves all HPM and Process Manager I/O (PMIO) wiring, and enables regulatory, sequential, batch and multivariable control," explained Urso. "It can also communicate with C300 HIVE I/O, talk to other smart I/O, and communicate with other integrated subsystems. We're now at the last step of the TDC3000 to Experion migration journey because we can move Local Control Network (LCN) nodes to an Experion LCN (ELCN) on an Ethernet foundation."

Likewise, Honeywell's Advanced Migration Technologies (AMT) takes the pain out of migration processes, according to Cindy Bloodgood, senior offering management director for lifecycle support services at HPS. "Most migrations are time-consuming and have different ways to try and reduce risk. However, AMT reduces risk by using software to create digital twins of processes that can be tested and validated before they're deployed—and barely dent the user's schedule," said Bloodgood. "Several customers are saying migrations with AMT are having half the impact they did before, and that it lets them migrate at their own pace."

DIGITAL TWINS GET AI BOOST

In fact, Urso added that Honeywell is even moving digital-twin capabilities into the operations realm with its newly launched Honeywell Digital Prime Twin that can help users save more time.

"Most users have standard work practices and management of change (MoC) procedures, but now they can use Honeywell Digital Prime Twin to twin a clone domain of their actual process environment, take their projects off critical paths that are costly and risky, and serve them process insights automatically," said Tiffany Barnes, senior product development manager for software solutions at HPS. "Honeywell Digital Prime Twin also puts all relevant information in one location and in the same phase, so they can plan and develop their digital twins with confidence."

Beyond enabling digital twins, concentrating data displays in one place also lets them work with AI functions to further improve optimization efforts and perfor-

mance, according to Graeme Laycock, user experience (UX) director at HPS. "Users typically have to deal with a lot of windows, but adding generative AI functions allows us to consolidate all that input. So, instead of seeing a lot of alarms, they can see emerging situations," explained Laycock. "They can also view adjacent units and plants, search for any asset and get its information, and use AI to identify situations and get back guidance to resolve them."

Likewise, Ramesh Babu Koniki, maintenance fellow at HPS, reported that the company will soon roll out its Honeywell Field PKS to help manage work orders, handle inquiries, and let AI agents attach relevant data to Honeywell Field Pack templates. This software will also get more and better data from Honeywell's Versatilis low-cost, wireless sensors and platform, which can help even rookie users work at higher competency levels.

SENSING EXCELLENCE, SECURITY AND SUSTAINABILITY

To achieve superior unit and plant operations, Urso announced the release of Honeywell Forge Performance+ for Industrials powered by AI, which also uses digital twins and production intelligence data, assembling tasks in priority order. It's a plantwide optimizer for process engineering, operations, planning and blending. The platform's Asset Performance Management (APM) functions also use data from Versatilis sensors to monitor processes, and check for a range of 20 parameters, such as vibration, surface and ambient temperature, atmospheric humidity, acoustics, magnetic flux and many others.

Once better sensor data arrives, Alicia Kempf, offering management director for process automation systems (PAS) at HPS, reports that the company's Manufacturing Excellence Platform (MXP) can digitalize it with fewer steps than were required in the past. For example, it coordinates with Honeywell's Sparta Systems and TrackWise Systems' software in pharmaceutical applications. These software functions will also be aided by the upcoming, late-2024 release of a new ControlEdge high-speed digital controller with 1-millisecond scan time for the hybrid automation space.

"Dealing with logbooks and other paper takes up 30% of staff time in many pharmaceutical applications, and it's only 90% accurate" added Kempf. "MXP lets user review data in real time, check recipes and records, and do reporting much more quickly. It also lets them see actionable information in context and in a single view, making real-time decisions possible based on what's been executed and what's coming up next."

To keep all these innovations secure, Urso announced Honeywell's new Cyber Insights program for constantly monitoring assets, identifying vulnerabilities, and finding cyber-threats that indicate the presence of malware. It's also launching a Cyber Watch service to further help users make sure their cybersecurity programs are complying with their company and regulatory standards.

On the sustainability and energy transition front, Urso reported that Honeywell is following up the UOP Ecofining program it launched last year with a Leak Detection and Remediation program, as well as enhancing its battery-based Energy Control System and Ionic modular, scalable batteries with Forge Sustainability+ for Industrial Emissions Management software to monitor multiple sources. The leak-detection effort will combine swarms of Versatilis Super Scout IoT-based methane sensors, real-time visualization software, and Rebellion thermal imaging cameras.

"Together, these solutions will let us continuously monitor for fugitive emissions, and even identify types of gas emitted," added Urso. "We'll also use AI to identify gas-plume dynamics, and calculate in real-time the amount of gas released," added Urso.

EXPERION PKS ADDRESSES CUSTOMER CHALLENGES

by Mike Bacidore

Migration from any Honeywell distributed control system (DCS) as old as Experion PKS R410 can now be made in a single hop to the latest R530. This is one of the many features of the latest version, setting the stage for a future filled with feature-pack enhancements to the system.

"R530 has been out for just over two months," explained Joe Bastone, who's held the title of Experion product marketing director for almost eight years. He co-presented a roadmap for Experion PKS along with Alicia Kempf, who'll be assuming responsibility for the line, during the 2024 Honeywell Users Group in Madrid.

Many industry challenges are addressed in the R530 release. "Managing cost and scheduling gets more complex and diverse, and there are fewer experts," said Bastone. "There are late project changes, and there's often that idea of custom modular equipment—everyone says they want standard equipment, but they want their standard equipment."

Lifecycle management continues to be a challenge. "You have fewer resources because a lot of expertise has left the workforce," explained Bastone. "There are a lot of new people entering the workforce, and there's a ton of process data out there. With the ever-present convergence of IT and OT convergence, there's more IT emphasis being put on OT. We have to manage those two worlds colliding."

VIRTUALIZATION BOOSTS FLEXIBILITY

Experion's Highly Integrated Virtual Environment (HIVE) architecture incorporates IT, I/O and control, decoupling hardware and software and enabling flexibility in its virtual reconfigurability. The HIVE elements can be used individually or collectively, in tandem with existing systems and infrastructure.

"IO HIVE is a scalable, modular approach, making it easy to place I/O where it's needed," explained Bastone. "Control HIVE lets me break apart the pieces of the control strategies. And IT HIVE expresses a centralized IT infrastructure."

IO HIVE essentially decouples I/O and control. "HIVE is fault-tolerant Ethernet," said Bastone. "We embrace standardization with the Universal Process Cabinet (UPC). Now I have my CN100s and Series-C I/O. I would love it if all the systems only had Series-C I/O, but it's a mix. We connect that via the Ethernet Interface Module (EIM), whether it's Eth-

"With the ever-present convergence of IT and OT, there's more IT emphasis being put on OT. We have to manage those two worlds colliding." Honeywell's Joe Bastone has been steering the direction of the Experion PKS automation platform for eight years.

erNet/IP or Profinet. Now you have a common approach to open protocol support."

Control HIVE is based on proven technology, and it decouples applications and controllers. "It's highly resilient, self-healing, easier to maintain, optimizes resource usage and is simple to implement. We're able to have a more resilient system," explained Bastone.

The Experion Remote Gateway is one of the R530 feature packs. "It's a secure read-only station client that connects to an Experion system via the business network," said Bastone. "It uses existing displays, so there's no re-engineering. It gives live updates with alarms and events, and it's browser-independent."

