WERUM
KÖRBER SOLUTIONS

PAS-X NEWS

Dear customers,

Digitization, data-driven execution and automated decision-making are on the horizon. We have initiated several projects to support you on this journey, but it all starts with change: changes in thinking, technology, business models, corporate culture … we invite you to add to this ever-expanding list.

Recently, we have brought three game-changing ideas into reality: For starters, PAS-X as a Service brings Werum's proven MES into the Cloud. The solution allows you to leave the IT infrastructure to us to better allocate your resources. Especially suitable for biotech startups and smaller production sites, PAS-X as a Service allows manufacturers to concentrate on core business needs rather than day-to-day IT tasks (see page 12).

Next, whether touch, speech or gesture control, innovative operating concepts are increasingly impacting pharma manufacturing. Together with partners, we are developing solutions to integrate cutting-edge concepts into our manufacturing IT solutions (see page 6).

Another recent launch is Werum's Enterprise Manufacturing Intelligence (EMI) solutions, enabling you to leverage your production data toward better decision-making and deeper insight into production workflows. Your pharma plant is a treasure chest of data – our EMI solutions provide the key to open it (see page 12).

As part of the Medipak Systems group of companies we are creating intelligent and user-friendly solutions. We link our technologies and know-how to provide joint solutions that generate the greatest possible benefit for you.

Are you ready for change and innovation? Let us guide you through your own digital advancement.

Yours sincerely

Rüdiger Schlierenkämper
CEO Werum IT Solutions

Hans-Peter Subel
CTO Werum IT Solutions

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NEW ANSWERS for the digital pharma factory.

ASTRAZENECA, AUSTRALIA

INNOVATION: HANDS-FREE LINE CLEARANCE WITH VOICE DIRECTED TECHNOLOGY AND PAS-X ELECTRONIC BATCH RECORD INTEGRATION

AstraZeneca introduces voice command of Werum's PAS-X MES at Australian site in North Ryde / Uplift and digitization of manufacturing processes / Build-in quality by design

AstraZeneca Australia together with Werum revolutionized the operation of PAS-X MES at their production site in North Ryde: Operators can now perform the packaging line clearance hands-free through their headset.

In the past, operators had to perform a complex cleaning and clearance SOP whilst opening and checking the packaging. The idea was born of using a voice directed technology which would enable mobile hands-free working environment to improve operator's experience and data integrity through real time data entry.

AstraZeneca integrated the technology familiar from warehouse picking into Werum's PAS-X MES. Operators receive their instructions audibly through the headset, execute the step and confirm it verbally step by step. Both production and quality departments love the new way.

"The benefit of voice directed technology is that we uplift and digitize our manufacturing processes further – introducing Industry 4.0 to biopharmaceutical manufacturing," says Geraldine Murphy, Site quality manager at AstraZeneca Australia. "We are building quality by design into our processes and it enables the end users to work hands-free and right-first-time philosophy."

For this project, AstraZeneca was honored at the Pharma 4.0 Award with the third place in the category "The Innovators".

SHARP PACKAGING, GLOBAL

LEADING CONTRACT PACKAGER SELECTS WERUM AS STRATEGIC MES PARTNER

MES as differentiator to digitize operations and improve business opportunities / PAS-X compatibility and a shared customer base key decisive factors / First implementation in Dutch packaging facility

Following a global bidding process, Sharp Packaging selected Werum IT Solutions as its strategic MES partner to implement an Electronic Batch Record infrastructure at its Netherlands facility. Sharp is an international market leader in providing commercial and clinical contract packaging services to the pharmaceutical and biotechnology industry. Headquartered in Allentown, PA, USA it works from state-of-the-art facilities in the United States, United Kingdom, Belgium and the Netherlands.

By using PAS-X, Sharp Packaging will benefit from greater compliance adherence, improved right first time and process standardization. The company starts its MES journey with the rollout of PAS-X at its production site in Heerenveen, the Netherlands. PAS-X fully integrates the existing Navision ERP system. The project is being implemented for one of Sharp's customers, a large Japanese pharma company.

