Presentation to Analysts / Investors

Johnson Matthey Process Technologies, Teesside
29th / 30th January 2008
Cautionary Statement

This presentation contains forward looking statements that are subject to risk factors associated with, amongst other things, the economic and business circumstances occurring from time to time in the countries and sectors in which Johnson Matthey operates. It is believed that the expectations reflected in these statements are reasonable but they may be affected by a wide range of variables which could cause actual results to differ materially from those currently anticipated.
Overview and Trading Update

Neil Carson
Chief Executive
JM Executive Board

• Neil Carson - Chief Executive
• John Sheldrick - Group Finance Director
• Dr Pelham Hawker - Executive Director, Process Technologies and Fine Chemicals & Catalysts
• Larry Pentz - Executive Director, Emission Control Technologies
• David Morgan - Executive Director, Corporate Development and Central Research
Other Senior Management

- Neil Whitley - Division Director, Process Technologies
- Andrew Wright - Managing Director, Syngas & Gas to Products
- Dr John Dunleavy - Managing Director, Refineries & Gas Processing
- Dr David Tomlinson - President, Davy Process Technology
- Graeme McGregor - Finance Director, Process Technologies
- Ian Godwin - Director, Investor Relations
- Dr Sally Jones - Public Relations Manager
Programme

09.00  Overview and Interim Management Statement (Neil Carson)
09.20  Process Technologies - Opportunities in Energy (Pelham Hawker)
09.40  Process Technologies (Neil Whitley)
10.10  Coffee Break
10.20  Ammonia, Methanol, Oil and Gas (Andrew Wright and John Dunleavy)
11.00  Davy Process Technology (David Tomlinson)
11.30  Tour of Billingham Site
13.00  Lunch
13.45  Depart by coach for Davy Process Technology, Stockton-on-Tees
14.00  Introduction to the DPT Technology Centre (David Tomlinson)
14.15  Tour of the Technology Centre
15.00  Wrap Up and Q&A
15.15  Depart by coach for Darlington Station
Interim Management Statement

• Strong third quarter
  • Sales for continuing businesses up 18%
  • Sales excluding precious metals up 23%
  • Operating profit up 17%

• Environmental Technologies Division well ahead of third quarter of last year
  • Emission Control Technologies benefits from good growth in sales of autocatalysts in Asia and of heavy duty diesel products
  • Process Technologies sees good demand for syngas catalysts and high energy prices drive demand for new process technology

• Precious Metal Products Division benefits from high pgm prices and good growth in its manufacturing businesses

• Fine Chemicals & Catalysts Division well ahead of third quarter of last year with continued good growth in the US
Interim Management Statement

- Investment in new plants in Macedonia and the USA
- Argillon
- Share buy-backs
- Outlook encouraging despite some signs of weakness in North American car market
- Fourth quarter of last year benefited from trading profits on minor pgms which are not expected to be repeated at the same level this year. Consequently profit growth in fourth quarter of this year will be lower than in the third quarter
- However, we expect profit before tax for the full year to be towards the top end of current market expectations
## Environmental Technologies Division Overview

<table>
<thead>
<tr>
<th>£m</th>
<th>1H 2007</th>
<th>1H 2006*</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>1,055</td>
<td>843</td>
<td>+25</td>
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<tr>
<td>Sales excluding precious metals</td>
<td>541</td>
<td>384</td>
<td>+41</td>
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<tr>
<td>Operating profit</td>
<td>65.2</td>
<td>57.0</td>
<td>+14</td>
</tr>
</tbody>
</table>

* At 2007 exchange rates

- Emission Control Technologies (ECT)
- Process Technologies (PT)
- Fuel Cells

![Pie chart showing ECT, PT, and Fuel Cells]

**PT + Fuel Cells**

**ECT**

**Sales ex pms**
The Catalyst Market

Total Sales $13.8 billion

Catalyst Sales by Market (2005)
- Polymers 21%
- Environmental 32%
- Fine Chemicals and Intermediates and Other 10%
- Refining 19%
- Petrochemicals 18%

Source: The Catalyst Group Intelligence Report 2006

Catalyst Sales by Region (2005)
- North America 34%
- Western Europe 24%
- Other Asia / Pacific 11%
- China 8%
- Japan 9%
- Africa / Middle East 5%
- Eastern Europe and Latin America 9%