The Experion PKS 500 series includes 10 different enhancements that were submitted by end users and selected by the Honeywell User Input Subcommittee (UIS). "One thing selected by the subcommittee from an end-user submission was the dynamic operator watchlist, which gives you the ability to drag and drop parameters via a picker," explained Bastone. "You can go back and forth instead of bouncing from display to display."

Cybersecurity has also been at the forefront of Experion PKS development. "We have system-level certifications, and we have built-in system hardening, so Experion PKS is secured out of the box," said Bastone. "We have geographically independent access control and antivirus qualification and support with Trellix, Symantec and Carbon Black. That provides a foundation for Forge Cybersecurity+. The two go hand in hand. It's important to have a secure foundation for a solid OT cyber program."

Honeywell introduced its Control Network Module (CNM) earlier this year. "I'm careful not to call it a switch, so the IT police don't swoop in and take control of it," cautioned Bastone. "It comes configured and can be used with safety systems or with IO HIVE. It's a network device for Control and IO integration. An expansion module has eight additional ports. It's supported in the Universal Process Cabinet. A lot of Modbus TCP devices will be connected through the CNM."

The next steps for Experion PKS after 530 will come in the shape of feature packs, explained Kempf. "Feature packs are a way to roll out without a new major release. It provides incremental functionality for those who want it," she explained.

The Modbus TCP on EIM, for example, is one of those feature packs. "Now EIM will support Modbus," said Kempf. "It offloads from the C300 and has EIM as the centralized module to bring in those protocols."

OPC UA is supported on Experion already, but a new feature pack will support OPC UA Client on the Unit Operations Controller (UOC). "We'll support UOC in HIVE, so we're going to be able to get all the benefits of the HIVE on the UOC platform," said Kempf.

BRIGHT FUTURES FOR EXPERION BATCH, PRODUCTION PORTAL AND MXP SOLUTIONS

by Jim Montague

Because where we're going is often based on where we're from, there's a good chance Honeywell's Experion Batch, Production Portal and Manufacturing Excellence Platform (MXP) solutions will continue to succeed because of the initial capabilities they're already achieved.

"The plan is to get all these products on one platform and ecosystem. That way, users won't have to keep trying to make several different types of software work together, and this plan is already unfolding," said Chris Peters, Experion PKS product manager, Honeywell Process Solutions. "We're hopeful that by the end of 2025, we'll have Experion Batch and Unit Operations Controller (UOC) embedded on the same platform, and users won't have to qualify, add and maintain nodes."

Peters and Rahul De, Experion PKS, senior engineering manager, presented "MXP + Experion Batch Roadmaps" on the opening day of the 2024 Honeywell Users Group June 10 in Madrid.

EXPERION BATCH

Upcoming capabilities and features for Honeywell's Experion Batch (R530) software include:

- Asset filter to reduce unit shown, either by selecting individual units or higher-level assets such as process cells.
- Alarm icon in the Unit Card, showing the most important alarm status of the asset, and allowing navigation to the Alarm Summary filtered to that asset.
- Activity status icon in the Unit Card, showing important data about the activity in a way that's consistent with the Procedures Explorer tree view. Clicking on the icon shows a callout with State, Status, Status Description, Mode and Mode Attribute.
- Using a hierarchical, asset-based unit sort order in the unit card instead of flat, alphabetical ordering by asset Item Name. The effect is that units will appear in the same order as seen in the Asset Filter tree.
- Batch filter view that reveals past units and future unit class lanes of a single batch.
- Restore Unit Timeline predictions after mismatching elements completes.
- Option to show Recipe Step instead of Public Name or Unite Timeline.

"In the future, users won't have to think about which software package to use because they're all going to condense into one platform. They'll all be part of MXP." Honeywell's Chris Peters discussed the latest enhancements and planned convergence of the company's Experion software solutions.

"We're also adding support for formulas configured and approved in Production Portal to be selected and used from the Batch Summary, both during batch creation and while the batch is in a pre-execution state," said Peters. "Related features include a new formula column that can be added to the default Batch Summary; an Automatic Unit Timeline Reference Batch selection based on formula selection as configured in the Production Portal formula details; and events that are journaled and included in batch reports for both the formula selection and for all individual, written-to parameters."

Meanwhile, Experion Batch's Notification Pane software will gain style changes to increase the prominence of Unit in the software's messages and filter, and an option will be added to hide Source and Block in Notification Pane's messages. Finally, Experion Batch will get a reference batch editor, batch identification in the Event Summary, and improvements in the batch faceplate.

PRODUCTION PORTAL

Similarly, previous updates to Production Portal software included version control for electronic work instructions and formula sets in May 2023, while Campaign Restart was added in 4Q23 to let users start a new batch campaign and resume the number order. Also, Formula Update During Campaign was added in 4Q23 to let users modify formulas and allow them to be reflected in the best batch created by the campaign.

Consequently, upcoming feature planned for Production Portal include:

- Electronic work instructions (EWI) that are event-driven and on-demand.
- Formula sets and campaigns that integrate with MXP.
- Application program interfaces (API) directly on Portal node.
- AI conversion of paper SOPs and batch sheets to EWI.
- Generate reports directly from Portal.
- Batch analytics.
- Unification of Production Portal and MXP.

"Again, in the future, users won't have to think about which software package to use because they're all going to condense into one platform," said Peters. "They'll all be part of MXP."

MXP UPDATE

Likewise, recent MXP updates included inventory management, class-based recipes and non-ERP process order management added in 3Q23, while the overall platform gained server redundance and cloud deployment on Microsoft Azure. In 1Q24, MXP added a native interface for SAP Integration Production Order; weigh and dispense (W&D) enhancements; logbook activity scheduling; batch historian and integration with DeltaV; webservices for SAP Process Order, native interfaces to laboratory information management systems (LIMS); OPC HDA data in batch reports such as trend and table; and DeltaV alarm and event capture.

Consequently, upcoming and contemplated features for MXP include:

- Open interface for ERP, LIMS, QMS/LMS;
- User interface improvements, including UI/UX themes and streamlined navigation;
- Localization;
- Simatic Batch integration;
- Experion Batch integration;
- TrackWise Digital (TWD) integration of QMS, DMS and TMS;
- Native interface to MasterControl and LMS; and
- Batch historian for Simatic Batch.

In addition, MXP's platform will increase to 140 concurrent users from its present limit of 60, and it will also get an ancillary server and localization for all modules.

"The update we're working on will integrate Experion Batch with TWD," said Peters. "It will be a complete link between the control system and the quality management system. No one else does this."

REFINERY PROTECTS CONTROL INFRASTRUCTURE WITH FORGE

by Mike Bacidore

STAR Refinery in western Turkey uses a range of the enabled services within Honeywell's Assurance 360 (A360) framework to enhance OT asset tracking, enable regulatory compliance and improve operations. During early June's Honeywell Users Group in Madrid, STAR's Sedat Topcuogullari, operations technology ICS supervisor, co-presented with Musa Ozturk, Honeywell's A360 performance manager, about how the refinery is relying on Honeywell Forge Cybersecurity Suite to manage system health, performance, maintenance and compliance.

Enabled services are being utilized by the OT team, the maintenance team, the cyber team and Honeywell's A360 team to monitor the availability, performance, maintenance and lifecycle of the integrated control and safety systems. It continuously monitors system status in alignment with ISO 27001, extending the rigorous approach to cybersecurity and processes to ensure proactive management and protection of digital infrastructure.

"It's fully automated," noted Ozturk. "The system refreshes itself, so the dashboard can display what's happening."