"We see MES as a strategic system that gives us competitive advantages," says Rick Seibert, SVP of Technology & Innovation at Sharp Packaging. "Investment in EBR will serve to improve our business opportunity pipeline and digitally transform the way in which the batch record process is executed. We have chosen Werum's PAS-X MES because of its proven ability to handle the most complex batch records without significant configuration as well as it's track record with a number of Sharp's existing customers."

TAKEDA, IRELAND

GLOBAL PHARMA COMPANY INTRODUCES DIGITAL OPERATIONS

PAS-X go-live at Takeda's API production site in Grange Castle, Ireland / Successful transformation to paperless factory / Huge benefits in quality, regulatory compliance, operations and data availability

Takeda Ireland Ltd has rolled out Werum's PAS-X MES at its Grange Castle, Ireland, production site. Takeda is a global, research and development-driven pharma company focusing on oncology, gastroenterology and neuroscience therapeutic areas plus vaccines.

"With the help of PAS-X we were able to transform our site into a paperless factory," says Paul Keogh, Plant Director, Takeda Ireland Ltd Grange Castle. "The new digital operations provide huge quality, regulatory, operational, and data availability benefits. Examples include work standardization, human error avoidance, data entry reduction, batch review by exception, manufacturing decision support, and data visualization. Moreover, the MES based Level 2-4 integration is a solid platform for digital innovation and operational expansion."

PAS-X automatically pulls manufacturing data from the shop floor by integrating Takeda's PCS via OSI-PI historian. Thus, approximately 94 percent of all parameters in each batch record are automatically entered to the batch record. MES is configured to download control recipes to the process control layer and to synchronize EBR with real-time process controls to ensure batch data entry is contemporaneous and original as production progresses. In addition to the basic data integrity benefits, the EBR enforces electronic signatures, based on GxP and safety risks, and standardized manufacturing processes.

In addition to the shop floor integration, new SAP-PAS-X interfaces were developed as part of a global SAP template rollout. These interfaces enable a seamless exchange between the global supply chain and the local manufacturing execution process.

The integrated MES template provides a basis for MES expansion to support operations for two new innovative manufacturing plants currently under construction at the Takeda Ireland Grange Castle campus.

ZAMBON, ITALY

LEADING MID-SIZED PHARMA MANUFACTURER IMPLEMENTED WERUM'S PAS-X OUT OF THE BOX

Zambon started PAS-X deployment for MBR and EBR in solid production at Vicenza site in Italy / Replacement of paper-based batch execution and documentation / Italian user interface

Zambon successfully implemented Werum's PAS-X MES at their main production site in Vicenza, Italy. The Italian pharmaceutical and fine-chemical multinational company is well-established in three therapeutic areas – respiratory, pain and woman's health – and is strongly committed to its entry into the CNS space. In Vicenza, the leading mid-sized pharma company produces for instance Ibuprofen tablets.

"We were searching for an Electronic Batch Recording system to create, manage and store Master Batch Records and to manage and store Batch Record Execution data," says Marco Rivolta, IT Senior Specialist, Zambon S. p. A. "We selected Werum's PAS-X MES because of the out-of-the-box approach for an affordable paper-on-glass solution and its broad functionality covering future requirements.

All equipment logbooks are now electronic and we had a remarkable six percent relative increase of the batch right-first-time factor."

PAS-X has been deployed out of the box and with an Italian user interface. In the first phase, Zambon uses MBR and EBR functionality to cover the granulation, tableting and coating production area for the solid production unit. The SAP ERP is integrated by means of a standardized interface. Zambon plans to scale-up MES functionality to include further process steps such as weighing and dispensing or packaging.

NEW ANSWERS for the digital pharma factory.

