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HP Executive Viewpoint

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Trends in the global process furnace market

Whether it is heating process fluids to achieve enough temperature in crude atmospheric and vacuum distillation units, or reaction temperatures inside furnace tubes to produce ethylene, vinyl chloride monomer, synthetic gas and continuous catalytic reformer reactors, or simple process heating (thermal fluid), process furnaces play a critical role in refineries and petrochemical complexes. Process furnaces are mostly qualified as long-lead items or critical items in tenders, so they are often ordered in the early phases of a project.

Over the past few decades, the market for process furnaces has experienced tremendous changes. Mostly driven by efficiency and total cost of ownership (TCO), the process furnace market is strongly influenced by the need for refineries and petrochemical assets to comply with ever tighter environmental standards (e.g., fuels and emissions) and by the growth of petrochemical demand.

Market evolution 2014-2019: Deep shifts in demand. After robust demand, driven by the latest petrochemical growth cycle, the furnace market experienced a strong slowdown in volume—reaching its lowest point in 2017—due to the drop in oil prices in 2014 (FIG. 1). The furnace market has partially recovered but has not reached levels prior to the crisis. In the meantime, client expectations and demand patterns have changed considerably.

The main driver of the furnace market remains cost effectiveness. However, this driver is expressed in two different ways, both which have drastically impacted the market over the last few years. First, on the lower end of the furnace market—mostly cost-driven furnace manufacturers with no technology integration—there is a strong drive towards lower cost execution. This trend is supported by low-cost fabrication and material sourcing—mostly in Asia—and has been driven by large engineering, procurement and construction (EPC) companies primarily under strong pressure from refining and petrochemical producers to reduce their investment costs.

Second, on the higher end of the furnace market—mostly technology integrated furnace manufacturers—there has been an evolution towards the development of a reduction in TCO. This move is leading to more integrated offers, with the objective to improve operations with multiple services. This includes technical services for new assets to integrated revamping approaches in which energy efficiency and compliance with stricter emissions standards are combining to provide higher value to clients. In this approach, overall costs are significantly reduced. However, an integrative approach requires developing additional skills and competencies.

Both market segments (e.g., high-end and low-end) have experienced similar trends in project execution, such as low-cost sourcing and in low-cost fabrication, as well as modularizing furnaces to reduce site erection costs and lead time when project requirements imposed such arrangements.

The growth of the process furnace market has been unequally spread across regions. During the oil price crisis, a strong deceleration was observed in every region. However, the main engines of the market (e.g., the Middle East and Asia) have restarted. At present, 55% of the furnace market and more than two-thirds of its growth is in the Middle East and Asia (FIG. 2). This growth is driven by major refining and petrochemical projects in those two regions.

Market competition: Toward diversity and integration. The process furnace market is comprised of three different groups:

- Group 1, which represents approximately 50% of market volume, are the global integrated actors, chiefly large EPC companies. These companies base their development on their own technology.
- Group 2 is constituted mostly by small and agile companies that can deliver projects in different regions of the world depending on their experience and capability. They are generally private capital and family-owned subject matter experts (SMEs) in Italy, Spain, the UK, Korea, Japan and the US who have generally been through the crisis by developing strategies to reduce their costs (e.g., lower overheads and increased low-cost sourcing).
- Group 3 is mostly fabricators that evolved toward furnace engineering or small engineering groups who developed into furnace equipment. Their area of influence is mainly regional, but they are less present when it comes to global tenders and execution in other regions. They are notably located in the US, Europe, Korea, India and China.

The evolution of process furnace manufacturers has mirrored the evolution of the market: small and family-owned companies from Group 2 have increasingly developed their ability to source in low-cost areas to survive the oil price drop crisis. Larger and integrated players have developed their cost competitiveness and have chosen to build their development with their own technologies and on larger offerings based on their group products and services.

Market demand and perspectives. Since the slump of 2017, the market has been recovering at a relatively steady pace. However, furnace manufacturing capacity still exceeds demand in most areas and pressure on prices remains high, specifically in Europe where the highest concentration of furnace vendors is located.

Based on project forecast, the process furnace market is expected to continue its recovery in 2019 and 2020 and will possibly revert to its robust levels witnessed in 2014. This recovery is highly dependent

upon the speed at which several major projects will materialize, especially in the refining and petrochemical sectors in Asia and the Middle East.

Digitalization. Beyond these volume considerations, high-speed data networks, cloud-based systems and advanced data techniques are leading a distinct change in the way industries monitor and optimize their operating assets. Refineries and petrochemicals sites that adopt real-time unit monitoring tools incorporating on-demand, advanced modelling or process performance will see an immediate marketplace advantage. Such initiatives include a digital service[a] that addresses the challenge to substantially improve the efficiency of refineries and petrochemical sites, and furnaces specifically. This service automatically collects data from the site, with the highest standards of cybersecurity, and converts it into normalized key performance indicators (KPIs) using proprietary high-fidelity models in real time. Results are displayed through customized dashboards and projection tools that accelerate decision-making processes.