The Honeywell Forge Cybersecurity Suite is a unified software system designed to simplify, strengthen and scale industrial cybersecurity in a complex OT environment, whether that's at a single site or in a global footprint. Digital transformations for facilities like STAR Refinery's mean connecting OT assets and enabling remote capabilities, so cybersecurity becomes fundamentally critical. From safely operating a complex ecosystem of plant control systems to avoiding non-compliance fines, a simple, centralized way to administer cybersecurity across the enterprise is needed.

The STAR infrastructure includes node agents, virtual-service-environment (VSE) service nodes and virtual-service-platform (VSP) relay nodes. "There are compliance regulations from the Digital Transformation Office of the Presidency of Turkey, energy licensing procedures and ISO 27001 standards. Endpoint security is part of the same requirements," explained Topcuogullari. "We are constantly updating our cybersecurity."

Honeywell Forge Cybersecurity Suite offers remote access to control OT assets in the field from a single security and operations center. Cybersecurity Suite uses a single outbound connection approach to simplify the manageability and visibility of complex OT environments. The suite complies with NIST Cybersecurity

"If Honeywell has published a new article, we are able to see directly if any asset is affected and if everything is compliant." Honeywell's Musa Ozturk explains how Forge Cybersecurity Suite protects assets at western Turkey's STAR Refinery.

Framework, NIST SP 800-82 guidelines and, most important for STAR Refinery, international standards such as NERC CIP, ENISA, ISA/IEC 62443 and ISO 27001.

Before the A360 implementation, Honeywell had an engineer posted in the STAR facility. "It's now automated," explained Ozturk, so the system automatically provides the most up-to-date audits from Honeywell's Global Technical Assistance Center (GTAC). "If Honeywell has published a new article, we are able to see directly if any asset is affected and if everything is compliant."

Honeywell and STAR Refinery are constantly working together to update key performance indicators (KPIs), such as critical incidents, non-critical incidents, maintenance reports, recent changes, plant availability, preventive-maintenance execution and operational support.

"If there's an issue and engineers need to be assigned, it will display active alerts and details that can be assigned to team members," explained Ozturk. "We are using the Honeywell Teams functionality to assign and track. When we finalize all the problems, we handshake with the audit team on KPIs."

DIGITAL TWINS PROVE THEIR LIFECYCLE RELEVANCE

by Jim Montague

If simulations are good for designs, why stop there?

This logical question appears to be fueling the emergence of digital twins from their origin in design spaces to help with construction, installation, configuration, operations, maintenance, and even long-term and end-of-life processes.

"Understanding more about the complex physics involved in any function can enable it from birth to its entire lifecycle," said Scott Parent, Field CTO at design and simulation software leader Ansys. "Honeywell and Ansys are present in every industry from aerospace and defense to medical and healthcare, but they both deal with the same physical forces that must be addressed from design to safety, and in every segment, including drones, pacemakers and energy-storage systems for buffering wind and solar applications, plus all the variables their users must deal with to optimize them."

Parent spoke on the occasion of "Gigafactory Day" at the 2024 Honeywell Users Group today in Madrid. His keynote presentation was timed with the official launch of Honeywell's Battery Manufacturing Excellence Platform (Battery MXP), an artificial intelligence (AI)-powered software solution that, like today's digital twin technology, is designed to optimize the operation of gigafactories from day one by improving battery cell yields and expediting facility startups for manufacturers.

DIGITAL TWINS MEET DIGITAL ENGINEERING

Just as simulations and digital twins let users try numerous design scenarios before building physical application and systems, they can also be used to derisk technologies that users are contemplating, and point out how to increase efficiencies, reduce their carbon impact, and scale up the most useful alternatives. Parent reported that users embracing simulations and digital twins are called hyperscalers because they're using high-performance computing, AI, machine learning (ML), cloud-computing, and Internet of Things (IoT) platforms to perform digital engineering tasks far more quickly than was possible before.

"One side of the spectrum is adopting and running with digital twins and digital engineering, and they can do in one day what takes their competition 30 days," explained Parent. "Hyperscalers in the digital ecosystem ae coming together to accelerate all forms of digital insight and intelligence, and drive produc-

"Simulations and digital engineering improve ultimate product performance and enhance all lifecycle aspects. Companies that take full advantage are going to be uncatchable." Ansys' Scott Parent kicked off "Gigafactory Day" at the Honeywell Users Group event June 11 in Madrid.

tivity, knowledge growth and sharing, and disruptive learning across science."

For instance, Ansys recently worked with a pump manufacturer re-engineering its subsystems at the component level, such as impeller spare parts. With help from an Ansys simulation, the manufacturer found it could improve overall performance by 80%.

"Companies like this are going to be uncatchable," added Parent. "Digital engineering improves ultimate product performance and enhances all aspects of its lifecycle. The battery industry has reported a 65% improvement in material usage by using generative simulations to improve additive manufacturing. They still do physical tests, but digital engineering can help integrate batteries into automotive body frames, which reduces weight and improves performance. Digital twin can deliver higher ROI throughout the entire battery lifecycle."

SCALING UP TO THE GIGAFACTORY

Once they prove useful and successful for batteries and other products, simulation and digital engineering principles can be applied to entire units, plants and businesses. They also enable multidisciplinary design analysis and optimization, as well as model-based systems engineering, which reduces expenses all along the lifecycle pathway, including R&D, production and deployment, operations and support, and disposal and recycling.

For example, Ansys also worked with Northrup for Aerospace's battery engineering division that takes a long-term, lifecycle-management view. It used a digital twin and virtual sensors to develop reduced-order models (ROM) for the manufacturer's electrode production process, which could be used to develop controls and manage asset performance. They described each step in the electrode production process, such as coating, drying and calendaring, and built process digital twins for each one. This helped optimize the physical and cyber/computerized subsystems, and reduced their material usage and cost sensitivity.

"This is like using the 'triangle of speed' to optimize a road trip. The value of ROI in assets becomes more alive in the digital twin world," said Parent. "To achieve similar gains, users must start by asking questions such as: What will the application's digital footprint be? What information will be needed to serve it? And what will data have to look like to better manage the process and plant?"

PLANT DESIGN, CONTROL AND OPTIMIZATION REDUCE PRODUCTION COSTS

by Mike Bacidore

The green hydrogen sector's biggest hurdle is in production costs, driven by operational inefficiencies, electrolyzer degradation and difficulties in power forecasting. Honeywell's Plant Design and Unified Control and Optimization systems are designed to orchestrate multiple operations and improve plant efficiency while reducing capital expenditures (CapEx) and operating expenses (OpEx).

The current installed capacity of green hydrogen is very small but is expected to grow exponentially, predicted Swapnil Adkar, director, offering management, Honeywell Process Solutions, who spoke during the Honeywell Users Group (HUG) meeting in Madrid. "From 2023 to 2030, there are 865 projects which have been announced, excluding demonstration projects."

In 2023, green hydrogen installed capacity was only 1.1 GW, said Adkar, but the optimistically estimated installed green hydrogen capacity for 2028 is 85 GW.

China, which already has the largest installed capacity with 70% of the global total, Europe, India and Australia are the hotbeds for green hydrogen projects, while the United States is emerging as a key area of activity. The levelized cost of hydrogen (LCOH), which measures lifetime costs divided by production, was $4.5/kg in 2019. "LCOH is a key concern for green hydrogen producers, and their key focus is to reduce LCOH to less than $2/kg of hydrogen. By the end of this decade, it's expected to be about $2.6 or $2.7," said Adkar.

