EXECUTIVE SUMMARY

Chapter 1 - ALL CABLE - ELECTRICAL CONDUCTORS AND MECHANICAL ROPE

Wires and cable perform two basic functions. 1) They conduct electricity or communications, for which they need high conductivity, or 2) They carry loads, for which they need high tensile strength. Sometimes they combine both requirements. This report surveys the marker for the first group, electricity and communications conductors, and contains a brief review of the second group, mechanical wire rope. The report excludes products from either group in the informal sector, small producers of low-end wire and cable, mainly based in China and India.

Chapter 2 - GLOBAL MARKET SIZE & PRICE INDEX - CONDUCTORS AND TELECOMS CABLES

Metallic wire and cable production and consumption are sized in 2017 and forecast to 2022. For metallic cable, material prices are plotted from 2000 to 2017, and charted against tonnage production, $/ton of cable produced and $ sales revenue, to establish commodity price predictors. Fibre optic sales are plotted against prices.

Chapter 3 - REGIONAL AND PRODUCT ANALYSIS OF THE WIRE AND CABLE MARKET

All wire and cable consumption is analysed by type (energy cable, telecoms metallic cable, fibre optic, winding wire), $ million, 2000-2022. The market is analysed geographically and split by insulated/bare conductors, both by tonnage production and $ sales.

Chapter 4 - THE EUROPEAN WIRE AND CABLE MARKET

The European market for wire and cable is estimated and forecast to 2022, by product type, with analysis of Western and Eastern Europe. Profiles of the five major markets; France, Germany, Italy, Spain and the United Kingdom are provided with consumption, historical and forecast to 2022, product shares and listings and surveys of the manufacturers, with extended coverage of the market leaders. An extensive section covers manufacturing facilities in Eastern Europe.

Chapter 5 - THE CIS WIRE AND CABLE MARKET

The market for wire and cable is estimated and forecast to 2022. Russia is profiled with consumption, historical and forecast to 2022, product shares and listings and surveys of the substantial Russian manufacturing industry.

Chapter 6 - THE CHINESE WIRE AND CABLE MARKET

The huge domestic market for wire and cable in China is surveyed and analysed in detail, with consumption estimates by product group and forecasts to 2022. International trade, market gaps, end users, certification, a detailed discussion of user markets and analysis of the manufacturing sector. Analysis of production capacity utilisation.
Chapter 7 - THE ASIA PACIFIC (EXCLUDING CHINA) WIRE AND CABLE MARKET

The Asian market for wire and is estimated and forecast to 2022 with analysis by product group. Profiles of four major markets; Japan, India, Korea and Taiwan, are provided with consumption, historical and forecast to 2021, product shares and listings and brief surveys of the manufacturers.

Chapter 8 - MIDDLE EAST AND AFRICA WIRE AND CABLE MARKET

This chapter covers the Middle East and North Africa, including the countries of the Gulf and the Arabian Peninsula, Turkey, the littoral counted on the eastern Mediterranean and North Africa and the 47 countries of Sub-Saharan Africa. The markets for wire and cable are estimated and forecast to 2022, with analysis by product group and a survey of the growing manufacturing sector in the region, together with lists of the leading manufacturers in each market.

Chapter 9 - NORTH AMERICAN WIRE AND CABLE MARKET

The United States was the largest single market, in terms of production and consumption of wire and cable until 2003, when China overtook it. The US remains the second largest today. The domestic market is surveyed and analysed in detail, with consumption estimates by product group and forecasts to 2022. LV wire & cable markets, construction, automotive wire and cable, HV and MV power cable, electricity transmission and distribution, telecoms technology and market size. American wire and cable manufacturers are outlined and discussed extensively with market shares within product segments.

Chapter 10 - LATIN AMERICAN WIRE AND CABLE MARKET

The LAC market for wire and is estimated and forecast to 2022 with analysis by product group. Two countries dominate the Latin American market, Brazil and Mexico. Mexico and Brazil are parts of two different economic and trade orbits, NAFTA and MERCOSUR. The two largest markets are profiled with consumption forecasts to 2021 by product group.

Chapter 11 - GLOBAL WIRE AND CABLE MARKET AND FORECASTS

Summary table of wire and cable forecasts of production in tonnes and consumption in $ billion, by country and region, 2016 – 2022.

Chapter 12 – COPPER SUBSTITUTION IN METALLIC CABLE

Copper and aluminium prices are compared from 2009 to 2017. The increasing divergence between them is shown and plotted as a factor of Cu/Al to chart copper substitution. Advantages and disadvantages of each material as a cable core.
Chapter 13 - THE TECHNOLOGY OF SINGLE AND MULTI MODE FIBRE OPTIC

Chapter 14 - WIRE ROPE

Wire rope is used for its mechanical properties not conductivity, although there are conductors with high tensile strength, especially copper alloys. Wire rope is not a primary focus of this report, which is concerned with energy and telecoms wire and cable. This chapter has a short survey of the wire rope market, including a market size estimate and a review of global manufacturers.

