Downstream Demand for Copper and Substitution in 2011-2013: A Perspective from the Wire & Cable Industry

International Copper Study Group Meeting
Lisbon, Portugal, 26 April 2012

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Presentation Structure

• Introduction
  • Global Wire & Cable industry
  • How this links to refined copper demand – a review of India
  • Globalisation and manufacturing clusters – review of China and Eastern Europe
  • Substitution threats to copper
  • Conclusions – questions & answer session
• Founded in 2002
• We track range of industries, from cable, power systems, metals, mining, through chemicals and emissions
• We have 40 staff in London
• Team in Detroit, USA since 2009. We opened up offices in Beijing and Tokyo in 2011.
• More than 95% of our business comes from outside the UK

Substitution threats – discussion points

• Wide regional variations in usage of aluminium, copper.
• Historically, aluminium has been widely used where there has been either strong state control – India, former Eastern communist (ex-China), or market development work (Reynolds, Alcoa, Alcan) in North America in the 1960s and 1970s, aluminium has been widely used
• The high water mark has been aluminium use in building wire in India, USA and former eastern
• Exceptions have been China and the Middle East, where aluminium could take major market share in utility power cable. Both regions reluctant to shift, due to inertia, despite the disparity in price of copper and aluminium.
• Now seeing Middle East cable companies installing aluminium stranding machines.
• In Europe, major trend to start using aluminium drawing and stranding machines in the automotive wire sector. Leading companies like Leoni already developing new generation of thin wall aluminium cables for High voltage electrical systems in Electric Vehicles for weight saving.
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China cable sector has shown once in a generation increase, outstripping all other leading economies

Data: Integer Research Ltd, Chinese national statistics, IEEMA, Eurostar, US Bureau of Census

26 April 2012 www.integer-research.com
China cable sector has shown once in a generation increase, outstripping all other leading economies.

Recent trends show that European demand for copper rod likely to suffer, as Spain, UK and Greece fall sharply in 2012.

<table>
<thead>
<tr>
<th>Country</th>
<th>Year-on-Year Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>6.8%</td>
</tr>
<tr>
<td>France</td>
<td>1.4%</td>
</tr>
<tr>
<td>Italy</td>
<td>-9.8%</td>
</tr>
<tr>
<td>Spain</td>
<td>-18.0%</td>
</tr>
<tr>
<td>Greece</td>
<td>-57.4%</td>
</tr>
<tr>
<td>Turkey</td>
<td>5.9%</td>
</tr>
<tr>
<td>EU-27</td>
<td>-0.9%</td>
</tr>
</tbody>
</table>

Data: Integer Research Ltd, Eurostat

26 April 2012
Weak Spanish cable production may mean consolidation of the cable makers, and the suppliers of copper rod and wire beyond 2013.

 integer

Spanish wire & cable production, y-o-y change, %

3 per. Mov. Avg. (Spanish wire & cable production, y-o-y change, %)

Data: Integer Research Ltd, Eurostat

26 April 2012

Integer tracks the leading 3000 cable companies globally and where they make cable, and also sell it.

Cable revenues in US$ million in 2011

Data: Integer Research Ltd, Company Accounts, Bloomberg, Factiva, MINT

26 April 2012
We also track in detail what they make at each plant, and where they sell it, helping us with our investment projects.

Data: Integer Research Ltd, Company Accounts, Bloomberg, Industry Sources

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India has a well defined formal sector, but a number of Indian companies operate Chinese upward casters that make defining the market difficult.

### Copper Wirerod Production

<table>
<thead>
<tr>
<th>Company</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sterlite Industries</td>
<td>95.0</td>
<td>117.0</td>
<td>124.7</td>
<td>149.8</td>
<td>225.1</td>
<td>220.1</td>
<td>202.8</td>
</tr>
<tr>
<td>Hindalco Industries</td>
<td>87.8</td>
<td>89.1</td>
<td>86.6</td>
<td>103.9</td>
<td>118.9</td>
<td>139.7</td>
<td>146.8</td>
</tr>
<tr>
<td>Hindustan Copper</td>
<td>28.6</td>
<td>27.8</td>
<td>32.9</td>
<td>41.5</td>
<td>54.5</td>
<td>53.4</td>
<td>44.4</td>
</tr>
<tr>
<td>Metaloid Industries</td>
<td>15.0</td>
<td>18.8</td>
<td>20.0</td>
<td>16.3</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Alchi Metals (DTD)</td>
<td>9.8</td>
<td>6.5</td>
<td>6.0</td>
<td>1.5</td>
<td>0.0</td>
<td>0.0</td>
<td>3.8</td>
</tr>
<tr>
<td>Master Alloys</td>
<td>10.0</td>
<td>15.8</td>
<td>15.0</td>
<td>11.3</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Hot Rolling</td>
<td>46.3</td>
<td>45.0</td>
<td>45.0</td>
<td>33.8</td>
<td>30.0</td>
<td>20.3</td>
<td>10.3</td>
</tr>
<tr>
<td>Upward casting</td>
<td>30.8</td>
<td>31.8</td>
<td>32.4</td>
<td>32.9</td>
<td>33.8</td>
<td>34.8</td>
<td>38.9</td>
</tr>
</tbody>
</table>