One of the top challenges for green hydrogen plants lies in forecasting the cost of electricity for production. "Green hydrogen is expected to use renewable power, which is not a flat curve, so there are variations in the power profile," explained Adkar. Energy storage management is another concern. "Eventually the cost of storage will come down, and energy storage will become part of these systems," he assured the audience.

"Eventually the cost of storage will come down, and energy storage will become part of these systems." Honeywell's Swapnil Adkar revealed green hydrogen plant optimization offerings at the Honeywell Users Group meeting in Madrid.

DESIGN, CONTROL AND OPTIMIZATION

Honeywell's portfolio of green hydrogen plant offerings is broad. From Level 0 instrumentation and analyzers to Level 4 design and optimization tools, solutions are available that reduce CapEx and LCOH at the concept stage as well as reduce ongoing OpEx and maintenance costs. Adkar highlighted three specific offerings in his presentation—Concept Design and Optimization; Plantwide Control and Optimization; and Electrolyzer Control System.

Concept Design and Optimization software takes external and user inputs, such as weather services, carbon intensity calculation and constraints, cases and objectives, into the design and optimization engine for green hydrogen plant design and optimization and create a dashboard and reports for analysis, design, bill of materials and financials.

Fast techno-commercial proposals and decisions can be made with the information and insights from the dashboards and reports. Power intermittency and carbon intensity can be addressed. It spans the value chain from grid to gate, making it flexible for wide design scenarios. And it optimizes design for objectives and carbon intensity targets over a lengthy time horizon. This reduces CapEx and LCOH at the concept stage.

Plantwide Control and Optimization reduces operating expenses and maintenance costs, ensures compliance with regulations and enables financial incentives. Across the value chain, the electrical cost is the largest of the operating expenses. The solution has the intelligence to make complex decisions at spec regarding energy mix, curtailment, carbon intensity management, inventory management and electrolyzer life optimization. "It deals with all of the complexities of a green hydrogen plant," said Adkar.

The Honeywell Electrolyzer Control System is designed to improve electrolyzer performance and extend life when integrated with the Honeywell Optimizer. "This will be useful for the plant to know how quickly these electrolyzers are degrading," explained Adkar. "It will also integrate with electrical systems, battery energy storage systems, analyzers and optimization systems. Electrolyzer degradation over time affects the performance prediction. And, in multiple electrolyzer stacks, startup/shutdown sequences need to be managed. When you have early or late hours of operation of solar, electrolyzer operation is affected."

PROCESS INDUSTRY USERS SHARE AI PERSPECTIVES

by Jim Montague

Scary questions and woolly mammoths are best approached and tackled by groups. That's why several dozen engineers gathered at the Honeywell User Group meeting in Madrid to answer, "How can AI software drive operations excellence?"

The group was moderated by Michel Teughels, senior product solutions manager at ExxonMobil, and Nadia Merzaa, solutions consultant, Honeywell. "Digital transformation includes cloud computing, Industrial Internet of Things (IIoT), mobility, big data and artificial intelligence (AI), but for an operating company is an AI strategy needed?" asked Merzaa. "The answer seems to be yes and sometimes no."

Honeywell's overall AI strategy focuses on enterprise analytics and insights, which are enabled by safety and operational excellence, sustainability, competence and productivity, end-to-end optimization and asset reliability, all protected by a cybersecurity program. "Honeywell has adopted an AI strategy to stay ahead of the curve, but oil and gas and other process industry users must decide if AI can help their businesses and outcomes. We envision AI as a way to accelerate your achieving those outcomes, and this is where AI can play a big part."

SMALL STEPS TO START

Teughels reported that ExxonMobil's goal for AI is autonomous decision-making, but it's pursuing it incrementally. "We're not planning to spend a lot of time yet on using AI for very advanced analytics. As an operations company, we want to use AI to solve individual problems," explained Teughels. "So, we're using AI as a cognitive advisor, but we're doing it in small steps, and progressing toward autonomous answers and decisions we can trust. This will give us confidence in AI, but we're still going to have human operators monitor it."

Although ExxonMobil seeks to run its worldwide facilities in a standardized manner, as if they were all one plant, Teughels added the biggest hurdle in using AI is the company generates a large volume of data that may not be consistent enough to be useful. "AI produces lots of data, but it's not clean, so we'll need to add naming conventions and other context," added Teughels.

"We're using AI to clean and validate data, so the next step could be asking it where to zoom in." ExxonMobil's Michel Teughels, together with Honeywell's Nadia Merzaa, led a roundtable discussion with Honeywell User Group attendees about their collective experience with AI technologies

SOME CAUTIOUS TOES IN THE WATER

The overall mood of the AI roundtable's other members was cautious. Though most haven't adopted any AI functions yet, several reported that their companies are reflexively jumping on the AI bandwagon to gain what see as competitive advantages before examining how they can apply it and machine learning in practical and useful ways.

"We're an oil and gas operating company, and our management wants to use AI and ML right away, but we think we need a more strategic approach about how to get there," stated one attendee. "We don't want to develop AI and simply test it on ourselves."

Another roundtable member reported that his production unit uses AI for maintenance and to examine piping photos to check for damage. "We've developed a tool that can check for corrosion," he said. "This helps us determine the right places to build scaffolding, so we don't have to waste hundreds of thousands of dollars building it in the wrong places like we did previously."

A third roundtable attendee added that his company is about to stand up advanced process control (APC) on a unit. "However, this program can't learn yet," he explained. "We're building the model, but this isn't where AI can help."

A fourth member agreed that while APC applications have been available for years, they are typically limited by the algorithms used to populate them. "This is where AI could help because its technology is faster and potentially more capable," he added. "AI could be leveraged for new operating regions and help provide feedback we can use for optimization.

"We see AI as helping with predictive maintenance," he added. "We previously looked at it for condition monitoring because we needed to get the compressors performing at better than 60% to 70% efficiency. Now, we want to get real-time health data of items like bearings, but APC can't do it alone. AI should be able to help, so we're making a big push in that direction."

A fifth member reported that his company runs numerous compressors and could use AI to assist in analyzing all the data they generate. "It's been a pain to schedule and have to sit on many maintenance issues," he said. "We think AI can help with them."

Two more roundtable members questioned AI's precision and reliability. "I don't think AI is precise enough for closed-loop control or other operations," he said. "It may be precise enough someday, but I don't know when that will be."

The other member noted that AI's performance depends on the reliability of its data sources. "If you add the wrong data, then AI could be like having a virus," he cautioned.

SEEKING A STRATEGY

Teughels added that all this input about AI shows that each player needs to research and develop a strategy that will be useful for them. "A couple of years ago, we asked if we needed a cloud computing strategy," said Teughels. "Now we need an AI strategy because without one we'll be all over the place, especially because we're often shorthanded. This is why we need to narrow our focus on AI and apply it in small steps. If it shows it's OK for populating a dashboard, then that will build our trust for using it elsewhere. We're also using AI to clean and validate data, so the next step could be asking it where to zoom in."

GENERATIVE AI ASSISTS FIELD PERSONNEL

by Mike Bacidore

Say adios to manual, paper-based systems that can be a black hole for field personnel's time. "A field technician doesn't need to carry 50-70 pages of paper documentation per job," said Hrishikesh Upasani, Honeywell's offering manager, workforce excellence. A more efficient option, he suggested, would be to ask generative artificial intelligence (AI) for the information or answer you need.