Chapter 15 - LONG TERM PROSPECTS AND PROFITABILITY OF CONDUCTORS

The most profitable segments of the wire and cable market are those with the best prospects of long term growth but they are not the largest. This chapter reviews the most profitable segments and plots them against long-term growth prospects.

Chapter 16 - ENERGY AND COMMUNICATIONS CABLE MANUFACTURERS

A chart of the top 56 companies which account for 54% of the global market is included, ordered by % share. The industry leaders in the United States, Europe and Japan are reviewed and tabulated with their market shares by product segment.

Chapter 17 - WIRE AND CABLE MARKET DRIVERS

The final uses of wires and cables are so diverse that there are many drivers of demand. In this report we comment on the following categories:

- Transmission and distribution for electrical supply - Insulated cables and bare conductors
- Railways - Insulated cables and bare conductors for dedicated T&D systems
- Telecoms - LV and telecoms cables
- Automotive sector - LV cable and wire harnesses
- Offshore OGT (oil, gas produces) and wind power sectors – EHV, HV and MV submarine cables and MV and LV topside wires and cables
- Construction – HV, MV and LV insulated cable

Chapter 18 - PRICE TRENDS AND FACTORS DRIVING PRICES

1. The prices of electrical equipment and cable have been volatile over the years. Many factors have contributed to this, the principal factors being; commodity prices for metallic cable, level of demand for cable, cable production capacity both for metallic cable and fibre optic, the learning rate for new technologies. We review each of these factors in this chapter, and present conclusions for the cable market.
Chapter 19 - INSULATED LAND CABLES – HV, MV & LV

Insulated underground land cables are not the most profitable segment of the power cable market nor the one with the highest long-term growth prospects but together with bare conductors they have the most stable demand. This chapter contains a series of tables from StatPlan T&D Reports analysing the extent of underground lines by country. The drivers for undergrounding, together with advantages and problems are discussed.

Chapter 20 - THE MARINE MARKET- OFFSHORE WIND POWER, OIL & GAS

The offshore market requires three categories of cable and this applies to oil, gas and wind. The difference between the offshore dry tree and subsea wet tree industry is explained, with state of the subsea market and future demand. SURF is outlined in detail. HVDC is discussed.

- Topside Cable – Cable used on the platform structure.
- Sub Sea Cable – Cable used under water to carry power or control functions.
- Umbilical Cable – Cable that is usually a mixture of hydraulic pipes and electrical elements, may also contain flow lines.

Subsea cables are a premium growth market. The technical barriers to entry are high and order backlogs are solid. These cables also achieve high margins above the average for the cable industry. There are relatively few manufacturers, which are listed and discussed. The global submarine cable networks are outlined, together with their development, technology and cable laying techniques.

Chapter 21 - SUBSEA COMMUNICATIONS NETWORKS

The global communications networks are outlined with development and the technology of submarine cable categories described.

Chapter 22 - INDUSTRIAL MARKETS

The transport, aircraft, shipping, automobile, mining, construction, terrestrial wind power, manufacturing and process industries are discussed, together with their requirements for cable and harnesses. As an example, the largest aircraft requires 500 km of cable. The chapter quotes some of these statistics to put these markets into perspective.

Chapter 23 - ELECTRIFIED RAILWAYS

Electric railways constitute a specific market for cable with different characteristics from industrial and other end users because of the distance cables travel, over many miles of track and this parallels the transmission and distribution cable market in which cables also cover long
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distances. The railways pose special mechanical demands on cable, which are outlined, together with railway statistics.

Chapter 24 - SUBSEA CABLES MANUFACTURERS

Chapter 25 - ADVANCED TECHNOLOGY, SUPERCONDUCTORS

Superconductors are materials that have no resistance to the flow of electricity; they are one of the last great frontiers of scientific discovery. Some materials, cooled below a material-specific temperature called ‘critical temperature’ ($T_c$), undergo a phase transition into the superconducting state. The fundamental value proposition of superconducting wire is the elimination of electrical loss. This chapter outlines the technology, the development and status of the market for HTS superconductors, the opportunities, manufacturers and players.

Chapter 26 - METAL THEFT

Metal theft is a worldwide problem and it seriously affects vulnerable wire and cable installations. There continue to be frequent reports of cable theft, both of power cables and of telecom cables, from many parts of the world, with cables being stolen for the scrap value of their metal content, especially copper. The report outlines the problem, the scale and its effects.

Chapter 27 - CABLE PROPERTIES

Wire, cable and rope have physical properties which distinguish them from each other and determine their suitability for different applications. They help to determine not only which product type is best for a particular use but more specifically which sub-type will perform best in a particular situation. The physical properties are mechanical and electrical; tensile strength, flexibility or flex ratio, weight, conductivity, cost.

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Wires and cable perform two basic functions. 1) They conduct electricity or communications, for which they need high conductivity, or 2) They carry loads, for which they need high tensile strength. Sometimes they combine both requirements.

