

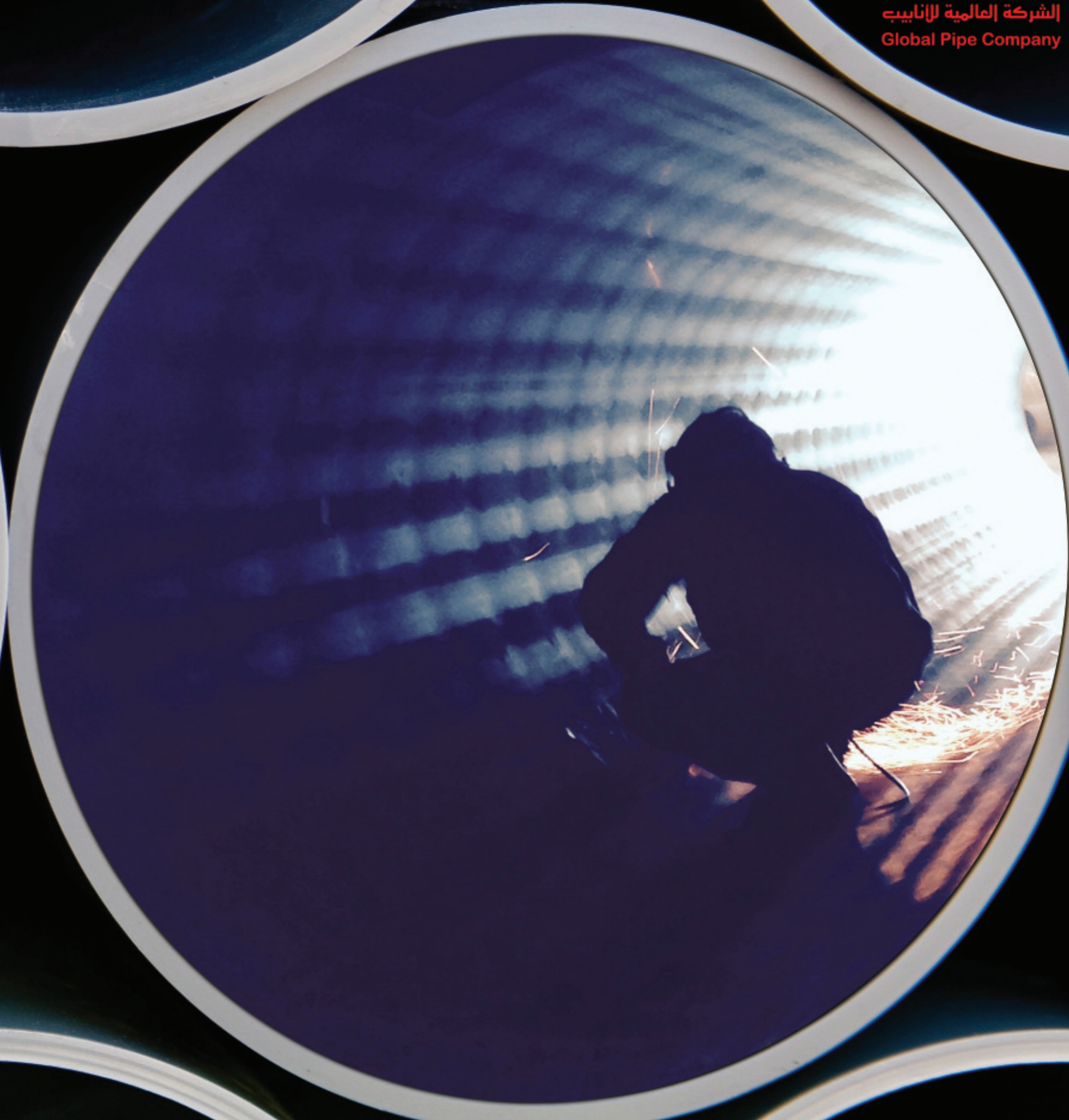


الشركة العالمية للأنابيب  
Global Pipe Company

# THE SMART SYSTEMS CREATING PIPE PERFECTION

Over the last seven months, Global Pipe Company (GPC) has embarked upon a number of strategic major investments designed to optimise operations and ensure the highest quality standards prevail throughout its crucial manufacturing activities for the likes of Saudi Arabia's huge Master Gas Project and other mission-critical contracts. In this issue, General Manager Mr Maher M. Fkaier takes Euroasia Industry inside the company's state-of-the-art plant to demonstrate the internal processes that converge to achieve GPC's celebrated manufacturing excellence.