Announcing the launch of Field Process Knowledge System (PKS) at the Honeywell Users Group meeting in Madrid, Upasani presented use cases that ask AI to retrieve a P&ID or job tags, perhaps even access spare-inventory data. "Every information regarding the field activity is available at ease for the technician," explained Upasani, "even if your network is not working. The field tech should be able to access information in off-line mode."

With a summer 2024 launch ahead, pilot users can still join and help to direct the development of new features, as well as benefit commercially, said Upasani. The initial product will connect with a company's SAP enterprise resource planning (ERP) system for work orders, maintenance records and inventory of spares. Plans for connectivity with other ERP systems are in the works. Likewise, connectivity to Experion PKS for real-time and historical data, as well as alarming and trending, is available with the initial launch, while connectivity to other distributed control systems is a possibility for the future.

Equally important is the Field PKS platform's access to document repositories for OEM documentation, plant-specific procedures and safety guidelines, as well as access to OT systems for operations management, asset performance management and alarming management.

Field PKS will feature two interfaces—one for supervisors and planners and another for field operators and technicians. The supervisor screen display will include a dashboard for job-pack creation, analytics and reporting, while the field worker's handheld, Android/iOS-based mobile display will give access to the generative-AI-based assistant, powered by GPT technology, which can provide a variety of contextual information.

"We need to make use of cutting-edge technology such as generative AI and artificial reality to provide complete visibility of field and workflow management." Honeywell's Hrishikesh Upasani announced the launch of Field PKS at the Honeywell Users Group meeting in Madrid.

CONNECTING THE DOTS

Field technicians and their supervisors face a variety of challenges due to disparate systems that have been siloed for decades. Field PKS looks to address those by using generative-AI technology to bridge those silos and make informed decisions based on specific application needs.

Despite overwhelming access to data, many organizations still look to gain better insights into that data. And, with the loss of skilled and experienced staff to retirement and turnover, tribal knowledge is being lost. Field workers are being asked to complete tasks right the first time, despite data that's often asymmetrical between the field and the SAP panel, said Upasani, whose development team identified multiple challenges—operations-to-maintenance handovers; unavailability of contextual data in field; equipment location identification; frequent reskilling/upskilling needs; field collaboration; history capture; resource allocation; and safety concerns—that Field PKS addresses.

The initial vision is to interface with the ERP, document system and visual communication system, as well as Honeywell's Experion PKS, historian, asset performance management software, field device manager and operations management software.

"We need to have a one-stop shop for our customers who do all of their work in the field," explained Upasani. "We need to make use of cutting-edge technology such as generative AI and artificial reality to provide complete visibility of field and workflow management. Field PKS is a rich, web-based application for faster scheduling and tracking of planned and unplanned maintenance."

For maintenance personnel, Field PKS integrates the ERP system for work orders, past maintenance records and spares inventory, as well as related documentation from the Experion PKS or other systems. The supervisor gets a dashboard to monitor and manage tasks, personnel and inventory.

Upasani presented a use case involving a split case pump, which typically has its axial wear rings replaced every 5,000 running hours. There are five steps and five separate pieces of documentation for that process, which normally takes 36 hours to perform, he said. The generative-AI assistance of Field PKS is able to turn that into a 20-hour process, saving 16 hours, as well as an additional $12,000 savings in spare-parts consumption.

Using Field PKS reduces human error, downtime, maintenance expense, direct material expense and working capital, explained Upasani, who shared a plethora of calculated benefits for users: up to an 80% reduction in time spent on procedure preparation, up to a 20% increase in wrench time and up to a 25% decrease in equipment downtime, not to mention decreases in insurance costs.

CAN YOU MEASURE THE OUTCOME OF YOUR CYBERSECURITY INVESTMENTS?

by Keith Larson

When it comes to cybersecurity measures, return on investment has always been difficult to calculate. As with other forms of risk reduction, how much is enough? And if the feared disaster doesn't materialize, does that mean you spent the right amount? Too much? Or too little and you just got lucky?

In the case of ensuring the cybersecurity of industrial OT environments, Honeywell Process Solutions has developed a better way based on its more than three decades experience helping to secure the assets of some 10,000 customers, according to Jazeem Mohammed, global industrial cybersecurity director , Honeywell Process Solutions.

The traditional method of cybersecurity investment starts with a transactional, customer-defined initiative that may or may not accomplish an organization's true goals. "It's an outdated execution model after which the value of the service provided is not visible, and the customer retains full responsibility for risk management," Mohammed explained in a presentation at the Honeywell Users Group (HUG) meeting in Madrid.

In contrast, outcome-based services are strategic agreements that both parties agree to. Cybersecurity is treated as an ongoing pursuit; the client pays for intelligent results; and the two parties partner to develop shared roadmaps for the future. "You are buying an outcome not a solution," he said. And by an outcome, he meant that technologists in the OT realm have had sufficient time to develop standards and regulations that describe the qualities of cybersecure systems.

"And compliance with the standards relevant to your organization is a key outcome that we can help you achieve," he said. Beyond compliance with industry standards, quantifiable outcomes that can also be addressed include risk reduction, operational safety, workforce development, resilience and business continuity.

"You are buying an outcome not a solution." Honeywell's Jazeem Mohammed discussed the company's outcome-based approach to advancing the OT cybersecurity of its industrial clients.

The program is modelled on one that the company developed a dozen years ago to work with industrial clients to deliver specific outcomes for users of its Experion PKS control systems. A key difference is that in the case of OT cybersecurity, nearly every plant and every company is already on a journey and may have an array of non-Honeywell systems in place. "It's not about changing your platform, but how can we help you continue the journey you're already on," Mohammed said.

Honeywell's methodology begins with gaining a better understanding of where a client currently stands on a cybersecurity maturity index, then mapping a journey forward to an agreed upon state, often compliance with relevant industry standards. A range of quantitative key performance and key risk indicators (KPIs and KRIs) create a "posture score," documenting progress along the way.

"The program will give clear visibility on the investment required to improve cyber outcomes in a timely manner," Mohammed said. "We look at the outcome; we focus on where you are now, and a vision of where you want to go."

FORGE SUSTAINABILITY+ BALANCES POWER SUPPLY AND DEMAND

by Mike Bacidore

Managing energy consumption in a facility traditionally consists of satisfying demand with an eye toward avoiding peak rates. But what if a system could integrate data from the supply side and the demand side to create a building-management solution that optimizes usage for sustainable outcomes?

Honeywell Forge Sustainability+ for Buildings is designed to orchestrate the two sides of the equation and bring them into harmony. Whether it's a process plant or the company headquarters office, significant challenges regarding energy costs, business continuity and resilience, electrification, hidden energy charges and carbon-emissions compliance exist.

"With increasing heat-pump and EV adoption, how do you properly manage increasing building load with limited grid capacity?" asked Adam Eliason, offering management lead, Honeywell, who spoke at the Honeywell Users Group meeting this week in Madrid. "We're expecting electricity prices to grow."

PRACTICE WHAT YOU PREACH

Honeywell has embarked on its own carbon-neutrality plan, keen on reaching a 50% reduction in Scope 1 and 2 emissions by 2030 and becoming carbon-neutral by 2035. Through operations optimization, renewable energy, efficiency and sustainability practices, fuel switching and electrification, carbon capture and environmental release mitigation, Honeywell is leveraging many of its own cross-functional capabilities to achieve its goals.

At the Honeywell facility in Lugoj, Romania, for example, the plant was experiencing frequent loss of grid power, which resulted in shutdowns. A combined Honeywell team set out to resolve not only the issues of grid reliability, power quality and renewables integration, but also lowering energy costs and reducing the facility's carbon footprint.