Figure 1: Categories of rope, cable and conductor

This report surveys the market for energy and communications conductors in depth and contains a brief review of mechanical steel rope. The report excludes products from either group in the informal wire and cable sector, small producers of low-end wire and cable, mainly based in China and India.

Table 1: Types and end users of wire, cable and rope

<table>
<thead>
<tr>
<th>Conductor type</th>
<th>Insulated</th>
<th>Bare</th>
<th>End users</th>
</tr>
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<tbody>
<tr>
<td>Energy</td>
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<tr>
<td>HV power cables</td>
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<td>OHL</td>
<td>Utilities, infrastructure, industry</td>
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<td>MV power cables</td>
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<td>HV subsea power cables</td>
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<td>MV subsea power cables</td>
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<td>Building LV cables</td>
<td>Cables</td>
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<td>LV automotive cables &amp; harnesses</td>
<td>Cables</td>
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<tr>
<td>Telecoms</td>
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<td>Voice &amp; data cables, fibre optic</td>
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<td>Telcos and industry</td>
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<tr>
<td>Winding wire</td>
<td>Wire</td>
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<td>Used in transformers and armatures</td>
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<td>Fibre optic</td>
<td>Cable</td>
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<td>Steel rope</td>
<td>Stranded wire</td>
<td>Rope</td>
<td>Load bearing applications</td>
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</table>
In 2000 global consumption of metallic and fibre optic cable above was $XX billion, rising to $XX billion in 2008, and after a large fall in 2009 due to the global financial crisis, recovering to $XX billion in 2011. From a peak of $XX billion in 2011, sales fell steadily in value for five years to $XX billion in 2017 but are forecast to grow to $XX billion by 2022.

Figure 2: Cable consumption including insulated and uninsulated metallic cable, fibre optical cable and winding wire, $ million, 2000-2022

In Fig 4 the total tonnage of production and value of consumption of metallic wire and cable are plotted with average annual prices per tonne and the copper prices, with prices in dotted lines. Each set of data is plotted from an index of 100 in 2000. The chart demonstrates a clear correlation between the copper price and total metallic wire and cable sales. Copper constitutes XX% of the sales value of insulated wire and cable. Thus, a XX% change.........................

Figure 3: Indices of total consumption of metallic wire and cable in tonnage and value and $ per ton, compared with the copper price 2000.
Prysmian purchased General Cable in 2018. 12% of Prysmian sales are in North America. In its 2011 report the company announced that it saw the first signs of profitability improvement in the power distribution sector North America despite volumes still being limited, improved business from trade and installers, growth in offshore, and strong demand for telecoms driven by stimulus packages.

Nexans purchased AmerCable in 2012 as part of its strategy to develop its position in specific and energy sectors in the US where it sees growth. Amercable is the leading American producer of mining, marine oil & gas and other industrial cables, and also in renewable energy. In addition to a leading position in North America where it makes 77% of its sales, AmerCable has growing operations in China, Latin America and Australia.

Table 1: Company shares of market segments, United States, 2017

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<tr>
<th></th>
<th>Fibre optic cable</th>
<th>Magnet wire</th>
<th>Internal data signal</th>
<th>External copper telecom</th>
<th>Power cable</th>
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Table 2: Summary of wire and cable forecasts 2016 – 2022, by country and region, $ billion

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Table 3: Manufacturers of subsea power cable and communications cable
### Table 4: The top global cable manufacturers by industry

<table>
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<tr>
<th>European companies</th>
<th>Utilities</th>
<th>Construction</th>
<th>Industry</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>Leader in all subsea applications with largest production capabilities. New leader in optical fibre cables.</td>
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<td>#1 in Europe interconnections, #1 building cables in France, #1 share in aerospace cables.</td>
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<td>Leader in European automotive cables and provides industrial, healthcare and communication cables.</td>
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<td>Focus on electricity, Infrastructure and have opened factories in China and Germany. Leader in the high performance over-head rail cable market in China.</td>
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<tr>
<td>US companies</td>
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<td></td>
<td>64% of revenues outside North America. Leader in T&amp; D cables in the US. 45% of ROW sales (33% of group) are in construction.</td>
</tr>
<tr>
<td>General Cable</td>
<td></td>
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<td>LV, MV and HV cable, building cables and wire for automotive harnesses, electric motors and industrial equipment.</td>
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<tr>
<td></td>
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<td>Transmission solutions and communication systems for power plants, buildings, hospitals, rail and other end markets.</td>
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<td></td>
<td>Electrical, electronic and assembled wire and cable products for industry and utilities.</td>
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<tr>
<td>Asian companies</td>
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<td>The largest segment of group sales (c 50%) is copper cables, industrial cables and magnet wire.</td>
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<td>Fujikura</td>
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<td>50% Market share in Brazil in telecom cables (FISA).</td>
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<td>Overseas revenue forecasts 28% of sales. Hitachi cable are targeting auto cables expansion outside Japan.</td>
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