

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

2 TECHNOLOGY AND RESEARCH

- 2.1 Introduction
 - 2.1.1 Background and description
 - 2.1.2 History
- 2.2 Economics
 - 2.2.1 Energy consumption
- 2.3 Competitive technologies
- 2.4 Research
 - 2.4.1 European research programmes
 - 2.4.2 North American / South American research programmes
 - 2.4.3 Asian PM research programmes
- 2.5 Standards
- 2.6 Health and safety, environmental
- 2.7 Powder synthesis
 - 2.7.1 Electrolytic processes
 - 2.7.2 Chemical reduction
 - 2.7.3 Atomisation
 - 2.7.3.1 Gas and water atomisation
 - 2.7.3.2 Levitation-melting and gas atomisation process
 - 2.7.4 Hydride/dehydride process
 - 2.7.5 Oxidation-reduction and hydrogen reduction
 - 2.7.6 Mechanical processes
 - 2.7.6.1 Ball milling
 - 2.7.7 Plasma processes
 - 2.7.7.1 Plasma atomisation
 - 2.7.7.2 Plasma quench process
 - 2.7.7.3 Plasma-rotating electrode process (PREP)
 - 2.7.8 Wet chemical precipitation process
 - 2.7.9 Other processes
 - 2.7.9.1 Carbonyl processes
 - 2.7.9.2 Hydrometallurgical processing
 - 2.7.9.3 Inert gas condensation
- 2.8 Powder compositions
 - 2.8.1 Ferrous powders
 - 2.8.1.1 Iron powders
 - 2.8.1.2 Steel powders
 - 2.8.2 Non-ferrous powders
 - 2.8.2.1 Aluminium
 - 2.8.2.2 Chromium
 - 2.8.2.3 Cobalt
 - 2.8.2.4 Copper and copper-base powders
 - 2.8.2.5 Magnesium
 - 2.8.2.6 Nickel
 - 2.8.2.7 Tantalum
 - 2.8.2.8 Titanium
 - 2.8.2.9 Refractory metals
 - 2.8.3 Other powders and materials
 - 2.8.3.1 Cemented carbides
 - 2.8.3.2 Metal matrix composites
 - 2.8.3.3 Nanopowders
- 2.9 Forming/fabrication techniques
 - 2.9.1 Compaction methods
 - 2.9.1.1 Die compaction
 - 2.9.1.2 Rapid omnidirection compaction (ROC)
 - 2.9.1.3 High velocity
 - 2.9.1.4 Warm compaction
 - 2.9.1.5 Roll compaction
 - 2.9.1.6 Split die compaction
 - 2.9.1.7 CastCon process
 - 2.9.1.8 Consolidation by atmospheric pressure
 - 2.9.1.9 Dynamic magnetic consolidation (DMC)
 - 2.9.1.10 Electroconsolidation process
 - 2.9.2 Extrusion
 - 2.9.3 Foaming process
 - 2.9.3.1 Slip reaction foam sintering
 - 2.9.4 Forging
 - 2.9.4.1 Dynaforge process
 - 2.9.4.2 Pneumatic isostatic forging (PIF)
 - 2.9.4.3 Quasi-isostatic pressure process
 - 2.9.5 Isostatic pressing
 - 2.9.5.1 Cold isostatic pressing
 - 2.9.5.2 Hot isostatic pressing
 - 2.9.6 Metal injection moulding (MIM)

- 2.9.6.1 Micro metal injection moulding
- 2.9.6.2 Thixomoulding
- 2.9.7 Precision cold forming
- 2.9.8 Spray forming
- 2.9.9 Direct metal deposition
- 2.9.10 Solid free-form fabrication (rapid prototyping)
 - 2.9.10.1 Three-dimensional printing (3D printing)
- 2.9.11 Wrought and semi-finished products
- 2.9.12 Sintering
- 2.9.13 Post-fabrication techniques
 - 2.9.13.1 Coating methods
 - 2.9.13.2 Heat treating
 - 2.9.13.3 Joining methods
 - 2.9.13.4 Machining
 - 2.9.13.5 Oil impregnation
 - 2.9.13.6 Shot peening
 - 2.9.13.7 Steam treatment
 - 2.9.13.8 Thermal spraying
 - 2.9.13.9 Transverse gear rolling
- 2.10 New developments in PM materials and processes
 - 2.10.1 Developments in materials
 - 2.10.2 Developments in processes
- 2.11 Significant patents

3 APPLICATIONS

- 3.1 Aerospace
- 3.2 Automotive
 - 3.2.1 Automotive – recent developments
- 3.3 Bearings
 - 3.3.1 Bearings – recent developments
- 3.4 Cutting tools
- 3.5 Electrical and electronic
 - 3.5.1 Electrical and electronic – recent developments
- 3.6 Energy
- 3.7 Filters
- 3.8 Industrial and consumer applications
 - 3.8.1 Industrial and consumer – recent developments
- 3.9 Magnets
 - 3.9.1 Soft magnets
 - 3.9.2 Permanent magnets
- 3.10 Medical and dental
- 3.11 Military

4 CURRENT MARKETS AND MARKET FORECASTS

- 4.1 Geographic markets
 - 4.1.1 North America
 - 4.1.2 Europe
 - 4.1.3 Asia
 - 4.1.3.1 China
 - 4.1.3.2 Japan
 - 4.1.3.3 Other Asian countries
 - 4.1.4 Rest of the World
- 4.2 Markets for powders and components
 - 4.2.1 PM powders
 - 4.2.1.1 Iron and steel powders
 - 4.2.1.2 Non-ferrous powders
 - 4.2.1.3 Other materials
 - 4.2.2 PM components
 - 4.2.2.1 Aerospace
 - 4.2.2.2 Automotive
 - 4.2.2.3 Bearings
 - 4.2.2.4 Cutting tools
 - 4.2.2.5 Filters
 - 4.2.2.6 Industrial equipment
 - 4.2.2.7 Magnets
 - 4.2.3 Metal injection moulding (MIM) components
- 4.3 Industry dynamics
 - 4.3.1 Industry structure
 - 4.3.2 Recent mergers and acquisitions

5 EXTENDED COMPANY PROFILES

(See back page of leaflet for details of companies featured)

6 COMPANY PROFILES

7 GLOSSARY