Press Release

June 11, 2018

Bilfinger at the Achema: Digital pioneer for the process industry

Industrial services provider Bilfinger will take visitors to this year's Achema on a journey through the world of digitalization. At the leading trade fair for the process industry, the company is presenting, among other things, BCAP (Bilfinger Connected Asset Performance) – a digital solution that can significantly increase Overall Equipment Effectiveness. Further Bilfinger innovations include a new technology for the digitalization of plant documents called PIDGraph as well as the video platform Industrial Tube, which makes it possible to maintain the knowledge of technical employees using a very simple approach. Achema will take place from June 11 to 15 at the trade fair grounds in Frankfurt am Main.

"The process industry is a long way from exhausting the opportunities presented by digitalization", says Tom Blades, Chief Executive Officer at Bilfinger. "Bilfinger has an excellent starting position in this regard. We are intimately familiar with the processes of our customers. We also have a strong understanding of the digitalization of these processes. That makes us a digital bridge builder between the process industry and IT."

With BCAP, Bilfinger has created a comprehensive solution for the digitalization of operating processes in industrial plants that can be implemented quickly and easily. At the core of the solution is a cloud-based platform in which previously separate data from engineering, operation and maintenance is brought together and subjected to a targeted evaluation. This allows for entirely new findings and leads to improvements in the anticipation of potential plant malfunctions as well as a further reduction in unplanned downtimes.

In the area of plant documentation, Bilfinger is currently developing PIDGraph, a solution that, in a first step, automatically converts piping and instrumentation diagrams (P&IDs) into an intelligent digital version. The application is significantly cheaper than previous conversion methods which require the P&IDs to be re-created manually. PIDGraph is able to use the already existing material as a basis. This saves not only money, but also time. The objective is, in a second step, to allow for the processing of additional plant documents.

A major challenge being faced by many companies is the retention of employee knowledge in the technical area. Industrial Tube, an Internet-based video platform from Bilfinger, is here to help. To make a video, all employees need is a smartphone or a pair of data glasses for the recording function as well as the Industrial Tube app. Integrated templates that are played through the app provide a script that the users follow to make step-by-step recordings. The individual work steps are commented on by the employee. The app then transfers the video material to the Industrial Tube cloud where it is automatically edited in line with a standardized approval process.

Further trade fair highlights from Bilfinger include a software for improving process efficiency in biotechnology as well as an Internet-based application for identifying optimization potential in the maintenance of industrial plants. In an interactive trade fair tunnel, visitors can also find out about Bilfinger's comprehensive engineering solutions. The Bilfinger stand B22 is located in Hall 9.1.

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Press Release

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Digital in six months with BCAP

- **Bilfinger presents innovative solution for fast digitalization of industrial plants**
- **Short amortization period addresses needs of small and mid-sized companies**

Digitalization is gaining momentum in the process industry, and Bilfinger is at the forefront of this development. With BCAP (Bilfinger Connected Asset Performance), the industrial services provider has created a comprehensive solution to digitalize the operating processes of industrial plants. BCAP can be implemented quickly and easily. BCAP is a very economical solution, generally paying for itself already in the first year.

“Our concept is unique in the industry. It offers small and mid-sized companies in particular an easy path to the Industry 4.0 era”, says Franz Braun, Chief Digital Officer at Bilfinger. “With BCAP, we make companies ready for digitalization in only six months.”

With BCAP, maintenance costs can be reduced by up to 30 percent. It also reduces the number of unforeseen plant malfunctions significantly. Depending on the industry, unplanned downtime can be reduced by up to 25 percent. Overall Equipment Effectiveness (OEE) can be increased by up to 15 percent by means of data analytics and improved planning. Different service packages tailor BCAP to the specific needs of the users and expand it step by step if required.

BCAP collects all key operating data in a cloud-based platform. Information from engineering, operation and maintenance flows into the platform in a coordinated form, making it possible to carry out a targeted evaluation. Data sources include the process control system, the production planning and sensors used to monitor the plant. With the help of BCAP, these previously separate data silos are linked and subjected to an intelligent analysis. The longer the analyses are performed, the more precise are the conclusions that can be drawn in terms of cause and effect. This means that potential malfunctions are easier to anticipate and unplanned downtimes can be reduced. Maintenance is thus increasingly forward-looking, with the much larger data basis serving as a foundation for this step.

