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Feature

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When the refinery comes to a stop: Bilfinger's expertise in turnarounds

A labyrinth of endlessly winding pipes, tall smokestacks and intertwined structures is what the workers in blue helmets and blue protective uniforms confidently wind their way through. They busy themselves with turning valves, welding pipes and putting up the scaffolding. They get on their bicycles to reach their work locations more quickly – the 320 hectares of the TOTAL refinery Mitteldeutschland are equal to 500 soccer fields put together. A 140-meter-high flare stack, its flame burning night and day, towers over the plant and is visible from afar. The refinery could aptly be described as a self-contained world of its own.

TOTAL's refinery Mitteldeutschland in Leuna is one of the most modern industrial plants in Europe. Its output products include gasoline, heating oil, liquefied gas, diesel and methanol – indispensable raw materials for any economy. It is easy to see that operating and maintaining such a huge facility is no simple task.

The technicians deployed here by the Mannheim-based industrial services provider Bilfinger are no strangers to the challenges that the plant and its operation present in practice. For 24 years now, the company has been working with the refinery in Leuna, assisting with various modernization and expansion measures, for example. Only recently, the TOTAL refinery awarded Bilfinger two further major contracts worth roughly EUR 30 million: The first involves exchanging the reactor systems; the second, performing the turnaround for the plant's POX methanol facility. More than 800 Bilfinger specialists will be involved in these two projects.

The first of them – replacing the six reactor systems – will have to be carried out in the midst of ongoing production operations and, if at all possible, without any downtimes. This is because the reactor systems, along with the downstream plant components, convert heavy petroleum residues from the refinery into methanol, a key industrial input chemical, by means of partial oxidation (POX). This will be the most extensive refurbishment work ever done on the Leuna plant, which is one of the last industrial holdovers from the Communist period in Eastern Germany. The project is expected to result in a 20% increase in the volume of methanol produced.



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A project of this magnitude requires careful advance preparation; accordingly, planning was begun as early as at the start of 2019. Gerald Weber has been looking after the plant's maintenance for a long time. The twenty-year veteran of Bilfinger's Engineering & Maintenance service line explains how he and his team will bring the plant up to the latest technical standard: "We will be removing and modernizing each of the reactors individually, which weigh between 60 and 70 tons – a process that will take 85 days each. Our tasks will also include building a new burner-cooling system."

The project's logistics present a particular challenge: The plant components to be installed are big and heavy. Thus, a special crawler crane with a capacity of 600 tons will be used to fit the reactors into place. Several days will be needed just to set up and remove the crane and to prepare its operating lane – a process that will have to be repeated for each of the six reactors. Transporting the crane and its appurtenant equipment will require some 50 trucks. Weber provides the details: "So you see that our services consist of more than the pre-assembly work and the conversion as such. Just as important is our preparatory planning and our coordination of the various trades on the construction site. In the end, everything has to run like clockwork. It's high-precision work. Of course, safety always comes first." The reactors are scheduled to be replaced by the end of 2021, thereby completing the project.

By this time, the second contract awarded to Bilfinger – the refinery's turnaround in the fall of 2020 – will also have been completed. Gerd Braune, the engineer at the Bilfinger Engineering & Maintenance service line who is supervising the turnaround, explains: "Operators are obligated to shut down their plants in this way at regular intervals. This sort of general inspection is intended to ensure that the plant remains technically reliable, legally compliant and environmentally friendly. We will be making the plant fit for the next six years while providing top-to-bottom maintenance." The plant has to be kept idle while all this is going on, Braune points out, thereby causing substantial turnover losses for the operator: "Our job is to keep these losses as small as possible. Every additional day of downtime for the plant increases the economic damage our customers stand to suffer."

In order to keep such downtimes as short as possible, Bilfinger has developed its own in-house concept for executing turnarounds. "How we go about it exactly is a trade secret," says Braune and laughs: "But I can say this much: Efficient scheduling and work planning are essential. Another factor is that our workforce is highly qualified and very familiar with the routines involved in such interventions. What's more, we're using digital solutions to an increasing degree." The results speak for themselves: Every year, Bilfinger performs around 30 comprehensive turnarounds of industrial plants across Europe. The service field responsible for



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turnarounds has expended 4.5 million man-hours of work in recent years – and this without a single accident entailing lost working days.

This hopefully will hold true also for the turnaround of the TOTAL refinery Mitteldeutschland. Bilfinger acts as general contractor for a number of the plant's systems, including the POX methanol facility. The maintenance services, which have been planned far in advance, must be completed within four to six weeks. This will involve opening, inspecting and cleaning innumerable containers and pipes – and of course also repairing them if needed. Subsequently, the individual components will be inspected and certified by the German Technical Supervision Association (TÜV). Braune sums up: "What counts here is experience, familiarity with the routines, and keeping a cool head: Every move has to be executed perfectly and the relevant work steps have to be clear to all involved."

To ensure that this is the case, giant workflow diagrams wallpaper have been hung up where everyone can see them. These depict the individual work steps and work packages, which can then be checked off as they are completed. Thus, everyone will be able to keep an eye on the big picture. As Braune puts it, "A turnaround is a like a vast mosaic composed of many small tiles representing work packages, one that has been painstakingly planned two years in advance." In fact, a planning period this long is indispensable: Certain portions of the plant will be turned into huge construction sites for short periods of time, where many people will be expected to work in coordination at very close quarters. It goes without saying that, despite the intense time pressure involved, occupational safety and diligence will always have top priority.

With these two projects, Bilfinger will support the TOTAL refinery in further boosting its competitiveness. The complete replacement of the reactors will form part of the "Leuna 2020+" catalogue of measures intended to make the refinery viable for the future. By ramping up its production of methanol, the refinery is reacting to declining demand for heavy fuel products. The TOTAL refinery compound in Leuna is set to see a lot of activity in the near future!



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Bilfinger is a leading international industrial services provider. The Group enhances the efficiency of assets, ensures a high level of availability, and reduces maintenance costs. The portfolio covers the entire value chain from consulting, engineering, manufacturing, assembly, maintenance, plant expansion as well as turnarounds and also includes environmental technologies and digital applications.

The company delivers its services in two service lines: Technologies and Engineering & Maintenance. Bilfinger is primarily active in the regions Continental Europe, Northwest Europe, North America, and the Middle East. Process industry customers come from sectors that include chemicals & petrochemicals, energy & utilities, oil & gas, pharma & biopharma, metallurgy, and cement. With its 36,000 employees, Bilfinger upholds the highest standards of safety and quality and generated revenue of €4.153 billion in financial year 2018.

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