A microgrid solution reduced emissions by 60%, and more than 80% of electricity consumed at the facility is now generated by on-site renewables. "We did 1 MW of PV rooftop solar," explained Eliason. "We added 1 MW of storage, as well. We've reduced our energy import from the grid by 30%." The facility uses Experion Energy Control System and the Forge Sustainability+ Power Manager in conjunction with a 1.6 MWh Honeywell battery energy storage system (BESS), diesel genera-

"It is a full turnkey solution for the supply side and the demand side." Honeywell's Adam Eliason brought the power equation into balance at the Honeywell Users Group meeting in Madrid.

tors, ControlEdge controllers and a SCADA system to enable a complete electrical power backup during grid blackouts and also advance Honeywell corporate sustainability targets.

BOTH SIDES NOW

Honeywell finds itself in the unique position of having business segments with decades of experience on both sides of the energy equation. Whether it's supply or demand, optimization technology is available.

HVAC systems are typically the largest consumers of energy on the building demand side, explained Eliason. By reducing the electrical load to overnight when the price is cheaper, facilities can optimize power by determining when HVAC or other loads run.

To orchestrate demand and supply, Forge Sustainability+ for Buildings allows facilities to look at shedding load and increasing supply to optimize the two together. Intelligent building optimization includes collecting and analyzing real-time occupancy sensor data, indoor-air-quality parameters, weather conditions, temperature, humidity and pollution levels, so that HVAC can meet sustainability goals and reach desired indoor-environment outcomes.

"Honeywell Forge Sustainability+ for Buildings is an autonomous controls platform that helps manage the environmental impact of buildings without compromising operational outcomes," explained Eliason. The Power Manager for Buildings directs load shedding, shifting and limiting on the demand side, as well as peak shaving, frequency/voltage regulation, islanding and black-start on the supply side.

Power Manager optimizes electricity costs, helps to reduce carbon emissions and improves return on investment by increasing revenue streams with market participation in demand-response programs, and it protects resilience and uptime. "It is a full turnkey solution for the supply side and the demand side," said Eliason. "We integrate with the system. It doesn't have to be a Honeywell building-management system. It may be a bit unique in terms of what customers expect from us. By combining supply and demand, we can increase value with multiple, stacked services. Advanced AI/ML algorithms are used to optimize the entire system."

Power Manager integrates the Honeywell Forge Sustainability+ for Buildings system with microgrid assets and the Experion Energy Control System for peak prediction, frequency regulation and autonomous dispatch.

"We've implemented this at schools, government buildings, military facilities, research areas and process groups," said Eliason. "We offer two delivery models—as a traditional program, which is treated as CapEx and Opex on the balance sheet, and as a service, which keeps it off the balance sheet."

ONEWIRELESS EXPANDS THE REACH OF EXPERION PKS

by Mike Bacidore

One of the biggest benefits of the Honeywell OneWireless system is its ability to support multiple protocols for more flexibility, said Jose Huerta, senior global product manager, industrial networking & wireless, Honeywell, who spoke at the Honeywell Users Group meeting in Madrid. The mesh network eliminates wired devices and is one single secured network. "These reduce expenses and maintenance costs," noted Huerta.

The Honeywell OneWireless infrastructure is capable of supporting ISA100 Wireless and WirelessHART field instruments, Wi- Fi devices and Ethernet/IP-based devices. The Wireless Device Manager (WDM) is a network gateway and system manager designed to offer secure and reliable communication. The Field Device Access Point, Gen3 (FDAP) provides wireless coverage for ISA100 Wireless and WirelessHART devices, while the FDAP Gen3 Plus (FDAP3P) is a field-upgradable version. The Process Control Access Point (PCAP) provides Wi-Fi IEEE, ISA100 and WirelessHART connectivity in a single integrated unit.

"OneWireless is easy to expand and easy to scale," said Huerta, who discussed Exerion PKS networking innovations, OneWireless and the Control Network Module in his update presentation. "We're increasing the capacity of each access point. You'll be able to leverage your existing infrastructure, so there's no need for you to buy additional hardware, just licensing."

Recent features of OneWireless R330 include the integration of real-time location, an FDAP capacity increase from 100 to 200 devices per access point, LoRaWAN transmitter integration via LoRa gateway and MQTT protocol integration with WDM. WDM data can be published to the MQTT broker, and WDM can subscribe to the MQTT broker using plain vanilla MQTT with no Sparkplug B. OneWireless supports LoRaWAN, ISA100, WirelessHART and Wi-Fi devices.

Going forward, the OneWireless R340.1 release in December will include increased infrastructure capacity, configurable FDAP redundancy, Sparklplug B support for the MQTT interface and SNMP support by extending the protocols, centralized management system and improved migration paths. The estimated release of FDAP Gen3 series C1/D1 Zone 1 (FDAP31) is set for September, and it will have increased device capacity and additional power options.

"OneWireless is easy to expand and easy to scale." Honeywell's Jose Huerta updates users on what's new with Honeywell's wireless mesh network at the Honeywell Users Group meeting in Madrid.

NETWORKING INFRASTRUCTURE

Honeywell-supplied networking platforms are based on models from switchgear manufacturers and specifically selected, tested and optimized for Experion PKS. These platforms are configured to Honeywell specifications for the optimal user experience.

Honeywell is working to qualify a lower-cost switch that can be a cost-attractive alternative for smaller systems. Various vendors are being evaluated. Many Cisco Internetwork Operating System (IOS) versions of switches support Control HIVE and IO HIVE.

"Bringing lower-cost switches to the market is one of our higher priorities," said Huerta. "The C1000 was not able to meet qualifications, so it's not working for us to meet FTE technical requirements." Its limited ternary content-addressable memory (TCAM) was the sticking point.

Honeywell collaborator OTN Systems' XTran nodes use the multi-protocol label switching—transfer profile (MPLS-TP) protocol, so protection can be guaranteed to the network's lowest level. XTran is being certified for Fault-Tolerant Ethernet (FTE) deployments. Some testbed scenarios have been certified, and the target is to certify XT, XTD and XTR series with FTE, explained Huerta.

The vision for the Experion Network Manager (ENM) is for it to become a simple user interface for managing the network with near real-time discovery and visualization of the network infrastructure. "You will be able to create baseline configurations and validate if they're still in place and report deviations from the trusted baseline," said Huerta.

ENM components include simple-to-use browser-based interface, network visibility, containerized deployment, easy network-configuration generation, switch-configuration deployment and future integration with advanced services and tools, such as connectivity with Enabled Services and Cyber Insights.

The Control Network Module is a ruggedized Level 1 network device. L1 devices will be connected to the CNM. Qualified FTE switches will continue to act as the L2 core devices. As of February, the CNM R100 was qualified and tested. It is a four-port version for safety applications only in the Universal Safety Cabinet (USC). In mid-June, the CNM R101 will launch. Also a four-port version, it can integrate IO HIVE in the Universal Process Cabinet (UPC). The CNM R110 will be released in early September and will include an eight-port expansion module, creating a total of 12 ports, with the ability to integrate safety applications in the USC and IO HIVE in the UPC. In mid-December, the CNM R200 with Tofino Modbus TCP firewall will be released.

MIGRATE YOUR SAFETY INSTRUMENTED SYSTEM? IT'S EASIER THAN EVER

by Jim Montague

After 20 or 30 years of faithful service, it's certain any safety instrumented system (SIS) will need some updates and upgrades, if not an outright replacement. The trick is identifying and implementing all the advances and innovations that likely emerged during the SIS's long tenure.