PHARMA 4.0 – VERTICAL INTEGRATION

NEW: PAS-X MSI 1.1 – EQUIPMENT INTEGRATION IN PHARMACEUTICAL PRODUCTION NOW EVEN EASIER

New version of Werum's PAS-X MSI Plug & Produce solution now available / Improved usability thanks to new dialog design / Advanced options for equipment integration / Seamless data acquisition to PAS-X KPI

Werum has launched an enhanced version of its Plug & Produce solution for the message-based shop floor integration. PAS-X MSI 1.1 offers additional user-friendly features and is available as a complete package with the required services and training.

"We analyzed the feedback from our customers and our own experience with past implementations," says Christiane Dickel, Product Manager, Werum IT Solutions. "These results were used in the further development of our Plug & Produce solution. A particular focus was placed on usability. Thanks to simplified user dialogs and new functionalities, it is now even easier to integrate equipment."

INDUSTRIE PREIS 2018
BEST OF

All messages from the MSI interface can be displayed in a well-structured dialog and filtered by different criteria. Now, it is possible to take into account more parameters for the integration of equipment than defined by the MBR. On top of that, PAS-X MSI 1.1 offers an alternative OPC-UA connection as well as an adapter for a web interface. Beginning with this version, all MSI data are also available in PAS-X KPI's external data interface, where they can be used for further analysis.

Werum's PAS-X MSI Plug & Produce solution was awarded as Best Of at the Industriepreis 2018 in the category "IT & Software Solutions".

FUTURE PHARMA MANUFACTURING

JOINT ABB / WERUM SOLUTION FOR MES-DCS INTEGRATION

Werum's Plug & Produce solution added to ABB's Manufacturing Operations Management solution / Customers benefit from reduced integration efforts and faster MBR creation / GE Healthcare is one of the pilot customers

In order to integrate Werum's PAS-X MES and System 800xA, ABB's Distributed Control System (DCS), ABB has added Werum's Plug & Produce solution based on PAS-X MSI to its Manufacturing Operations Management solution. The offering, called "Shop Floor Integration for Life Sciences", includes features for automatic parameter assignment and automatic synchronization of 800xA Batch Management recipe procedures and MES.

This automated integration significantly reduces engineering efforts for integration especially with the high validation requirements in a GMP production environment. Pharma and biotech customers benefit from simplified operation, faster MBR creation, and a joint deployment and validation approach. The substantial savings in engineering MBRs, and the integration between MES and DCS, are particularly appreciated. This is achieved by the new message-based communication, which enables parallel engineering of MBRs and recipes with a qualified method of exchanging data and syncing recipe execution and EBR.

Among the first customers implementing this new solution is GE Healthcare. At their manufacturing site in Uppsala, Sweden, which has one of the world's

largest installed capacities for production of chromatographic resins, GE Healthcare uses the Plug & Produce solution to integrate the automation and equipment level for the production of a chromatography medium (see page 5).

GE HEALTHCARE, SWEDEN

LEADING BIOMANUFACTURING PROVIDER STARTED PAS-X ROLLOUT

PAS-X MES went live at manufacturing site in Uppsala, Sweden / GMP-compliant and electronic batch execution / Werum's MSI Plug & Produce for easy integration of software and equipment

GE Healthcare has successfully gone live with Werum's PAS-X MES at its Swedish production site in Uppsala – using Werum's MSI Plug & Produce Solution for the first time. As a leading provider of medical imaging, monitoring, biomanufacturing, and cell & gene therapy technologies, GE Healthcare enables precision health in diagnostics, therapeutics and monitoring.

GE Healthcare wanted to change from paper-based processing and documentation to electronic batch recording for GMP-compliant production of chromatographic media. The EBR solution is to communicate with both Oracle ERP and ABB's 800xA process control system and support common QA mechanisms such as Review by Exception.

"We opted for Werum's PAS-X MES because it is an established and proven Pharma MES with very good references," says Eva von Heijne, Head of Manufacturing, Uppsala, GE Healthcare Life Sciences. "PAS-X helps us to assure the quality of our processes and to meet all compliance requirements."