For further information, please visit:
http://www.bilfinger.com/en/services/digitalization/bcap-bilfinger-connected-asset-performance

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Press Release

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BCAP at the Achema: Experience digitalization live

- **Bilfinger presents digitalization concept in live demonstration**
- **In focus: New approaches to plant monitoring and forward-looking maintenance**

The systematic evaluation of plant data is the most important instrument for reducing maintenance costs and minimizing unplanned downtimes. For this reason, Bilfinger has developed a digitalization concept for the process industry that meets all the requirements for a fast and easy implementation: The modular design of BCAP (Bilfinger Connected Asset Performance) makes it possible to carry out an implementation within just six months and generally pays for itself in the first year. Bilfinger shows how a digitalized plant works in practice as part of the Achema in Frankfurt am Main from June 11 to 15, 2018. In Hall 9.1 at stand B22, visitors experience live demonstrations of, among other things, predictive maintenance as well as innovative methods for plant monitoring.

At the stand, visitors can follow a live broadcast via cloud connection on monitors and augmented reality glasses: Typical application cases from the BCAP solution are simulated in an Industry 4.0 test plant in Frankfurt am Main that Bilfinger operates on behalf of the Interessengemeinschaft Regelwerke Technik (IGR) e.V. Within the scope of the test assembly, about 50 sensor readings such as flow rate, pH level and temperature are continuously monitored and processed by means of software.

Transparent processes improve plant availability

The measured data is visualized using operational interfaces, so-called dashboards. This makes it possible for the trade fair visitor to see how the system reacts when threshold values are exceeded – when the sensors report a critical pump condition, for example. The cause is localized in the dashboard using a graphic overview and can be quickly identified for the plant personnel. The software also calculates relevant information such as the probability and duration of a possible plant breakdown. From this, it provides specific recommendations for action to solve the problem.

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In addition, Bilfinger shows how a complex plant can be simultaneously monitored for a large number of potential malfunctions using a relatively simple set of equipment consisting of cameras and microphones. To this end, various malfunctions such as smoke development or an undesired cavitation flow are simulated in the test plant. Instead of working with smoke or pressure sensors, just a camera or a microphone is used. The actual recognition of the malfunction takes place on the software side through learning algorithms.

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Press Release

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Industrial Tube: The video platform for better work quality

- **Bilfinger creates central point of contact for expertise in the process industry**
- **Shared knowledge for optimal work flows and work safety**

In a major company like Bilfinger, there are many areas of activity. In the future, the challenge will be to maintain the knowledge and experience that has been collected over many decades. Industrial Tube, an Internet-based video platform from Bilfinger, is here to help. This platform from experts for experts aims to safeguard the knowledge of technical employees as simply as possible and to make this knowledge available for other employees. With Industrial Tube, valuable information pertaining to work flows and work safety in the company can be shared – without restraints from language barriers.

The concept is simple: All employees need is a smartphone or a pair of data glasses for the recording function as well as the Industrial Tube app. Integrated templates that are played through the app provide a script that the users follow to make step-by-step recordings. The individual work steps are commented on by the employee as the work is being conducted. The app then transfers the video material to the Industrial Tube cloud where it is automatically edited in line with a standardized approval process. One major advantage: No personnel is needed for the editing of the film material. On the basis of artificial intelligence, the system also prepares multi-language subtitles as well as key words that ensure the video can be easily found and shared in the Industrial Tube portal using a key-word search. Overall, the need for manual handling is reduced to a minimum through automated processing.

Solutions offering with a broad reach

The pilot test of the system is currently being run at selected Bilfinger locations before the knowledge platform is activated for all users in the company. “Bilfinger benefits greatly when knowledge does not remain isolated or is potentially even lost, but rather shared throughout the company”, says Martin Bergmann, Project Manager at Bilfinger’s Digitalization & Innovation Lab. In the next step, Bilfinger will offer the process chain made up of recording, automatic processing and provision in two variations. First of all, in a software-as-a-service format that companies can use exclusively for internal purposes. There is also an open area being planned for which the user will not require any log-in data. It would then be possible, for example, for

original equipment manufacturers to make their maintenance videos available to a broad audience, but one that is clearly defined according to professional interest. As a result of the standardized creation and the high quality of the teaching videos, Industrial Tube should establish itself as a central knowledge hub for the process industry.

