

■ FRANCE BUSINESS REPORT ■

AXENS BANKS ON TECHNOLOGICAL INNOVATIONS FOR MORE ECO-EFFICIENT FUEL PRODUCTION

Innovation is constantly pushed forward by the evolving needs and demands of society. People opt for more environmentally friendly solutions, seek ways to further improve quality of life, and turn to measures that help safeguard the future.

Companies not agile enough to adapt to this ever-changing world could be quickly rendered obsolete. Seeing how mobility and transport are big factors that impact society, oil and gas companies face tremendous pressure to stay a step ahead of the changes.

Combining French engineering expertise with the rich insights of a global workforce, Axens provides top-notch support for oil and gas and water treatment companies with its technologies, catalysts, adsorbents, services and equipment that help clients maintain sustainably sound and efficient operations.

A non-aligned, pure technology company, Axens' main business is focused on providing sustainable and economically efficient solutions for the conversion of oil and biomass to cleaner fuels and on the production and purification of major petrochemical intermediates. Axens' offer also covers all of natural gas treatment and conversion options.

"Everything is about innovation. We are committed to the trust agreement of the technologies and processes we license to help our clients continue to improve their performance," says Dr Patrick Sarrazin, executive vice-president, process licensing.

Axens has a strong technical background, being an affiliate of IFP Energies nouvelles (IFPEN) – a leading-edge technological research and training company specialising in the fields of energy, transport, and environment. Axens' expertise actually stems from two companies, as it is a result of a merger between catalyst and adsorbent producer Procatalyse and IFPEN's process licensing and service division.

In 2001, the creation of Axens through the merger of Procatalyse and IFPEN's process licensing and service division was a strategy that paid off as Axens offers one of the most

comprehensive service portfolios in the industry. Building on this foundation, Axens' acquisition of oil and gas engineering group Heurtey Petrochem further broadens the former's offer across the entire value chain from feasibility study to unit start-up and follow-up throughout the unit's entire lifecycle.

Axens Group now provides a complete range of solutions, including technologies, equipment, furnaces, modular units, catalysts, adsorbents and services.

"The merger between Axens and Heurtey paves the way for a prime technological industrial group specialising in cleaner fuels and eco-efficient processes. This enables us to respond more efficiently to customer needs," Sarrazin says. "With Heurtey's expertise and experience, Axens is in position to manufacture and deliver mid-sized and modular projects to the customer's site in complete packages, bringing added value to customers that may be constrained by either time to market or project execution."

Axens operates three business units, namely, catalysts and adsorbents (CA), process licensing (PL) and engineering and solutions (ES). With these different arms, Axens is able to cover the end-to-end needs of clients for a unit's entire lifecycle.

"Being a subsidiary of a research and development centre is key to being a leader in this segment. It is not just being innovative one time, but constantly. Initially, we offer customers cutting-edge technologies that set them apart from competitors. However, we are also able to understand and adapt to what would be the market needs in the coming five or 10 years," Sarrazin says.

Axens' CA business unit is developing and manufacturing catalysts and adsorbents that are used in many industrial plants globally. These products are key to various processes such as in reforming and isomerisation, hydroprocessing, sulfur recovery, hydrogenation, selected contaminants removal, drying and purification, along with other specialised applications.

Global leadership

"Axens has established itself as a technology leader and operates in five markets: oil refining, petrochemicals, natural gas and industrial gases, renewables and alternatives, as well as water treatment. In addition, Axens is considered as a benchmark in clean fuel technology," Sarrazin says.

Axens' expertise in refining covers a wide array of solutions from liquefied petroleum gas (LPG) sweetening to vacuum residue conversion. Axens enables companies to process straight run streams from the top of the barrel, cracked gasoline, middle distillates and as bottom of the barrel residues. The combination of all these solutions enables refiners to obtain value from every drop of oil.

"Axens makes an impact in the industry. Forty per cent of the worldwide fuels production is generated with Axens' technologies," Sarrazin says. "To date, we have licensed 2,900 units worldwide to allow many countries to deliver or market clean fuels."