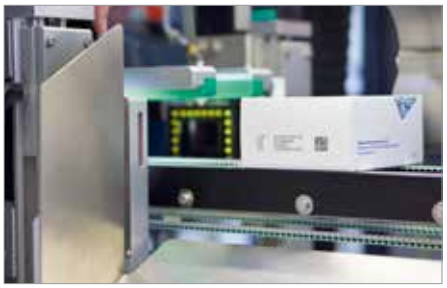
PAS-X was implemented as full-scope MES with little customizations. The process control system as well as smart equipment were successfully integrated with PAS-X using Werum's easily configurable MSI interface. Through this standardized and message-based interface, both levels can communicate directly with each other.

In the next step, the operation of PAS-X is planned to be extended to other production areas in the Uppsala facility.

MENARINI, GLOBAL

LARGEST ITALIAN PHARMA MANUFACTURER INTRODUCES PAS-X TRACK & TRACE

Rollout in seven production sites in Germany, Italy, Russia and Spain



Following an international request for proposals, the Menarini Group opted for Werum's PAS-X Track & Trace as its global L3 serialization solution. Werum will work in conjunction with a L4 solution and other relevant applications present in the Menarini system landscape in order to be compliant with FMDs and other regulations. The rollout program will start with implementations in seven manufacturing sites – e.g. in Germany, Italy, Russia and Spain.

Menarini is the leading Italian pharmaceutical company in the world. The group's three divisions – research, biotech and diagnostics – are committed to therapeutic areas such as cardiovascular diseases, oncology, pain/inflammation, asthma and anti-infectives.

Menarini required an independent, flexible platform to integrate different suppliers on ERP and automation level. PAS-X Track & Trace connects to three different ERP systems and three different level-2-suppliers. It provides serialization and aggregation functionality to all Menarini products to comply with the international anti-counterfeiting requirements.

INTERVIEW: SHOP FLOOR OF THE FUTURE

INNOVATIVE CONTROL CONCEPTS COME TO PHARMA MANUFACTURING

Interview with Christiane Dickel, Product Manager, Werum IT Solutions

Whether touch, speech or gesture control – new operating concepts will increasingly find their way into the pharmaceutical and biopharmaceutical industries. Together with its partners, Werum is developing solutions to integrate these cutting-edge concepts into its manufacturing IT solutions.

What control concepts are we talking about?

Christiane Dickel: The approaches include augmented reality, wearables or voice control. What these methods have in common is that they enable contactless human-machine interaction, which offers great potential: Operators can act more efficiently if their hands are free. In addition, these approaches help to avoid operator errors, reduce the amount of training and increase the utilization of machines.

To which processes can these concepts be applied?

Christiane Dickel: Based on our analyses and customer surveys, we have identified several use cases, for example: line clearance, changeover, material handling production, sampling, user authentication and SOP confirmation.

Is there already some practical experience?

Christiane Dickel: Yes. Vifor Pharma, St. Gallen, for example, has implemented a system called OptiworX to support set up and changeover including format changes of a complex packaging line. OptiworX is a networked system that uses smart and augmented reality devices like HoloLens. Vifor is currently installing the system by Goodly Innovations in a second facility. AR glasses are capable of integrating augmented information with the physical environment, enabling the user to interact with this information through gestures.

How does the "augmented" changeover or line clearance work?

Christiane Dickel: Until now, users had to hold a printed SOP with a fixed amount of tasks in their hands and follow it step by step. This was a time-consuming, error-prone process which did not provide the required flexibility, for example, when the size of the team changed. Now users are guided safely and precisely using AR and smart devices, e.g. HoloLens, through the process. They can see exactly where to carry out which action and what the correct parameters are. This has enabled Vifor Pharma to considerably shorten their changeover times and to increase the runtime of their machines. We are currently working on a PAS-X integrated prototype of OptiworX, the software Vifor Pharma is also using. The system can be applied for changeover and line clearance processes.

"What all these methods have in common is that they enable contactless human-machine interaction, which offers great potential."

***Christiane Dickel**, Product Manager, Werum IT Solutions*

Does it mean that augmented reality would be the first choice?