Source: Freedonia World Catalyst Report 2007
Opportunities in Energy

Pelham Hawker
Executive Director, Process Technologies and Fine Chemicals & Catalysts
Opportunities in Energy: Global Energy Themes

- Energy demand and supply
- Impact of oil and gas price
- Increasing use of gas and coal
- Tightening environmental regulations
- Investments in oil, gas and coal
Energy Demand and Supply

- Strong demand from developing economies particularly Asia:
  - Power consumption
  - Automotive and transport fuels
  - Petrochemicals
  - Domestic uses

- China is 50% of all Asia / Pacific hydrocarbon demand
- China approaching 20% of world demand (17% 2006)

Growth in Hydrocarbon Demand in China

Energy Demand and Supply

- Oil supply nearing the peak
- Oil is more difficult and costly to extract
- ‘Dirty’ oil requires more refining
- Gas and coal forecast to grow

Source: IEA 2006
Energy Demand and Supply

- Energy security concerns for major economies
  - China increasing number of coal projects with restrictions on gas
  - US higher LNG imports and utilising lower quality crude oil
  - US and Canada extracting higher volume of tar sand sources of oil
  - Nuclear, biofuels and alternative energy growing but small
  - Oil and gas supply concerns in the Middle East and FSU

Impact of Oil and Gas Price

• High oil price improves refinery margins and encourages investment
• Increased oil exploration activity
• Opportunities created for gas projects although gas prices also rising
• High oil and gas prices feed through into power, fuel and petrochemical prices
• High oil price encourages investments in new gas and coal based projects

Source: BP Statistical Review of World Energy 2006
Increasing Use of Gas and Coal

- $40 per barrel makes alternative sources economically viable
  - Processing dirtier crude
  - Increased number of tar sands projects
  - Many ‘gas to product’ schemes under review
    - Methanol, DME, MTO, MTP, GTL
  - Coal to chemicals in China and the US
Increasing Use of Gas and Coal

• Gas (Syngas) to Products

Traditional Applications
• Methanol - Wood preservative, vinyl paint, resins, adhesives, MTBE
• Hydrogen - Desulphurising fuels, chemical processes, fuel
• Ammonia - Fertiliser, pharmaceuticals, chemical intermediates

New Energy Sources
• Gas to Products - Methanol (direct, biodiesel, DME, MTO)
  - Fischer-Tropsch diesel
• Clean Coal - CO₂ sequestration
• Low Carbon - Syngas from biomass
  - Carbon sequestration and flare elimination
Tightening Environmental Legislation

- CO₂ emissions forecast to grow significantly particularly in Asia
- Impurities require capture
  - Sulphur
  - NOx
  - Mercury
  - Chlorides
  - CO₂
- Regulations will continue to tighten globally
Investments in Oil, Gas and Coal

• Increased investment in hydrocarbon extraction and refining
• Strategic energy planning is increasing the investment in alternative feedstock projects – particularly tar sands, gas and coal
• China developing numerous coal to product projects – attractive above $40 per barrel
• Syngas and methanol projects well above historical growth levels helped by high methanol prices
• Demand for new hydrogen capacity to meet tighter fuel sulphur specifications
Process Technologies

Neil Whitley
Division Director, Process Technologies
Process Technologies - Programme

• History of Process Technologies
• Growth of Process Technologies
• Strengths of the business
• Well placed for growth
• Detailed review of key businesses, markets and technologies
  • Syngas & Gas to Products - Andrew Wright
  • Refineries & Purification - John Dunleavy
  • Davy Process Technology - David Tomlinson
• Tour of Billingham and Stockton research and technology development facilities
History of Process Technologies

• November 2002 JM acquired the ICI catalyst business for £260 million
  • Ammonia, Methanol, Oil and Gas (AMOG)
    • Syngas & Gas to Products
    • Refineries & Purification
  • Chiral and Oleochemical catalysts *
  • Tracerco
  • Vertec

• Increased investment in manufacturing, research and process technology
• February 2006 JM acquired Davy Process Technology for £41 million
• April 2007 formation of Process Technologies

* Now within the Fine Chemicals & Catalysts Division
Process Technologies Overview

<table>
<thead>
<tr>
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<th>1H 2006*</th>
<th>%</th>
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<tbody>
<tr>
<td>Sales excluding precious metals **</td>
<td>113</td>
<td>105</td>
<td>+8</td>
</tr>
<tr>
<td>Operating profit</td>
<td>19.2</td>
<td>17.5</td>
<td>+10</td>
</tr>
</tbody>
</table>

