

BUSINESS REVIEW

Research & Development

Investment in research and development (R&D) is an integral part of Johnson Matthey's growth strategy. It underpins the development of new products and manufacturing processes and enables the group to differentiate itself using its world class technology. In 2009/10 Johnson Matthey spent £91.7 million gross on R&D.

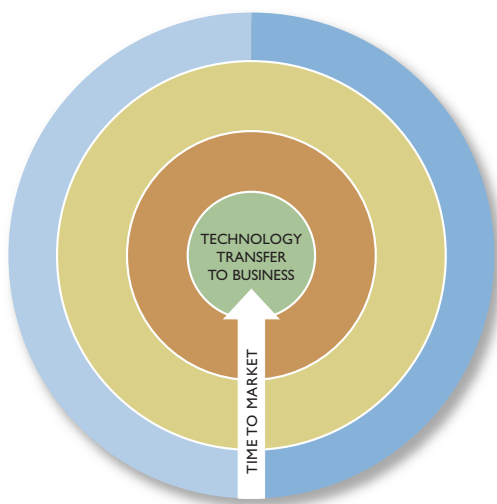
Our group technology centre is a central resource which conducts strategic R&D on behalf of all Johnson Matthey's businesses. It operates across three sites in the UK (Sonning Common, Billingham and Royston) and employs around 200 people. In addition, the group's businesses also have their own dedicated R&D and technical centres around the world which focus on the delivery of shorter term business specific projects.

In the group technology centre, R&D activities are broadly divided into four categories; core science, divisional projects, sponsored university programmes and collaborative external projects. This combination of internal research and collaboration ensures we have access to the very latest technology and develop relationships with leading scientists around the world.

Core Science

Some research skills are considered core to the company's technical expertise and are applicable across multiple businesses. In order to develop these skills the core science group develops fundamental knowledge about the science underpinning many of Johnson Matthey's technologies, transferring new products and processes to the divisions as appropriate.

Group R&D Activities



- Divisional projects – business funded R&D
- Core science
- Sponsored university programmes
- Collaborative external projects

An example of a core science technology area is advanced materials synthesis which has wide applications in our catalyst businesses. Johnson Matthey has a dedicated facility to produce a range of advanced materials using a state of the art technique called flame spray pyrolysis. This can be used to produce a wide array of materials ranging from metals, metal oxides and more complex mixed oxides or catalysts. Flame spray pyrolysis is a single step process where one or more precursor compounds are dissolved in a solvent and sprayed into a flame zone. The spray is combusted and the precursor is converted into extremely small metal or metal oxide particles. The technique is versatile and allows the use of a wide range of precursors, solvents and process conditions, thus providing control over particle size and composition.

Divisional Projects

The group technology centre undertakes a wide range of work for and directly funded by Johnson Matthey's divisions. One example is in the area of refining research where we are working to improve our platinum group metal (pgm) refining operations and services. By combining creative synthetic chemistry with cutting edge characterisation technology, we are developing faster and more efficient processes that separate pgms in very high yields. We are also able to draw on our international links with academia to build on our understanding of chemical transformations and to control more precisely the chemical behaviour of the precious metals. As with all divisional projects, we are working closely with development teams in Johnson Matthey's Refining business. Together we are delivering advances in process technology which will lower raw material consumption, minimise energy use and eliminate waste. We are also launching a modelling programme in which powerful simulations track and ultimately predict the behaviour of metals throughout the numerous complex processes within the refinery. Our range of R&D projects in this area all focus on delivering a streamlined and more sustainable refinery design.

Sponsored University Programmes

Developing our knowledge and expertise in advanced analytical and characterisation methods are a key component of our R&D programme. For a number of years we have worked closely with the University of Warwick in the UK to apply solid state nuclear magnetic resonance (NMR) spectroscopy to industrial R&D issues. The successful application of this method has led to major improvements in our understanding of the fundamental science of catalyst, glass and ceramic materials. We are now working to automate the technique which will allow for rapid screening and early identification of novel, highly tailored catalysts.

Collaborative External Projects

The continued development of new products or access to new markets requires the company to collaborate with both leading participants in these markets and with academic researchers who have an understanding of the latest developments. To support this, Johnson Matthey participates in a diverse range of UK and US government and European Union (EU) funded R&D programmes.