"An SIS usually needs modernization when it, or part of it, is facing obsolescence. But it's important to step back and think about what needs to be done," said Steve Lindsay, solutions leader in competitive displacement at Honeywell. "Ongoing compliance is a given, but are there valuable lessons learned that should be considered in advance of any migration? What hard-earned intellectual property (IP) do you want to capture and document for future use?"

Lindsay presented "Retain IEC 61511 compliance while modernizing an SIS" at the Honeywell User Group meeting in Madrid.

BACK TO SIS BASICS

Whether an SIS is being upgraded or implemented for the first time, Lindsay reported there are several directives and procedures that should be closely followed. These include completing a risk assessment (RA) and process hazards analysis (PHA). There are several options for performing these, but one of the best known is the IEC 61151 process safety summary, which includes:

- Initial assessment employing a HazOp and PHA, and using those results to do a layers of protection analysis (LOPA) and assign protection layers.
- Draft a safety requirement specification (SRS) and design safety integrity functions (SIFs) that provide safety integrity levels (SILs) consistent with the needs indicated by the initial assessment.
- Implement the SIS and validate via factory assessment test (FAT) or site assessment test (SAT).
- Operate and maintain, with proof testing as indicated.

"We had one customer with 100 PLCs they wanted to modernize, but now they no longer had to wait. They could pull years of logic in advance and add what they needed and wanted. They were ready ahead of time and got their SIS migration off the critical path." Honeywell's Steve Lindsay discussed how to apply essential methodologies and new tools to ensure your SIS works as intended.

"If your SIS or emergency shutdown (ESD) system has been operating for 20-30 years, you need to determine what steps to take before you migrate it," explained Lindsay.

REALIGN AS-IS AND AS-DESIGNED

Lindsay reported that an effective SIS migration begins with a high-level walk of the facility and its legacy applications. This allows users to bring their function block logic back into an as-is definition; conduct offline and virtual tests; repeatedly emulate, migrate and verify their SRS design specifications as needed; and push it to a safety management system such as Honeywell's Safety Manager SC (SMSC) software.

The next step is reverse engineering to retain IP and produce an as-is state on an evaluation platform. Some considerations are:

- What format is my existing application in, such as ladder logic?
- How well is my existing application defined, and is it well commented?
- Does it meet new requirements and best practices?
- Have I fully documented all my requirements, and are they 100% covered?

"Users can manage their reverse engineering by leveraging assisted migration services with tools such as iDefine to automate application retrieval and replication; put the running application in formats consistent with IEC 61131 function block diagrams; and minimize human error when revising old applications," explained Lindsay.

To emulate an SIS application offline and verify its as-is state compared to its as-designed state, Lindsay added there are several steps for benchmarking to the original design. These include:

1. Verify the application against the SRS by documenting gaps, new or updated requirements, such as regulatory expectations or best practices.
2. Evaluate gaps and establish closure actions by asking if original requirements or assumptions are still valid, and reevaluate and update safety requirements as indicated. For example, reevaluate original safety integrated function (SIF) designs to determine if they're too optimistic or too pessimistic.
3. Leverage digitalization capabilities to connect data. Feed iDesign results to tools such as Honeywell's Process Safety Workbench (PSW) software to connect as-tested functions to as-designed ones and enable dynamic functional safety management (FSM) capabilities.
4. Test and document safety requirements achieved, and record automated testing scripts for reuse for easier, future FSM activities.

"Users can add cause-and-effects, step changes and what-ifs, such as if a pump isn't running, did its logic still behave in the right way?" said Lindsay. "It's important to determine whether operations diagrams were OK before the actual migration."

Next, perform offline emulation and verify as-is state against the "to-produce, as-desired" state before migrating. This involves capturing as-operated requirements by asking:

- Is the original design fully operational? Follow-up questions may include: Can proof testing be easily done while running? Are actual demand rates captured? Are bypass assumptions acceptable? Has the process changed enough to create a different steady state?
- Was equipment availability suitably accounted for? Follow-up questions may include: Is field equipment consolidated in too few controllers? Are there significant amounts of non-safety interlocks in the SIS?
- Were shutdown and restart conditions accurately captured? Plus, can the process be easily shut down and restarted? Are startup overrides accurate? And do interlocks affect how some equipment restarts?

To connect as-is to as-designed digitally, and employ lifecycle analysis tools like PSW and Honeywell's Process Safety Analyzer (PSA), Lindsay advised;

- Digitally connect SIS data;
- Use assisted FSM;
- Minimize human effort, and reduce manual effort;
- Use Dynamic Safety Lifecycle enablement;
- Update, adjust and verify requirements with all stakeholders; and,
- Track demand rates and bypassing.

NO TIME LIKE NOW TO MIGRATE SIS

"If an SIS has been running in its box for 20-30 years, and it's not documenting well, or its running OK but no wants to touch it, now may be the time when you have to touch it," added Lindsay. "One relatively recent innovation that can help is Honeywell's Universal I/O (UIO) and Safety UIO. These solutions incorporate operational lessons learned into migrated solutions, remove workarounds, and are often a preferred option for operations and maintenance teams. UIO and Safety UIO remove constraints such as homerun cables driving I/O allocations; assigning critical equipment across multiple systems or controllers; increase availability without decreasing reliability with Safety UIO; and provide hardware conversion kits to reduce footprint in existing equipment rooms and cabinets."

Finally, Lindsay reported that users can migrate their legacy logic to new logic and test functions. "For instance, when migrating from a typical, legacy Triconex one-out-of-two (1oo2) voting safety system to SMSC with 1oo2 voting, users can leverage the standard functional logic library.

"This allows a standard Experion PKS to display SIS status right out of the box. Maintenance is also easy via a publish function, and users can remove peer control data interface (PCDI) and Modbus arrays," he concluded. "We had one customer with 100 PLCs they wanted to modernize, but now they no longer had to wait. They could pull years of logic in advance and add what they needed and wanted. The were ready ahead of time and got their SIS migration off the critical path."

LNG PROVIDER BOOSTS OPERATOR COMPETENCE WITH IMMERSIVE FIELD SIMULATOR

by Mike Bacidore

Headquartered in Houston, Cheniere is a liquefied natural gas (LNG) provider with total production capacity of more than 55 million tons per annum. Its production facility in Corpus Christi, Texas, accounts for around 25 million tons, while the remainder is at the Sabine Pass facility, nestled between Texas and Louisiana.

With six offices globally and numerous pipelines, Cheniere employs more than 1,600 people, but the terminals in Texas are the focus of attention, with more than $40 million currently being investment at the two facilities.

Sabine Pass, which became an LNG facility in 2015, operates six LNG trains, and plans for more are already in the works. "Our first train in Corpus Christi became operational at the beginning of 2019," said Lance Brown, training manager at Cheniere, who shared details of his company's training transformation at the Honeywell Users Group meeting in Madrid. "By 2022, three trains were operational at Corpus Christi. Within seven years, we had nine LNG trains."

It was that same year, in 2019, when Cheniere initiated a capital project with Honeywell to develop and deliver training on the Immersive Field Simulator, a virtual platform for exploring a plant and interacting with components. A full plant was developed in a virtual environment with 26 pre-built scenarios for operations, health and safety (H&S) and emergency-response.

Bringing the tool online took longer than originally expected, due to delays caused by the COVID pandemic. "Training started in 2022," declared Brown, who noted that onboarding time for new operators at the facilities has already dropped from five weeks to two weeks at both facilities.