With LESER GmbH & Co. KG, one of the leading producers of safety valves, Bilfinger has already gained a first partner for Industrial Tube. LESER will be making its new teaching videos available on Industrial Tube. “For us, Industrial Tube is an ideal channel for reaching current and future customers and making knowledge on the maintenance of LESER safety valves available to them in a digital format,” says Mark Rowitz, Global Aftermarket Manager at LESER.

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Press Release

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Bilfinger introduces new technology for the digitalization of plant documents

- **Artificial intelligence automatically captures P&IDs**
- **Cost reduction of at least 50 percent possible**

Virtual plant models – so-called digital twins – are now the measure of all things in plant documentation. With their help, it is possible to locate all important data in mere seconds. They thus make it easier to comply with operator obligations, accelerate plant modifications and allow for entirely new efficiency enhancement applications through a connection to the Internet of Things. But the conversion of plant documents into a digital form is costly both in terms of time and money. This is where the new digital solution PIDGraph comes into play – a solution that industrial services provider Bilfinger is currently developing for the market.

In a first step, PIDGraph automatically converts piping and instrumentation diagrams (P&IDs) into an intelligent digital version. The application is significantly cheaper than previous conversion methods. Where it was previously necessary to re-create the P&IDs manually, PIDGraph can work with the existing material as a basis, leading to a cost reduction of at least 50 percent. The objective in a second step is to enable the processing of additional plant documents using PIDGraph.

“PIDGraph is a revolution in the generation of ‘digital twins’”, says Martin Bergmann, Project Manager at the Bilfinger Digitalization & Innovation Lab. “The application is not only significantly cheaper than previously common procedures, it also generates tremendous time savings. With PIDGraph, we generate a clear efficiency and competitive advantage for our customers.”

Optimized process efficiency with artificial intelligence

The automation of this time-consuming task is made possible with the use of artificial intelligence: The software reads a P&ID, for example, as an image file and subsequently disassembles it into so-called nodes and edges. Neural networks trained to recognize patterns identify the symbols that are used and put together an overall image of the diagram. PIDGraph also remembers corrections made by the user and adapts its recognition accordingly. Errors can thus be minimized quickly.

PIDGraph is operated through a convenient web interface to which P&IDs can be uploaded as image files, PDFs and in DWG format. PIDGraph then identifies objects, tags and charts and automatically converts them into XML files in accordance with the DEXPI standard. This ensures compatibility with common CAE tools in which the digital P&IDs can be further processed and, if necessary, linked to additional information and documents.

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Press Release

June 11, 2018

Bilfinger delivers solution for greater efficiency in biotechnology

- **Company develops software for more process efficiency in biotechnology**
- **“Quality by Control” makes product quality controllable during production**

Bioreactors are at the core of many processes in the biopharma sector. But there is one major challenge: Many decisive quality features cannot be directly measured during production of an active ingredient. Whether the desired result is achieved at the end of the process can therefore only be determined by means of expensive analyses of the end product. This will change with the advent of a quality monitoring and control software that is currently being developed by Bilfinger subsidiary Bilfinger Industrietechnik Salzburg GmbH in cooperation with the Department of Biotechnology at the University of Natural Resources and Life Sciences, Vienna. The software makes it easier, among other things, to integrate spectroscopic measurement procedures and to use mathematical models to monitor and control the processes in the reactor in real time.

The most common procedure to date of the review of processes in bioreactors is called “Quality by Testing” – the quality can only be determined at the end of the process. For biotech and biopharmaceutical companies, this makes the path to market approval longer and more expensive. And the quality management in production is especially complex as a result.

“With our solution, we are now tackling the fundamental problem”, says Gerald Berghammer, Head of Project Development Plants & Systems at Bilfinger Industrietechnik Salzburg. “Our new procedure ‘Smart Bioprocessing’ builds on ‘Quality by Control’ so that the product quality can be predicted and influenced already in the reactor. This will allow companies to organize their production capacities much more effectively in the future.”

The most important reactions in a bioreactor generally take place inside the production cell lines. Against this backdrop, it is very difficult to get a direct measurement of meaningful process variables. In addition to the standard sensors such as pH, temperature, pressure or dissolved oxygen, non-invasive spectroscopic measurement methods such as 2D fluorescence, near infrared spectroscopy or Raman spectroscopy are therefore increasingly being used in bioprocesses. With the help of mathematical models, these methods can deliver relevant quality

information. This is where the software platform developed by Bilfinger comes in: Various measurement data is combined and, on the basis of mathematical models, evaluated so that conclusions can be drawn regarding the current status of an ongoing process and the probable product quality. In the case of deviations, the processes can be influenced in a targeted manner with control measures, so that the product quality is within the prescribed tolerances in the end.