* At 2007 exchange rates
** Including Fuel Cells

- AMOG and DPT: 10 – 15% growth expected
- Tracerco: 5 - 8% growth expected (process diagnostics, taggants and specialist measurement)
- Vertec: 3 - 5% growth expected (Ink and polymer catalysts)
Strengths of the Business

Key market positions where we are leaders

- **Methanol #1**
  - Over half of global methanol production uses JM catalysts. 55% of global production also uses JM technology
- **Hydrogen #1**
  - Over one third of global hydrogen production uses JM catalysts. Largest catalyst supplier and highest growth with industrial gas companies
- **Ammonia #2**
  - Around a quarter of global ammonia production uses JM catalysts. Strong growth in new plants with Uhde collaboration
- **Gas**
  - Strong niche position in gas streams that need removal of sulphur and mercury
- **Reforming**
  - Widest portfolio of steam reforming technology
- **Oxo alcohols #1**
  - 90% of butanol and 2EH licence market in LP Oxo technology in collaboration with Dow
Strengths of the Business

• A strong catalysis and process technology company

• Research
  • Billingham and Sonning

• Technology Development
  • Billingham and Stockton

• Manufacturing
  • Manufacturing excellence in Clitheroe and Panki

• Catalyst scale up
  • Manufacturing Science Centre

• Engineering
  • Process design scale up ability

• Technical support
  • Experience and quality of operational process engineers
Strengths of the Business – Geographical Reach

- **Central & South America**
- **Middle East**
- **Asia**
- **China**
- **Africa**
- **UK**
- **North America**
- **Europe**

**AMOG / DPT Locations**
- Technical sales offices x 9
- Manufacturing sites x 3 (UK, China, India)
- Technology sites x 2 (Billingham, Stockton)
- Engineering and Licensing centres x 2 (London, Billingham)

**2006/07 Sales by Region (by destination)**
- Central & South America
- Middle East
- Asia
- China
- North America
- Europe
- UK
- Africa
Well Placed for Growth

- Gas (and Coal) to Products
- Refineries
- China
- Tightening environmental regulations
Well Placed for Growth

Gas and Coal to Products

- JM has strong technology and product position
- Excellent, long term customer relationships
- Increasing opportunities in gas and coal
- Competitors – Haldor Topsoe, Sud Chemie, Lurgi, BASF

Key Catalysts & Technologies

- Pre-reforming
- Steam reforming
- Water gas shift
- Synthesis – Methanol / Ammonia
- Sulphur & Mercury Removal
- MTO / MTP / DME
- Synthetic Natural Gas
Well Placed for Growth

Refineries

- JM has strong position in hydrogen at many refineries
- Tightening specification for sulphur in fuel driving need for more hydrogen
- Exploring options to grow in other refinery catalyst applications – Sinopec
- Well placed in growing gas polishing and mercury removal markets
- Competitors – Grace, Albermarle, UOP, BASF, Haldor Topsoe, Sud Chemie, Axens
Well Placed for Growth

China

- Significant investment in gas and coal petrochemicals
- In 2007 JM won three Oxo alcohol projects and two methanol projects in China
- Joint venture to manufacture sour shift catalysts
- Hydroprocessing catalysts with Sinopec

‘Coal based chemical sector to grow rapidly’
– 18/9/07
Well Placed for Growth

Tightening environmental regulations

- Hydrogen
- Mercury and sulphur removal
- Gas heated reformers 30% less CO\(_2\)
- CO\(_2\) sequestration
- Glycerol to propylene glycol
Key Businesses

• Ammonia Methanol Oil and Gas (AMOG)
  • Syngas & Gas to Products - Andrew Wright
  • Refineries & Purification - John Dunleavy
• Davy Process Technology - David Tomlinson
Syngas & Gas to Products

Andrew Wright
Managing Director
Activities

• Syngas
  • Develop, manufacture and supply catalysts, process technology and services for the efficient conversion of natural gas or naphtha to ammonia, methanol or hydrogen.

• Gas To Products
  • Develop process technologies and catalysts that support the emerging gas and coal to products markets
Continued Growth

- Exciting times in methanol
- Higher growth in ammonia due to fertilisers for biodiesel
- Hydrogen growth exceeds expectation
- Interest continues in new gas and coal to products schemes
- JM well placed for longer term gas to liquids
Syngas: What is it?