Sarah Pursey reports. ↘





**Saudi Arabia's oil & gas sector** is notoriously stringent when it comes to high standards and accreditation – and in recent years, pipe manufacturer GPC has emerged as one of only a few local players in its field capable of meeting KSA's increasingly demanding technical requirements in this most challenging of industries. And in securing a major new supply agreement with Saudi Aramco for an extension of Saudi Arabia's Master Gas System (MGS) – a country-wide network of pipelines and gas-processing plants initially established in the 1970s and expanded upon considerably over the decades to become the facilitator of ethane and LPG production in the Kingdom – it is fair to say that GPC has earned its status as a preferred supplier. Since Euroasia Industry last spoke to GPC, the company has commenced work on the mammoth contract, which will entail providing pipeline material for over half the new 1,000km-long pipeline network that is destined to stretch across the eastern, central and western regions of Saudi Arabia.

As you might expect, the company's GM Mr Fkaier regards the Master Gas Project as a challenging project in terms of both quality and quantity. "The pipe size required is 56-inch diameter, with wall thickness ranging from 14.25mm to 25.4mm. And fulfilling the Saudi Aramco specification in term of 'ovality', straightness and picking is, of course, a challenging task," he advises. "From a quantity point of view, the total length of 550km and the tight delivery schedule further increase the complexity of the project."

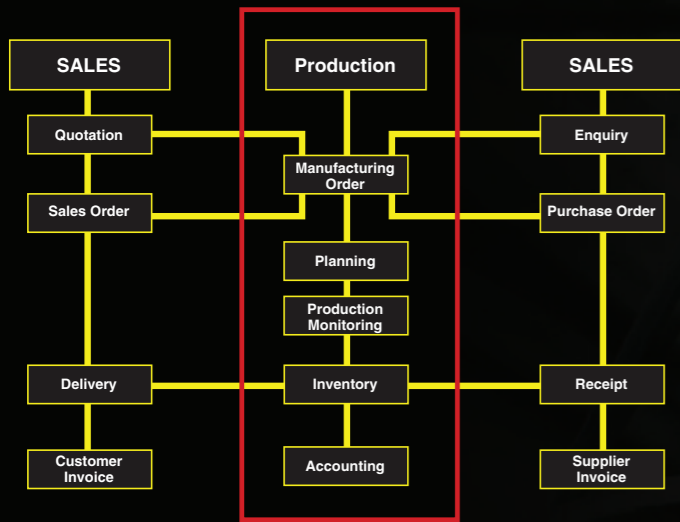
To be forearmed is to be forewarned, however. The company's recently concluded Fadhili contract for the delivery of 27km of pipes provided excellent training for the GPC's Master Gas endeavour – requiring, as it did, production of pipes of the same huge diameter, and of a very similar thickness range. Above and beyond such fortuitous experience, however, GPC developed an action plan to secure higher output and smooth execution of Saudi Aramco's mega contract. This action plan has led to investments in improved plate logistics, a new X-ray inspection bunker, increased manpower, and – not least – a new Manufacturing Execution Software System. Together, such holistic enhancements are helping to make considerable time savings and cost reductions throughout GPC's operations, to the benefit of the project in its entirety.

#### **Monitoring the entire process**

"Undoubtedly, one of our main achievements in recent months has been the installation of the Manufacturing Execution Software System," remarks Mr Fkaier, adding that it has been GPC's plan since establishment to install MES software to cover all the main processes in its operations. "GPC is dealing with a complicated manufacturing process where at least 15 manufacturing steps – starting from plate edge milling, through plate forming and pipe welding, up to final inspection – are involved for each pipe, alongside a complicated supply chain encompassing the sourcing of steel plate material, welding consumables and release of manufacturing orders for production. The inspection and release process of the final product – the pipe – is also complicated and involves not only the manufacturing process but also the lab testing activity."