Bilfinger is currently programming the modularly designed software platform for implementation of the “Quality by Control” concept. At the same time, the functions are being thoroughly tested. Market launch for the first modules is expected in the second half of 2018. The developers are planning the first fully-functional version of their monitoring and control software already for the end of this year.

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Fast & easy: Maintenance analysis via Bilfinger Maintenance Radar

- **Identifying maintenance potential independently with the Maintenance Radar**
- **Bilfinger Maintenance Concept reduces maintenance costs by up to 40 percent**

There is potential to further optimize maintenance processes in every industrial plant. It is, however, very time-consuming to get a detailed overview of this potential. Industrial services provider Bilfinger has therefore expanded its proven Bilfinger Maintenance Concept (BMC) through the addition of the Internet-based Maintenance Radar. Using this fast analysis, companies can get initial insights into the optimization possibilities – quickly and free of charge.

“There is potential for improvement in every plant”, says Marcus Dörfler, Business Development Manager at Bilfinger. “With the Maintenance Radar, the customer can now, for the first time, get an initial overview of the situation himself. A Bilfinger Maintenance Analysis can then provide more detailed insights. We look after the subsequent execution of the potentials that are found.”

In just a few minutes, the Maintenance Radar gives companies a comprehensive overview of the status of their maintenance and associated processes. The customer initially provides information on which areas are relevant for the company’s maintenance organization. Afterwards, he is led through the most important maintenance areas with the help of the online tool and, on the basis of a two-dimensional evaluation matrix, finds initial optimization potentials.

Following this quick-check, a subsequent detailed consideration can be undertaken using the Bilfinger Maintenance Analysis (BMA). On the basis of this analysis, Bilfinger creates a customized maintenance concept. The objective is to increase the reliability of plants while at the same time reducing costs. In total, experience gained from more than 400 maintenance analyses went into the BMC. The concept is based on 16 modules and is precisely fitted to the individual needs of the customer. With a consistent application, the potential for reduction of annual maintenance costs over a period of five years is up to 40 percent, while plant productivity can be increased by up to 10 percent under certain conditions.

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Bilfinger Mobile Solutions improve efficiency and transparency

- **High-quality maintenance documentation in significantly less time**
- **Efficiency enhancements through improved work scheduling**

Documentation of maintenance plays a key role in the smooth operation of industrial plants. Filling out complex maintenance reports, however, takes up a great deal of time. This is where the Mobile Solutions systems from Bilfinger Maintenance GmbH come in: Order scheduling and processing tasks that used to be paper-based are digitalized and made more user-friendly with the mobile solution platform “enginius”. Maintenance employees can thus create order-related documentation faster, easier and without gaps.

“Our mobile solutions outline complex situations very simply and intuitively and allow for high-quality documentation – in significantly less time than before”, says Oliver Wichmann, Head of Mobile Solutions at the Bilfinger subsidiary.

The enginius solution platform covers all requirements for intelligent and mobile maintenance: It consists of a customer portal, planning tools and mobile applications. Order processes can be carried out fully digitally with the involvement of the customer. If, for example, there is a malfunction in a plant, the customer can report it through the portal. Using the planning tool, the responsible maintenance planner assigns the relevant order to a technician, who should then repair the malfunction. The technician receives the order assigned to him in real time on his smartphone or tablet together with all relevant working steps. As soon as the work is completed, it is documented in the mobile application. As a result, both the planner and the customer can see that the malfunction has been repaired. The customer can subsequently document his satisfaction in the customer portal. Bilfinger thus always receives direct feedback on the handling of malfunctions.

Improved process efficiency and documentation of occupational safety

The use of mobile applications also eliminates redundant work steps. Because all documents are saved in the SAP system, maintenance personnel and the customer both have access. A complex duplication or distribution is thus no longer necessary. This relates not only to documentation of maintenance works, but also to documentation of the occupational safety

measures. The apps also include occupational safety functions that make data from the safety area available and indicate appropriate measures. Here, in addition, employees can create threat evaluations and report any incidents.

The enginius solution platform supports various languages as well as different mobile operating systems. The smart apps are available for both iOS and Android. Bilfinger is showing the fully-digital work process – Digital Work Order Management – at the Achema. Visitors can test all applications live on tablets, smartphones and a PC.

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