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In one example, Johnson Matthey's researchers are engaged in a large EU collaboration that addresses some of the specific challenges around purifying bioderived synthesis gas. There is growing interest around the world in using non-food crops, such as wood and agricultural waste, to produce sustainable biofuels via bioderived synthesis gas. A range of biochemical and thermochemical processes are emerging, all of which offer opportunities for growth in the areas of catalysts, process technology and precious metals. Biofeedstocks are inherently variable and so fuel upgrading and purification of the bioderived synthesis gas are key issues. By engaging with a range of academic groups, Johnson Matthey is working to develop the purification materials, catalysts and processes for synthesis gas cleaning in the production of biofuels.

We maintain a close link between the four categories of our R&D activities and with the development work carried out directly by Johnson Matthey's businesses. This interaction is key in ensuring the rapid transfer of technology to support the continued development of new products and services for our customers.

Risks and Uncertainties

There are a number of potential risks and uncertainties which could have a material impact on the group's long term performance.

Technological Change and Patents

Much of the group's business is focused on selling products which are technologically advanced or employ technologically advanced processes in their manufacture. In most cases these products are subject to continuous improvement as new technology is developed. The group is exposed to the risk that if it does not keep up with changes in the market place its products will no longer be competitive. This is both a threat and an opportunity since Johnson Matthey can gain business as well as lose it. The group's strategy to meet this risk is to invest significantly in research and development to maintain or achieve leadership positions in those markets which offer sufficient added value to justify the long term investment required.

The group's results are also impacted by the status of patents. These include patents which the group itself registers and maintains, as well as the risks arising from new third party patents and the benefits that arise from the expiry of third party patents. All the group's divisions have significant registered intellectual property. The Fine Chemicals Division supplies active pharmaceutical ingredients to generic manufacturers and can benefit when third party patents expire. If actual patent lives differ from the expectations of the relevant group business, such as by being extended or successfully challenged, this can affect the group's results. The group has established policies both to monitor its existing patent portfolio and those of third parties, taking appropriate action as necessary in respect of infringement.

Legislation

Much of the stimulus for the development and growth of Johnson Matthey's products arises from new legislation governing the environmental or health impact of its customers' products in different jurisdictions worldwide. This is most significant for Emission Control Technologies where historic and future growth depends on global tightening of emissions limits.

Legislation is also relevant for some of the group's other businesses. Process Technologies and Catalysts and Chemicals manufacture products to remove contaminants or to produce particularly pure chemicals. Colour Technologies is supported by legislation phasing out lead, cadmium and other heavy metals from glass and ceramic glazes. The development of the fuel cells industry is also impacted by clean air regulations and the drive towards zero emissions within both local and national legislation.

Whilst the group has benefited considerably from the development of such legislation its growth could be adversely affected if the pace of legislative change slowed significantly. Johnson Matthey monitors the development of legislation globally and coordinates its development work to ensure it can achieve greatest advantage from each new requirement. Regular reviews are undertaken at the business and group level to monitor growth and to investigate other areas of potential if legislation slows.

Global, Political and Economic Conditions

Johnson Matthey operates in over 30 countries around the world including within Africa, Asia and Latin America. While benefiting from the opportunities and growth in these regions the group is exposed to the economic, political and business risks associated with such international operations. The group encounters different legal and regulatory requirements including those for taxation, environmental, operational and competitive matters. It is exposed to the effect of political risk which can include sudden changes in regulations, expropriation of assets, imposition of trade barriers and wage controls, limits on the export of currency and volatility of prices, taxes and currencies. The group is exposed to possible natural catastrophe risk, for example through major earthquake or flood, and possible terrorist action. Management monitors such risks, maintaining adequate insurance cover and amending business procedures as appropriate to mitigate any exposure while remaining in compliance with local and group requirements.

Environment, Health and Safety (EHS)

Johnson Matthey is committed to providing the highest level of protection to the environment and to safeguarding the health and safety of its employees, customers and communities. Shortcomings in any area of EHS can have devastating effects on people's lives and on the planet. In addition, the failure to maintain the required high standards in EHS could damage the group's reputation, result in financial penalties, cause disruption to the business and potentially result in temporary or permanent closure of sites.

The environmental laws of various jurisdictions impose actual and potential obligations on the group to remediate contaminated sites, both those currently owned and, also in some cases, those which have been sold. The group incurs costs annually in meeting these obligations and also maintains provisions for potential liabilities. If existing provisions are inadequate to cover any liabilities or the associated costs arising from environmental obligations this could materially impact the group's results.

All the group's manufacturing facilities are required to operate in accordance with the group's EHS policies which include comprehensive guidance on, inter alia, occupational safety, environmental protection and health management and are set out on the company's website at www.matthey.com. The group EHS management system supplements these policies and details additional guidance and requirements on matters including community relations, process risk management and product stewardship.