GPC evaluated several systems and realised most were designed as ERP systems – covering basically the commercial aspects of the business but neglecting the company's specific manufacturing processes for longitudinal welded pipes. "As a result, we decided to buy standard software and adapt it to our needs," explains the General Manager. "We selected the SMS system from the company Smart Management Software GmbH in Germany. This system was covering the main commercial processes in our company, providing extendable interfaces for the implementation of the manufacturing processes." Crucially, the program code was also provided as part of the package, allowing the customisation and adaptation to be done by GPC's own team as an in-house project. "This helped us to save time and reduce cost for the whole project," he adds.

The installed software covers the company's entire work flow – starting from the sales offer and order management, to the purchase request and purchase order – although the main focus is obviously on the manufacturing activity and the supporting processes. Those processes include the technical specification, the planning and scheduling of the manufacturing orders, the work instruction development for each manufacturing step of the manufacturing orders, the maintenance activity for preventive and breakdown maintenance, and the QC reports with related records from both the lab testing and the pipe release activity. ↘



## SYSTEM ARCHITECTURE

### A “complete chain of evidence”

Traceability is one of the major requirements for GPC’s manufacturing process, Mr Fkaier stresses, and this is a key feature of the new software in which the company has invested. “The complete chain of evidence for the steel plate and welding consumables used for the manufacturing of a particular pipe is absolutely required for each pipe produced in our yard. Even years after delivery of the pipes, that information has to be available with us,” he stresses. “However, such a requirement is not easy to implement using the manual paper process. With our MES software, this feature not only covers the material used for each pipe but also the name of the operator and the execution date for each manufacturing step.”

The data collection module in the shop floor is another major feature of the MES software, enabling GPC to establish a paperless process in the manufacturing. “Using barcodes – on plates/pipes and on the Route Cards – together with 55 Computational Terminals available on the shopfloor allows us to collect manufacturing data based on simple scans. The work instruction – like Material Data Specification, Welding Procedure Specification, NDT Instruction, and Hydro Testing Instruction – are available at the terminal on the shop floor. It means that paper distribution is no longer required,” affirms Mr Fkaier.

The lab testing activity as per API requirements is also integrated in the MES software. The definition of test units and sample selection can be monitored by the system. The results of the lab tests can be collected by the system through software

interfaces to the lab testing machines. This feature reduces the manual work undertaken during the data collection and also reduces the risk of typing mistakes. Another major feature is the pipe release activity, as Mr Fkaier points out, “Since all manufacturing activities and all lab results are reflected in the systems, it is easier for our QC team to release pipes through the MES software. Pipes ‘on hold’ or subject of a pending defect memo will be blocked during the pipe release process,” he informs. “Another major advantage is that the release documents are also generated automatically through the MES software, freeing up resources for more productive tasks instead of the less productive documentation work.”

A manufacturing activity monitor for the real time visualisation of all such activities – at all machines and working stations – is just one valuable “start feature” that the new system is facilitating, advises Mr Fkaier. “The monitor displays the quantity achieved for each working station versus the targeted quantity. It also shows the machine’s status in real time. Another interesting feature is the email notification service, which sends messages to notify dedicated personnel about important events in our manufacturing process – the creation of defect memos, the breakdown of a machine, or a jam on the manufacturing line, for instance.”

Crucially, all of these interesting features of the new MES system work towards achieving one over-arching goal, according to Mr Fkaier. “It’s ultimately about communication. The installed MES software optimises the communication between all involved departments in our company and minimises manual internal reporting. In a

second stage, the further development of our MES system to follow our dynamic business processes and keep pace with the technical progress of the information technology is part of our daily work. The fact that our own team manages the development of the system as an in-house project simplifies the process of making any adjustments and upgrades based on our software users’ requests. After covering most of our internal processes in the first step of the implementation, in a second stage we will look at implementing interfaces to external parties. For example, the input of plate data provided from our suppliers will be handled via software interfaces, reducing the manual data input not only for heat and plate numbers but also for technical information like chemical and mechanical properties.

Another potential feature is the plate offer evaluation,” he reveals. “We typically spend much time evaluating offers for steel plates, but submitting those offers online via the system would dramatically speed up the commercial and technical evaluation process, and reduce the long email communication with our suppliers regarding evaluation of any technical deviations.”