"As the training manager, our objective is to develop local resources for field operators, provide a comprehensive training setup for field operators and panel operators to train together, and to reduce onboarding training and on-job training," said Brown.

Prior to the Immersive Field Simulator, Honeywell didn't have a field solution. "We had a panel simulator," noted Brown. "Now we can use the Immersive Field Simulator and Operator Training Simulator (OTS) at

"We believe there are endless possibilities." Cheniere's Lance Brown explained the wide variety of ways that Honeywell's Immersive Field Simulator can help improve operator effectiveness.

both plants in virtual environments with five dynamic animations for visual learners."

A field operator might need to put on personal protective equipment (PPE), for example, so the user can select it virtually. "We have customizable avatars to meet diversity, equity and inclusion, and the OTS and IFS are integrated with each other," said Brown.

The Immersive Field Simulator has three operational modes: exploratory, step by step, and task practice and assessment.

"In exploratory mode, you can put someone in the IFS, and they can explore the plant," explained Brown. "They can't interact, but they can become acclimated. We use that on the first day of onboarding. By the end of that first week, we have them start to identify equipment by name and type." The user is placed in the environment in exploratory mode and then moves through it at their own pace, activating items and learning nuggets of interest.

NARRATED EXPLORATORY MODE

In the step-by-step, or guided, mode, there will be a narrator talking to the operator. "It will show the operator a path to help them learn the plant at a much more granular level," explained Brown. "There are stop signs and caution signs, and the narrator might explain the considerations the trainee should be thinking of." The user is led through learning exercises with varied scopes of actions to ensure learning is covered for essential or regulated courses.

Once they've completed the guided assessment mode, they move into the assessment mode. The user is given increasingly complex tasks to do with a relatively high degree of latitude. "There's software running 100% of the time in the assessment mode," said Brown. "They have to achieve 90% on the assessment."

Cheniere is already using the virtual platform for a variety of cases. "We use the IFS for apprenticeship onboarding," said Brown. "We partner with the local community colleges. We take students with associate degrees in process technology and bring them onboard for a year."

The primary use is for operator and field training, similar to the apprentice training. "We also use the IFS if there is an operation scheduled that we haven't done in some period of time," noted Brown. "We have those operators revisit the IFS before executing."

QUALIFICATION REQUIREMENTS

Because Cheniere has regulatory requirements to qualify every two years, it has embedded the IFS into qualification and requalification. "We use those scenarios as a means of qualification," explained Brown. "We take the traditional subjectivity out and make it objective. In the virtual world, we can put them through anything that we want."

The simulator is also being used for facility tours. "Any person who comes to the facility can be put into the IFS, and we can take them on a tour," added Brown. "We believe there are endless possibilities."

Some potential future applications include deploying incident command training; operations, H&S and emergency-response scenarios; and turnaround planning. "Instead of tabletop drills, we can put them in the virtual environment," said Brown. "It will strengthen our overall incident command capabilities. As we've adopted these emergency-response scenarios, we're going to be reaching out to Honeywell to expand that capability. In the virtual world, you'll see fire extinguishers, but they're not interactive now. We want to make those interactive. Our maintenance planners use a 3D CAD model. In the virtual world, you can see things like where a crane would fit or wouldn't. Maybe we can use a virtual tool to measure distances in the simulated world."

TECH PANEL Q&A BRINGS HONEYWELL USERS GROUP TO A CLOSE

by Keith Larson

Remarkably, after three discussion-packed days centered on the latest technology advances in the field of industrial automation, attendees of the Honeywell Users Group (HUG) meeting in Madrid, still had a few questions to ask.

In what has become a centerpiece of the event's closing session, Cindy Bloodgood, offering director for the company's lifecycle support services, posed a series of customer questions—submitted through the event app—to a panel of subject matter experts from the Honeywell Process Solutions organization. These included Nisha Lathif, general manager, upstream oil & gas; Alicia Kempf, director of offering management, process automation systems; Liz Jones, director of engineering; and Brian Reynolds, CTO projects and automation solutions.

She started with one for Nisha Lathif aimed at Honeywell's support of Industrial Internet of Things (IIoT) applications: "How is Honeywell adapting to offer innovative solutions that leverage the existing installed base?"

"Honeywell has been developing IIoT applications since before there was an IIoT," began Lathif, going on to describe the company's Experion Elevate, a cloud-based, software-as-a-service SCADA solution, and well as the new Versatilis Signal Scout, a detector of methane fugitive emissions that communicates via LoRaWAN wireless protocol for extended reach. "There are other wireless sensors for equipment health and a lot more solutions coming," she said.

"It's been about a year since Honeywell acquired Compressor Controls Corporation," resumed Bloodgood, this time addressing Brian Reynolds. "What has been done to integrate CCC applications into solutions like Experion PKS?"

Reynolds responded, referring to the longstanding relationship that already existed before the acquisition, and affirmed that tighter integrations are in the works. "Turbomachinery Advisor already exists as an advanced module within Honeywell's Asset Performance Management portfolio and can be deployed on premise or in the cloud via Honeywell Forge." Other integrations in-

"What will happen to my support if I haven't migrated my legacy system by the end of 2025?" This urgent question from a user facing imminent system obsolescence was among those posed by Honeywell's Cindy Bloodgood to a panel of the company's technical leaders to wrap up this year's Honeywell User Group in Madrid.

clude function blocks to execute CCC functions within the Honeywell C300 controller, as well as within the Experion Field Device Manager, Reynolds noted.

Moving on to question three, Bloodgood asked Nisha Lathif: "Which protocol does Honeywell think is the best to connect between OT and IT for Industry 4.0? Any thoughts on OPC UA vs. MQTT?"

Lathif was suitably diplomatic, noting that "we don't pick sides" among protocol standards. She added that Honeywell supports both OPC UA and MQTT, depending on customer needs. "The two standards often work hand in hand."

Bloodgood then framed the question that is perhaps most often asked of solution providers like Honeywell in this day and age: "How will Honeywell utilize AI in industrial automation in the near future?"

Alicia Kempf handled this one on behalf of the team, identifying operations, engineering and services as key arenas where AI is proving beneficial. In the operations realm, AI is auto-generating operator graphics based on the particulars of the situation. On the engineering front, AI is proving useful in the migration of legacy PLC code. "It helps to identify required test cases," she said. "Structure and layout of engineering documentation is another use case. Standard templates can be automatically populated with data and yield finished documents with less engineering effort."

"Solutions like Field PKS and the Experion Operator Advisor are about improving safety and productivity for our customers," added Liz Jones. "Enabled services and Honeywell Digital Prime, the always on, digital replica of your system, will benefit from AI. And TechGPT, currently in pilot, is a solution that quickly retrieves relevant information from documentation to guide customer service representatives to the help solve customer problems more quickly."

Bloodgood's final question to the panel may have been a plant, but nevertheless addressed a key pain point for some users in attendance: "What will happen to my support if I haven't migrated my legacy system by the end of 2025?" she asked, referring to the imminent obsolescence of the company's TPS, or TotalPlant Solutions, control systems that first debuted in 1998.

"Parts for TPS systems will simply not be available beyond 2025," responded Liz Smith. "Please plan your migration now," she pleaded. "As a last resort, we will recycle parts that have been taken out of service," she said, "But only as a last resort."

"Use AMT," added Brian Reynolds, referring to the company's Advanced Migration Technologies. "Migration can be done on process (without shutting down), and it's only one hop to current technology."

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