Natural Gas Feed

Hydrogen

Steams

Air

Desulphurisation
Primary Reforming
Secondary Reforming
High Temperature CO Shift
Low Temperature CO Shift
CO₂ Removal
Methanation
Ammonia Synthesis

Take out poisons
React HC + Steam (and N₂ in Sy) to get CO and H₂
React CO + Steam to get CO₂ and more H₂
React H₂ and Nitrogen

Katalco 41-6
Katalco 32-4 & 32-5
Puraspec 2084

Katalco 25-4Q
Katalco 57-4GQ

Katalco 54-8Q

Katalco 71-5

Katalco 83-3

Katalco 11-4 & 11-4R

Katalco 35-8A

CO₂ Removal

MUG

330°C

470°C
Methanol

- ~$350 million installed value catalyst market
- Continued growth in methanol catalyst sales
- High methanol price, coal feedstock and new downstream use stimulates investment in methanol production
- Significant project activity in China although slowing slightly
Hydrogen

- ~$575 million installed value catalyst market
- Growth driven by tightening fuel specifications
- Hydrogen considered an important utility
- Hydrogen as utility for tar sands and coal to products facilities
- JM well placed with industrial gas suppliers – fastest growing market segment
- Catalyst and technology development programmes with leading customer in this sector
Ammonia

- ~$1.2 billion installed value catalyst market
- Growth driven by GDP growth and fertilisers for biodiesel
- Trend towards investment in regions with large gas or coal reserves
- Strong relationship with Uhde yields six new ammonia plant projects

<table>
<thead>
<tr>
<th>Location</th>
<th>Start-Up Year</th>
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<tbody>
<tr>
<td>Turkmenistan</td>
<td>2005</td>
</tr>
<tr>
<td>QAFCO IV, Qatar</td>
<td>2005</td>
</tr>
<tr>
<td>EFC 2, Egypt</td>
<td>2006</td>
</tr>
<tr>
<td>AlexFert, Egypt</td>
<td>2006</td>
</tr>
<tr>
<td>Helena, Egypt</td>
<td>2007</td>
</tr>
<tr>
<td>MOPCO, Egypt</td>
<td>2008</td>
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</table>
Reforming Technology Opportunities

- Gas heated reformer (GHR) technology developments ongoing
- Lower capital cost, improved energy efficiencies and 30% lower CO$_2$ emissions
- Offshore projects emerging and opportunity from GHR due to reduced weight and plant size – 2013 onwards
- Unique materials demonstration unit and new syngas generation pilot plant
Gas and Coal to Products

- Increasing activity in gas and coal schemes driven by continued high oil price and energy security concerns (China, United States)
- Environmental pressure continues to encourage new schemes
- GTL development slower than anticipated but industry watching current projects
- JM has developed strong FT catalyst manufacturing technology
- Other technologies growing more rapidly. Medium term opportunities starting with MTO / MTP / DME
Carbon Sequestration

- Sequestration technologies available and project feasibilities completed
- Schemes currently viable when $\text{CO}_2$ injected to enhance oil recovery
- Aim to supply technology into a project within three years
- Technologies offer carbon reduction potential for customers

Source: www.bp.com
Catalyst Manufacturing at Clitheroe
Activities

- **Refineries**
  - Develop, manufacture and supply catalysts and absorbents for refineries to produce on purpose hydrogen and remove harmful impurities. Supply other catalysts that utilise the technical and geographic strengths of the business.

- **Gas Purification**
  - Develop, manufacture and supply absorbents and reactor technology that remove trace levels of sulphur, mercury and other impurities from natural gas or process streams.
Refineries & Purification Sales

- Focused on the oil refining sector
  - Providing catalysts for on purpose hydrogen plants
  - Absorbent products to remove sulphur, chlorides and mercury
- Currently working with Sinopec in the hydroprocessing market
- JM currently niche player with potential to grow
- Gas purification grows as new plants come on stream
- Gas purification growth driven by tightening mercury legislation
Refinery Catalyst Market
– Refineries increasingly require ‘on purpose’ hydrogen