Christiane Dickel: Not necessarily, as a trendsetting AstraZeneca project shows: together with Werum, the biotech company has introduced voice command in the line clearance processes of their Australian site in North Ryde. For that purpose, the operators wear a headset through which they receive their instructions. Every time they perform a specific step, they confirm it verbally through the microphone. On page 2 of our newsletter, you will find a detailed article on this topic.

What would the use of wearables in the pharmaceutical industry look like?

Christiane Dickel: We'll see wearables play a larger role in the pharma industry as we move forward. The Nymi Band is an excellent example of a wearable helping to improve compliance and data integrity. It is a multi-factor biometrically authenticated wearable worn by shop floor workers and managed by the enterprise. After setup, the user simply has to put on the Nymi Band and authenticate using their fingerprint. The device will remain authenticated for as long as it remains on the user's wrist. The band also has sensors to read the wearer's electrocardiogram. This confirms that the person wearing the Nymi Band and placing their finger on the sensor is indeed the authorized person.

How do PAS-X and Nymi Band work together?

Christiane Dickel: To log in to PAS-X, the operator simply places his authenticated Nymi Band in front of an NFC reader at the terminal, and the system logs the user's intent. This procedure also allows him to provide signatures to the system. Additionally, through the use of Bluetooth technology, user proximity to the terminal is established, allowing automatic log off if the user leaves his terminal. Currently, we are working on a first prototype in collaboration with Nymi.

Watch our video: Changeover process on a Dividella packaging machine using HoloLens powered by Goodly Innovations in connection with PAS-X MES (prototype)

DIGITAL SERVICES

IMPROVED SELF-SERVICE PORTAL FOR WERUM CUSTOMERS

Web portal with customer-specific FAQ, know-how databases, current product information and further services / Continuous expansion for different products and user groups

Werum presents the second release of its self-service portal with an improved look & feel based on customer feedback and featuring new content. The portal can be accessed via https://selfservice-prod.werum.com. Currently, it includes content for PAS-X KPI and PAS-X 3.1.8, and is available for customers with a valid maintenance agreement for those solutions. In the next step, resources for other products will continuously be added.

In the future, the modern portal will present a wide variety of services and information regarding all of Werum's products and solutions, such as current product information, databases for know-how and configuration management, troubleshooting as well as a download area for software and documents.

"We want to offer our pharmaceutical and biopharmaceutical customers the best possible support on their way towards Pharma 4.0. For that purpose, we develop new digital services to make the processes with our customers easier," says Torsten Isenberg, Senior Director Services, Werum IT Solutions. "With our Self-Service Portal, we grant our customers direct access to solutions and information which are relevant for them. If you have any questions regarding the operation of the PAS-X installation in your plant, our portal will offer you basic information to help you solve potential problems that may arise. Additionally, we provide proactive services, such as the assessment of Microsoft patches."

All self-services can be reached from a single access point. Werum's Service Desk is also integrated into the Self-Service Portal, together with the Incident Management System (IMS). In the future, the portal will provide customized content not only to customers, but also to PFU members, UGM participants and Service and Sales partners.

ISPE FACILITY OF THE YEAR AWARD

CONGRATULATIONS: LARGEST THAI PHARMACEUTICAL MANUFACTURER GPO HONORED WITH ISPE FACILITY OF THE YEAR AWARD

Applying quality-by-design principles and international best practices / Vital role of Werum's PAS-X MES / Interfaces to ERP, LIMS and eQMS ensure efficiency and compliance / Production of low-cost HIV medicines possible

The Government Pharmaceutical Organization (GPO), Thailand, is Honorable Mention Winner at this year's ISPE Facility of the Year Awards. The largest Thai pharma producer was awarded for successfully applying quality-by-design principles and international best practices to its Rangsit plant to manufacture affordable HIV medicines.

Traditionally, GPO used paper-based systems for all processes, which required a large amount of manual data entry, with a varying effect on product quality. To control the processes and ensure data integrity with paperless operations, GPO went for Werum's MES.

PAS-X has been implemented as a full-scope MES across the whole facility, from the receipt of raw materials, warehousing, production until shipment of finished products. It integrates GPO's ERP and LIMS systems to ensure efficient and compliant data transfer. The MES is supported by an electronic QM system.

