

BUSINESS SEGMENT REVIEW



Advanced Materials

The segment, with facilities in Europe and North America, produces raw materials designed for cleaner, lighter and environment-friendly

21st-century applications in specialty chemicals, coatings, construction, petroleum and other global industries.



0.39 Mn MT

Sales volume

₹33,178 Mn

Revenue from operations




23%

Contribution to consolidated revenue

5%

Operating margin

Our Advanced Material products

Product Groups	Raw materials used	Manufacturing process	Finished Products	Production locations
Engineered products 	Pitch and petroleum tar	Manufactured from a highly reduced concentration of PAHs	<ul style="list-style-type: none"> - CARBORES® - PETRORES® - Sealer coatings 	Belgium, Canada, Germany and Poland
Chemical intermediates 	Naphthalene oil, crude benzene and cracker residues	Produced from our internal production process of naphthalene oil, which is further processed into downstream products, such as phthalic anhydride – that serve as key raw materials in various industries Distillation of crude benzene	<ul style="list-style-type: none"> - Refined naphthalene - Phthalic anhydride - Modifiers - Benzene - Toluene - Xylene - Solvents - Fuel additives 	Belgium, Canada and Germany
Resins 	Carbo-indene C9 feedstock	Downstream refining of naphthalene and other inputs	<ul style="list-style-type: none"> - Carbon resins - Pure resins - Hydrogenated resins - Phenolics 	Germany

We realigned our product portfolio and formed the Advanced Materials business segment in 2019 to combine our downstream businesses, non-coal tar related products and unique material segments. The business focuses on the development of eco-friendlier alternatives as well as non-coal tar-based downstream hydrocarbon and advanced carbon products. Today, we are a global leader and innovator in the production of advanced materials.

We transform part of our carbon output, petrochemicals and other raw materials into high-value, eco-friendly raw materials that are critical to the specialty chemicals, coatings, construction, automotive, petroleum industries, in addition to other global industries. We have five advanced material production facilities in Belgium, Canada, Germany and Poland.

BUSINESS SEGMENT REVIEW - ADVANCED MATERIALS

Operational highlights of 2021

- Ramped up troubleshooting of the HHCR plant's novel precursor technology and began to build a portfolio of leading customers for our 'water-white' resins.
- Completed a strategic project to convert one of our units in Europe to produce PETRORES®, providing us with the capability to increase production to meet growing demand by the energy-storage industry.



Market overview

- Business expanded at an unprecedented rate in 2021 across all relevant product segments, including record output of our CARBORES®, PETRORES® and resins to serve the specialty graphite, refractory and lithium-ion battery segments as well as hydrocarbon resins following the consolidation of our resins business in 2020
- Particularly strong interest in energy efficiency is driving increased sales across our PETRORES® -specialty coatings, phthalic anhydride for wind-turbine blades and selected NOVARES® resins that reduce the rolling resistance of tyres, thereby decreasing fuel consumption
- Regulatory changes and societal demand for cleaner and contaminant-free products, such as adhesives used in hygiene products and food packaging, should lead to increasing demand for the NOVARES® pure, 'water-white' resins produced at our new HHCR facility in Germany





Case study

Growth driven by innovation

Since the early 20th century, our Duisburg facility in Germany has been a leader in chemical-related and carbon-based product development. This includes being the first to produce plastic made from synthetic components known as Bakelite on an industrial scale during the early 1900s. Despite its long and storied history, in more recent years the plant struggled to find its place in the new industrial economy.

Several years ago, we formulated a clear, new strategy for the site based on a streamlined set of innovative product lines and forward-looking ways of thinking. This allowed Duisburg to experience strong global demand once again for its unique products and run at utilisation levels that were hard to imagine five years ago. Contributing to the German plant's renaissance was the decision to close our Uithoorn resins production facility in the Netherlands. The production of its profitable hydrocarbon resins products was transferred to Duisburg and the others were eliminated. This has resulted in improved economies of scale for the Duisburg facility and



the elimination of ~US\$ 8 Mn in annual production costs.

In 2021, we opened a state-of-the-art rubber lab in Duisburg. The US\$ 1.3 Mn investment will significantly improve our technical services and targeted product development for the rubber industry, with the intention of positioning our Company as a preferred partner in applications and R&D cooperation.

With this investment, the lab team can assess a broader range of variables giving us a much better understanding of our products and their performance. It also enables us to evaluate how certain modifications will optimise products for specific applications or result in the

creation of a new resin. In addition, being able to conduct in-house testing will improve our knowledge of the link between resin structure and performance. This will enhance RAIN's credibility with rubber customers, allowing us to speak their language when it comes to key performance data. This includes grip and abrasion performance, dynamic loss factor, the interaction between rubber and filler, processing capability and more.

Most crucially, the new Duisburg rubber lab will help us develop new products for safer tyres and better fuel economy, which is a win-win for all stakeholders.

Outlook

In 2022, we expect to benefit from continued strong demand for our CARBORES[®] engineered product, which is used in refractory and graphite products, as well as our PETRORES[®] specialty coating for lithium-ion batteries. In 2022, we are looking for an incremental production increase of both products thanks to the fourth-quarter completion of a strategic project to convert one of our units in Europe to produce PETRORES[®], which will enable us to meet the increasing demand.

We also anticipate that sales volumes of the rest of our Advanced Materials products will remain strong, and we are ready to meet that demand as a result of late-2021 maintenance outages at our BTX and phthalic anhydride production facilities that will provide increased operational capacity and reliability. In addition, we expect that the replacement of the reactors in the hydrogenated hydrocarbon resins facility will improve its reliability. The new reactors are based on a much simpler design, and are already providing the desired results, reducing the need for future maintenance outages.

As with the carbon distillation business, this segment faces the continued challenge of coal tar availability and rising cost for the raw material. Moreover, soaring energy prices in Europe could remain an issue in the near term. In response, we have changed fuels for our internal energy production, hedged a portion of our natural gas contracts and implemented energy surcharges to our sales prices. In a few of our Advanced Materials product lines, we have also taken aggressive actions to reduce energy consumption to restore margins, as we move forward in 2022.