Revamping. In the refining world, where margins are highly volatile, environmental standards are driving significant plant emissions reduction and technological changes, and where energy costs and energy efficiency are becoming increasingly important, the revamping of old assets to obtain "more with less" is another strong driving force for process furnace manufacturers.

This is particularly true for regions with cost and demand constraints, such as Europe, where most refining producers are looking for more from their assets, as well as transforming their assets to obtain a more versatile feed (e.g., fuel oil to fuel gas) or even to convert their refineries to bio-based feedstocks.

The ability to design and endorse the process characteristics of a fully revamped furnace, together with significant capabilities for piping and instrumentation that are often required in large projects, is creating a differentiation between furnace vendors. Larger revamping projects are requiring a broader set of capabilities that restrain the number of players with the critical resource and experience in this segment, whereas most furnace manufacturers can manage simpler projects, such as convection section revamping.

In this respect, the acquisition of Heurtey Petrochem by Axens has allowed Heurtey Petrochem Solutions—the new brand under which the furnace activity is developed within the group—to integrate technological support and resources that reinforce its capabilities to conduct large and integrated revamping, which necessitate a strong coordination between the process technology and project construction teams.

A choice in growth strategies. In the rapidly evolving furnace market, furnace companies face two choices: growing and sustaining their activities on equipment and execution costs or growing through enhanced offers integrating technology and services. Certain actors have been practicing both to combine a search for competitiveness and an improvement of their positioning. However, only technology-integrated companies have been successful in combining both to offer additional services like emissions reduction technology, higher efficiency furnaces, high levels of modularization and technical service for furnaces. HP

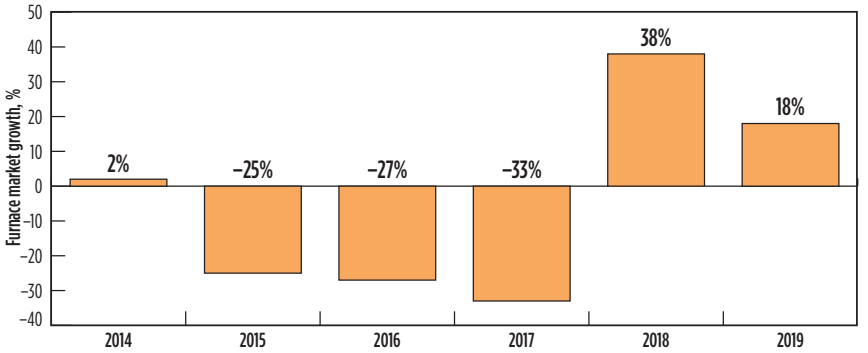

FIG. 1. Evolution of the non-proprietary process furnace market, 2014–2018.

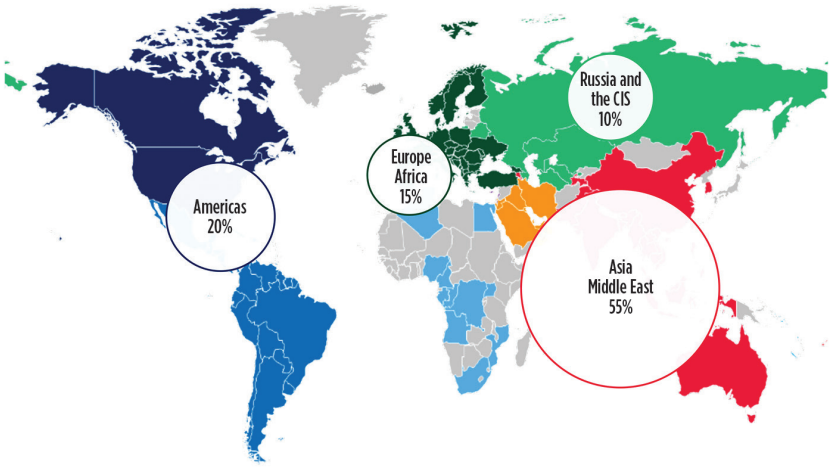

FIG. 2. More than 50% of the non-proprietary furnace market is in Asia and the Middle East. Source: Axens.

NOTES

[a] Refers to Axens' Connect'In, an Axens' software-as-a-service

THOMAS GRIMAUD is a chemical process engineer graduate from École Nationale Supérieure de Chimie de Paris and from the Insead Global Executive MBA. He held various management positions at Total, Arkema and Manoir Industries before joining Heurtey Petrochem in 2015. Mr. Grimaud is Executive Vice President in charge of the Engineering and Solutions business unit of Axens, which regroups the former activities of Heurtey Petrochem, the project execution teams of Prosernat, and the advanced services of the *Performance Programs* product line of Axens.

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