"PAS-X has enabled us to reduce paper records and replace them with an electronic and sequential way of gathering the right data for the right product from the right authority at the right time. The review-by-exception functionality allows us to start reviewing the events in real time – this saves time," says Dr. Mukdavan Prakobvaitayakit, Director of Quality Assurance Department, GPO.

The IT design and validation services were provided as a turnkey solution. The result was a production facility with efficiency gains which allow producing HIV medicines for a price 20 times lower than imported medicines while achieving global quality standards.

REGULATORY INFORMATION MANAGEMENT

NEW: RIMANAGER STARTER PACKAGE AVAILABLE FOR QUICK AND COST-EFFECTIVE IMPLEMENTATION

Best-practice approach jointly developed by Werum and EXTEDO

Christian Bohrmann, EXTEDO

Werum and EXTEDO announced the launch of RImanager Starter Package. The package includes the RImanager software and a set of services such as software installation, pre-defined and EMA SPOR-compliant configurations, best-practice content, consulting and training.

"Statistics show that organizations who follow a structured implementation approach typically reap a faster return on their investment than those who don't," said Christian Bohrmann, VP Marketing & Alliances at EXTEDO. "Pharma and biotech customers using our RImanager Starter Package benefit from faster and cost-effective implementation and pre-defined configurations that have been extensively tested. We developed this best-practice approach together with our partner Werum and regulatory experts."

RImanager enables pharma and biotech companies to efficiently manage their regulated product master data as well as plan and track related regulated activities, processes, submissions and commitments. It covers the entire lifecycle of pharma-ceutical products from a regulatory point of view including registration, submission management and pharmacovigilance processes. The software product RImanager is developed by Werum while EXTEDO is in charge of the global distribution, the product rollout to the customers and the definition of functional requirements for new product versions.

BIOTECH SCALE-UP

THE ROAD TO COMMERCIAL MANUFACTURING FOR CELL AND GENE THERAPIES

Werum's PAS-X MES targets the key challenges for cell therapy manufacturers, managing complex processes and controlling the chain of identity

Watch our webinar:
Learn more about scaling cell therapy into commercial manufacturing

Imagine you are an up and coming cell therapy company. You have gone through the exploration phase, with all of its complexities and are in the process of finalizing a breakthrough treatment. At this point a vision begins to develop of how to get to a commercial manufacturing setting, with all the tools and systems in place to support the process. The tools that worked well for you in the past may not necessarily work moving forward. There will be a need to consider new ways of doing things within the company to be successful moving forward.

As the vision to commercial manufacturing becomes clearer, there has to be some major considerations on ways to improve and streamline the manufacture of cell and gene therapies. Some of the considerations include cost of production, ability to deliver the drugs to the patient on time, preserving the chain of identity throughout the entire process, reduction of manual processes to decrease human error, increase quality through standardization of processes, coordination of supply chain tracking, etc.

When scaling-up to commercial manufacturing, electronic systems are emerging as the only option for managing complex processes and controlling the chain of identity. Werum's PAS-X MES is ideally suited to target the key challenges for cell therapy manufacturers through its capabilities to automate calculations and workflows. For instance, PAS-X has the ability to track and control patient's material from collection through infusion, provides full EBR to the plant and increases compliance. What's more, PAS-X MBR, through its user-friendly design and ability to create process libraries, offers a way to expedite recipe creation. Moving to EBR greatly reduces the time needed to make updates to recipes, which is constantly happening in cell therapy – even after commercial manufacturing is achieved. Future-proof your manufacturing process now!

QUALITY & COMPLIANCE

MES – THE DATA INTEGRITY ENGINE ON THE SHOP FLOOR

Interview with Christian Wölbeling, Senior Director Global Accounts, Werum IT Solutions

What is data integrity?