JM catalyst sales
JM niche purification sales
Gas Purification - Sulphur

• Long track record in capturing low levels of sulphur
• Offer significant operational support to customers who have low manning on site
• Growth in regions with low sulphur levels in gas streams which require “polishing” in order to meet pipeline specifications
• Cradle to grave catalyst system
Gas Purification - Mercury

- Growing issues with mercury in gas streams
- Serious process safety concerns in aluminium heat exchangers
- Real concerns for health of operators and downstream customers if not captured
- Mercury captured and recycled
Activities

- Develop process technologies for the oil, gas, petrochemical and chemical industries
- License proprietary technologies to clients worldwide
- Operate strategic alliances with major companies including Dow and BP
- Design, build and operate mini pilot plant test facilities
- Execute collaborative and custom R&D projects
Locations

Davy Process Technology

Head Office, London
- Management
- Licensing and Sales
- Process Development
- Process Engineering
- Front-end Engineering
- Project Management
- Quality Assurance

Technology Centre, Stockton
- Technology Development
- Pilot Plant Design and Construction
- University Links
- Health and Safety Reviews
Core Technologies

- Gas conversion
- Methanol
- Oxo alcohols
- Butanediol
- Natural detergent alcohols
- Ethyl acetate
- Amines
Licensing Components

- Licence contract (containing the fee, process guarantees and limitation of liabilities)
- Basic engineering package
- Supply of proprietary equipment
- Supply of catalyst
- Services (plant start up and commissioning assistance)

Underpinned by ongoing process improvement and Development of the IP portfolio
DPT – Methanol

- DPT: 34 plants in 17 countries over last 37 years
- Global market 38 million t.p.a. – 2.5% growth for chemical use (equal to one or two new plants per year)
- Also new uses of methanol creating much faster growth:
  - Automotive fuel (directly)
  - LPG blendstock (DME)
  - Methanol to olefins
  - Methanol to gasoline
  - Diesel substitute (DME)
  - New feedstocks for methanol – coal and waste gas
- Competitors Lurgi, Haldor Topsoe, Mitsubishi
DPT – Oxo Alcohols

- DPT / Dow Low Pressure Oxo process has captured more than 90% of butanol and 2EH licence market
- Global market of:
  - 2EH (2007) - 2.8 million t.p.a. growing at 2.5% p.a.
- Growth from solvents, coatings, PVC, plasticisers and detergents
- China and India net importers of butanol and 2EH
- ‘Competitors’ - Eastman and BASF (operate own technology)
DPT – Butanediol (BDO)

- Global market for BDO (2006) 1.2 million t.p.a. - growth 5 - 6%
- China market demand growing at 50k t.p.a. and currently importing 100k t.p.a.
- Middle East demand due to cheap butane feedstock
- Half new plants use owner’s technologies (BASF market leader, Mitsubishi and Lyondell)
- Half will purchase licences
  - Competition from Lurgi and Conser
DPT – New Technologies

- Gas to Liquids
  - Favourable conditions for investment
  - Technical and cost issues in the industry
  - Medium term opportunity
  - BP / DPT fixed bed FT technology
  - BP / DPT AJT slurry phase technology
- Glycerol to propylene glycol
- Dimethyl ether
Tour of DPT Technology Centre
Wrap Up and Q&A

Neil Carson
Chief Executive
Glossary

2EH  2-Ethyl hexanol
AJT  Advanced jet loop technology
AMOG Ammonia, Methanol, Oil and Gas
BDO  Butanediol
CO  Carbon monoxide
CO$_2$Carbon dioxide
CV  Calorific value
DME Dimethyl ether
DPT Davy Process Technology
ECT Emission Control Technologies
FSU Former Soviet Union
FT  Fischer-Tropsch
GHR Gas heated reformer
GTL Gas to liquids
GTP Gas to products
H2S Hydrogen sulphide
HC  Hydrocarbons
Hg  Mercury
LNG Liquefied natural gas
LPG Liquefied petroleum gas
LP Oxo DPT / Dow low pressure technology for production of oxo alcohols from olefins
LP Oxo DPT / Dow low pressure technology for production of oxo alcohols from olefins
MTBE Methyl tert-butyl ether
MTO Methanol to olefins
MTP Methanol to propylene
N$_2$ Nitrogen
NGLs Natural gas liquids
NOx Nitrogen oxides
Org S Organic sulphur
Pgm Platinum group metal
PT Process Technologies
Syngas A mixture of hydrogen and carbon oxides
t.p.a. Tonnes per annum