A particular example of its technological leadership was in the 2008 Beijing Olympics, where Chinese subsidiary Axens Beijing enabled PetroChina to put on-stream the first Prime-G+ gasoline desulfurisation unit in China to provide ultra-low sulfur gasoline for the Olympics. With Axens' assistance, PetroChina was able to treat 100 per cent fluid catalytic cracked naphtha and produced an ultra-low sulfur gasoline component. Axens contributed to the production of clean gasoline in China, which resulted in better air pollution control. Since that time, Prime-G+ became a bestseller and the must-have technology for gasoline desulfurisation in China.

The petrochemical industry relies upon a wide range of intermediate products and processes to turn source materials into finished goods.

Axens is a reliable partner of petrochemical companies, providing technologies, along with class-leading catalysts and adsorbents, for the production and purification of olefins and aromatics. These petrochemical intermediates are

the building blocks used in manufacturing polymers for industries such as packaging, automotive, electronics and clothing. In the future, global demand for fuels should experience slower growth than the petrochemicals market.

Axens can help clients adapt to this market swap and help companies optimise asset profitability by assisting them in integrating refining and petrochemical sites.

For the gas processing industry, Axens specialises in natural gas and industrial gases purification and treatment. For natural gas, Axens provides molecular sieves and mercury removal adsorbents for purifying and drying natural gas before it can be supplied as feedstock for producing liquefied natural gas (LNG). With industrial gases on the other hand, Axens develops products to dry carbon dioxide and nitrogen for the food and chemical industries.

Another very important market for the future that Axens serves is the production of renewable fuels and petrochemicals from biomass. Axens' technologies can convert various biomass sources into high-quality diesel, jet fuels and second-generation ethanol, such as ethanol from non-edible biomass. Ethanol could be used to produce bio-ethylene, while further processes enable the production of bio-based butadiene and aromatics. Axens has also developed solutions for the production of alternative liquid fuels from non-oil resources, such as the Gas-To-Liquids Fischer-Tropsch technology.

Outside oil and gas, Axens is providing high-performance water treatment adsorbents for drinking water, environmental remediation and industry. With Axens' activated alumina product Actiguard, unwanted minerals and nutrients such as arsenic, fluoride, copper, zinc, lead, silica, phosphates and nitrates are removed from water. The Actiguard line is used to treat potable water for municipal and household use and the remediation of waste streams.

Axens serves these five markets with innovative solutions that reconcile efficacy and environmental friendliness.

"About 60 per cent of the processes and



Dr Patrick Sarrazin, executive vice-president, process licensing

products we are delivering to the market are directly or indirectly involved in environmental protection," Sarrazin says.

Supporting oil and gas market globally

Since the merger that formed Axens in 2001, Axens has rapidly grown, doubling its manpower worldwide.

"Our main difference is technical excellence combined with the successful deployment of our strategy, which relies first on the motivation, expertise, talents and diversity of all our employees worldwide," Sarrazin says.

With its workforce keeping a close eye on market developments, Axens is able to anticipate the evolution of the industry, noting the differences from varying geographical regions. For instance, Axens initiated the study of biomass-based technologies in the 1990s and has successfully become among the pioneers of biodiesel manufacturing.

In China, where pollution has been a long-time problem, Axens sees ample opportunities to help and assist refining and petrochemical companies to make a positive difference.

Axens' mother company IFPEN, which was known as IFP at that time, was among the first process licensors in China's oil and gas industry. IFP licensed and designed several units for the first Chinese petrochemical complex in Liaoyang in

the 1970s. Since then, IFP has continued to make contributions that helped grow China's oil and gas industry. In the 1990s, the company helped in the design of the first direct coal liquefaction complex in China.

Axens Beijing has kept its strong momentum in China, licensing important conversion processes. Since last year's integration with Heurtey, Axens Beijing has also started offering furnaces and modular units supply in China.

Aside from PetroChina, Axens has also worked with a private company to supply its technologies for a crude-to-paraxylene complex in China's Liaoning Province. Axens was chosen for the project – which is the largest site in the world for high purity paraxylene production and will also produce gasoline and diesel fuels – for its large technology portfolio and ability to maximise naphtha and paraxylene production.

Axens has also developed relationships of trust with smaller and independent oil refiners in order to help them deliver cleaner fuels to the market. Axens also has several cooperation agreements with the most important Chinese engineering companies.

"Axens' commitment has been and will be to continue being a trusted partner to all customers from Asia, helping them to meet the environmental challenges of the future," Sarrazin says.