Christian Wölbeling: According to the FDA ("Data Integrity and Compliance with CGMP Guidance for Industry"), data integrity refers to the completeness, consistency, and accuracy of data. Data should be attributable, legible, contemporaneously recorded, either original or true copy, and accurate (ALCOA+). These requirements are based on existing regulations such as the FDA 21 CFR Part 11, 210 et seqq., and EU EudraLex Chapter 4 and Annex 11.

Does the pharma and biotech industry have a data integrity issue?

Christian Wölbeling: Yes. In the last years, the FDA has seen an increase in data integrity violations. The number of its warnings has increased from 1,720 in 2011 to 14,590 in 2016. Why? Andrew Hopkins, MHRA, explained to me that they "are now watching closely what the industry is supposed to do". Interestingly, the requirements have not changed. For example, record retention and review do not differ by data format: As Paula Katz, FDA, stated, "paper-based and electronic data record keeping systems are subject to the same requirements".

What are the main reasons for this?

Christian Wölbeling: US regulators, for example, are enforcing the availability of drugs on the market due to current drug shortages and lack of quality. Lawrence Yu, FDA, says that "the fundamental problem we identify is the inability of the market to observe and reward quality. This lack of reward for quality can reinforce price competition and encourage manu-facturers to keep costs down by minimizing quality investments." He requests the industry to invest and use state-of-the-art technologies like manufacturing IT systems to improve the quality and to operate a "Process Performance & Product Quality Monitoring System", as stated in ICH Q10.

Which data integrity issues can occur and how can MES help here?

Christian Wölbeling: Karen Takahashi, FDA, has analyzed the data integrity warning letters statistically. MES can prevent these issues with ALCOA+-based functionalities included in our PAS-X. Three examples: The 7th most frequent quotation was: "Your firm failed to document production and process control functions at the time of performance (21 CFR 211.100(b))." With the operator execution dialog, a timely data entry and capture is enforced. If the PAS-X MSI Plug & Produce interface is in place, data will be captured automatically. 4th most frequent quotation was: "Your firm failed to maintain complete information relating to the production and control of each batch (21 CFR 211.188)." In PAS-X, this is controlled by the integrated order data management with ERP, LIMS, CAPA and other interfaced IT systems involved in the batch record execution. The Review by Exception feature, for example, enforces the audit trail review regarding the CPPs and CQAs.

"Using an MES will boost your data integrity compliance and your process understanding, since your processes will be well structured, executed and maintained across the pharmaceutical product life cycle."

***Christian Wölbeling**,*
Senior Director Global Accounts, Werum IT Solutions

The 2nd most frequent quotation was: "Your firm failed to exercise appropriate controls over computer or related systems to assure that only authorized personnel institute changes in the master production and control records, or other records (21 CFR 211.68 (b))." PAS-X enforces the formal user administration and workflows related to the access and the record change management by providing pre-defined best practice Rights & Roles Content Packages. PAS-X also supports features related to the use of RFID card readers or biometric equipment, thus enforcing

data integrity by streamlining the identification and user access procedures.

What are the basic principles to avoid data integrity issues by implementing MES?

Christian Wölbeling: The number-one best practice for implementing an MES is to follow a data-integrity-by-design approach. For the implementation, it is essential to have a clear description and understanding of the business and pharmaceutical processes The number-two enabler is a risk-management-based implementation approach as requested in ICH Q10. Our predefined PAS-X content libraries are very important elements to streamline, harmonize and standardize manufacturing processes as they are based on best practices agglomerated in many MES projects. This ensures that the same tableting process is running the same procedures and electronic signature rules in all production areas and the central MES libraries enable the enforcement of data integrity rules across the whole pharmaceutical organization.

What role does MES play in the data-integrity-by-design-based ICH control strategy?

Christian Wölbeling: The ICH control strategy ensures that the Quality Target Product Profile (QTPP) is met by the control of the CPPs and CQAs. The initial control strategy needs to be enhanced to a manufacturing control strategy by the production, facilities and GMP control strategy elements while it is applied to commercial manufacturing in the tech-transfer and scale-up phases. This strategy is called a Holistic Control Strategy. All manufacturing execution elements are controlled and documented in the MES. With this key role, using an MES will boost your data integrity compliance and your process understanding, since your processes will be well structured, executed, maintained and documented across the pharma-ceutical product life cycle.