Certainly, the further development of the system to cover new features that interface with entities operating beyond the walls of GPC’s facilities remains a future endeavour for the company, as Mr Fkaier is keen to stress: “Even though we have reached a high level of coverage regarding implementation of smart systems throughout our internal processes, we believe that extending such infrastructure and incorporating our suppliers and customers into such a network could help us to further simplify interfaces and improve the external communication process. A major step forward has been achieved in establishing GPC as a ‘Digital Factory’ – nonetheless, the further development of that system remains our daily task.”





### Logistics, inspection and workforce enhancements

While the MES software is undoubtedly the jewel in the crown of Global Pipe Company's action plan to help boost output and ensure smooth operations throughout its mighty Master Gas System contract activity, it is by no means the only improvement made to the company's operations.

"In order to cover the higher output, it has been necessary to improve our plate logistics by increasing the plate storage area, adding new vacuum extensions for overhead cranes and installing a new conveyor system for plate transportation," elaborates Mr Fkaier. "Designed for a 200,000-metric-ton annual capacity, our layout took into account only one bay for plate storage. For the Master Gas Project, however, we need to receive and inspect at least 3,300 plates before transforming them into pipes on a monthly basis. For that reason, the plate storage area was extended to include a second bay in our plant." In addition, three new vacuum extensions have been added – for plate handling during the plate receiving and inspection phase – as well as a new conveyor system to connect the new storage area with the manufacturing line.

The company has also invested in a new X-ray bunker – Mr Fkaier explains the reasoning behind the new investment. "API specification for the pipe manufacturing requires us to perform X-ray inspection on the weld at both pipe ends. This inspection has previously proved to be a bottleneck in our manufacturing process. Now, however, with two X-ray bunkers integrated in our manufacturing line, the X-ray Non-Destructive Testing is no longer holding up the manufacturing process."

Finally, the huge uptick in capacity as a result of the Master Gas System contract has meant the need for more manpower at Global Pipe Company. "Since our manufacturing activity is running in a two-shift system covering 24 hours a day, it would be impossible to increase our output without adding new manpower," Mr Fkaier points out. "About 20 new employees have therefore been added to operate the new aforementioned plate handling equipment and X-ray bunker. Furthermore, we have added 10 quality inspectors and lab technicians." Indeed, with a total staff complement of 412 personnel today, GPC is now well pre-

pared to handle major projects like Master Gas System II (MGS II), on which it has recently embarked.

### Ramping up with Master Gas System II

Mr Fkaier recounts how the company was "elated" to be awarded MGS II – a project requiring the manufacture of around 300,000 metric tons of pipe of various dimensions. GPC started the manufacturing activity for MGS II in June 2016, and the first days of production have proved very promising indeed, as the General Manager attests. "GPC has increased its output to 140 pipes and will continue working to further improve that result. The large quantity required for this new Master Gas Project will allow us to work for longer periods on the same size. That will offer us the opportunity to optimise our manufacturing process and achieve a higher output."

Certainly, MGS II will be a further test to the various optimisations and efficiencies that Global Pipe Company has recently built into its manufacturing operations, given the national importance of the project – and Saudi Aramco's emphasis on getting it completed in a swift manner. "That is why we have increased our capacity and modified our forming procedure – to keep pace with that higher rate," advises the GM, and indeed, while GPC has previously reported a capacity of around 200,000 metric tons, the new project will see it working towards boosting that by 50 per cent per annum to deliver the whole quantity required for MGS II in less than one year from now, all being well. "MGS II is considered a very prestigious project for the Kingdom of Saudi Arabia, and all involved parties are focused on completing it in a shorter time," he adds.

Certainly, the action plan and myriad investments that GPC has made with the aim of vastly enhancing its internal processes make it seem entirely feasible that such a tight schedule could nonetheless be met by the company – assuming no delays elsewhere in the value chain, of course. Moreover, the significant optimisation that has recently been re-engineered into GPC's operations – not least in the emphasis on communication and freeing up personnel for more productive tasks – will provide a legacy of efficiency that will live on far beyond the firm's work on the MGS II contract, to further establish Global Pipe Company as a star supplier for any major jobs in the pipeline. □