PLANNING

PAS-X FINITE SCHEDULING REISSUED

sedApta's Factory Scheduler seamlessly integrated into PAS-X MES / detailed planning of manufacturing processes to optimize pharma production

Today's trends in pharma production, such as digitization, increased demand on flexibility, pharmaceutical serialization, functional integration, and personalized medicine are forcing pharma companies to adapt their production to a schedule-oriented operating model, synchronizing production operations and all related activities based on a tight integration of scheduled activities and the actual as-is status of the production.

To support its customers even more effectively, Werum has reissued its PAS-X Finite Scheduling to meet these requirements. Finite Scheduling is now powered by sedApta's Factory Scheduler, whose standard functions are seamlessly integrated into PAS-X MES. Pharma customers benefit from a higher quality of scheduling results with real-time feedback, less implementation effort thanks to a pre-tested, out-of-the-box interface, joint master data management and high visibility across a multi-tier network to reduce inventory.

PAS-X Finite Scheduling enables the detailed scheduling of production processes and resources with finite capacity, the optimization of production sequences as well as the management of materials and multi-scenario analysis. It supports decision-making processes in real time by evaluating multiple supply-demand balancing scenarios against various metrics which enable optimal trade-offs. Finite Scheduling allows users to generate optimized plans, in terms of both lead time for fulfilling orders and production costs, based on customizable heuristics.

CLOUD-BASED MES

PAS X AS A SERVICE

WERUM'S PAS-X AS A SERVICE: YOUR EASY WAY TO BENEFIT FROM AN MES

Pharma & biotech manufacturers concentrate on their core business while leaving the IT to Werum

With PAS-X as a Service, Werum brings its leading MES into the cloud. Rather than setting up infrastructure locally, facility operators can turn this time-consuming responsibility over to Werum. We will store the data in a dedicated data center provided by cloud provider AWS. This means pharma companies can focus on their core business – manufacturing vital, often life-saving pharmaceutical products.

"We are delighted to expand PAS-X as a Service in the US, where we will start with pilot customers and early adopters," says Linda Gerhard, Senior Manager Cloud Solutions, Werum IT Solutions. "Initially, we will be offering our cloud-based solution to customers and sites that are currently unable to implement an MES – for instance, because they can't justify further capital expenditure or because they don't have any production-grade IT infrastructure in place."

Watch our video:
Learn more about PAS-X as a Service

ENTERPRISE MANUFACTURING INTELLIGENCE (EMI)

WERUM'S EMI SOLUTIONS CREATE VALUE ON ALL LEVELS

Use case API yield increase in high value biotech / Improved operational efficiency

A leading German multinational pharma and life sciences company has commissioned Werum to integrate a prediction model for the optimal time to extract an API into a biopharmaceutical manufacturing process. The API is separated from undesired secondary components by means of an extraction process using chromatography columns in the downstream phase. Until now, this had been done by an experienced employee who decided on the start and end times of the extraction based on IPC data.

From the history of this chromatography data, Werum was able to generate a prediction model based on neural networks. The model predicts the optimal time to extract the API and will be simultaneously integrated into the process. The benefits for the pharma company are invaluable: Through the process optimization, they can increase their product yield by about one percent of additional API.

"We deliver solutions providing business value right from their first use."

***Dirk Heche**, Senior Head of Business Development EMI, Werum IT Solutions*

This is a good example of how production data in pharma and biotech facilities can be leveraged to support better decision making and to gain deeper insights with the help of Werum's EMI solutions. "The typical approach of the analytics industry is to provide just a platform for data analysis," says Dirk Heche, Senior Head of Business Development EMI, Werum IT Solutions. "Our focus on the other hand is to deliver out-of-the-box solutions providing business value right from their first use. Werum's EMI apps unite business knowledge with embedded data science expertise, thus being ready to improve the operational efficiency!"

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