| Total                | 339.8 | 367.2 | 382.7 | 407.9 | 515.1 | 526.8 | 511.0 |

| Balance Item/Stock   | -4.4  | -6.7  | -4.2  | 1.7   | 0.1   | 0.7   | -0.1  |
| Wirerod Imports      | 9.5   | 16.1  | 32.2  | 25.2  | 25.8  | 28.3  | 34.6  |
| Wirerod Exports      | -28.0 | -38.4 | -86.8 | -103.4 | -106.8 | -81.2 | -35.2 |

### Copper Wirerod Consumption

<table>
<thead>
<tr>
<th>Country</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td></td>
</tr>
<tr>
<td>Copper Wirerod ('000 tonnes)</td>
<td>Wirerod Diameter</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wirerod Production</th>
<th>511.0</th>
<th>488.0</th>
<th>23.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Wirerod Scrap in wirerod production</td>
<td>-5.1</td>
<td>-4.9</td>
<td>-0.2</td>
</tr>
<tr>
<td>+ Inventory decrease / (increase)</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Wirerod Sales (internal or external)</td>
<td>505.9</td>
<td>483.1</td>
<td>22.8</td>
</tr>
<tr>
<td>+ Wirerod Imports</td>
<td>34.6</td>
<td>32.4</td>
<td>2.2</td>
</tr>
<tr>
<td>- Wirerod Exports</td>
<td>-35.2</td>
<td>-33.4</td>
<td>-1.8</td>
</tr>
<tr>
<td>Wirerod Consumption</td>
<td>505.3</td>
<td>482.1</td>
<td>23.3</td>
</tr>
<tr>
<td>+ Inventory decrease / (increase)</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>- Scrap (in wire &amp; strip production)</td>
<td>-11.0</td>
<td>-9.6</td>
<td>-1.4</td>
</tr>
<tr>
<td>+ Cathode Imports</td>
<td>16.0</td>
<td>38.9</td>
<td>36.8</td>
</tr>
<tr>
<td>- Cathode Exports</td>
<td>-92.3</td>
<td>-111.0</td>
<td>-149.0</td>
</tr>
<tr>
<td>- Scrap in wire &amp; strip production</td>
<td>-46.0</td>
<td>-44.0</td>
<td>30.0</td>
</tr>
<tr>
<td>- Bare Wire &amp; Strip Production</td>
<td>494.3</td>
<td>472.4</td>
<td>21.9</td>
</tr>
<tr>
<td>Bare Round Wire</td>
<td>444.1</td>
<td>444.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Bare Strip / Shapes</td>
<td>50.2</td>
<td>28.3</td>
<td>21.9</td>
</tr>
</tbody>
</table>

Data: Integer Research Ltd, Company Accounts, Bloomberg, Industry Sources

We then compare the “top down” numbers, with what we see in real consumption.
Which helps our clients work out if there really is a “capacity gap”, to justify an investment

<table>
<thead>
<tr>
<th>Wire &amp; Cable (’000 tonnes)</th>
<th>Total Wire</th>
<th>Bunched or stranded conductor</th>
<th>single Wire</th>
<th>Bought</th>
<th>of bunch or strand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Consumption - Insulated Wire &amp; Cable</td>
<td>332.5</td>
<td>53.1</td>
<td>249.4</td>
<td>83.1</td>
<td>236.9</td>
</tr>
<tr>
<td>Wire Consumption - Bare Brand</td>
<td>1.0</td>
<td>0.0</td>
<td>1.0</td>
<td>0.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Wire Consumption - Winding Wire</td>
<td>108.1</td>
<td>108.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Scrap in stranding &amp; insulating</td>
<td>-17.3</td>
<td>-4.8</td>
<td>-12.5</td>
<td>-11.8</td>
<td>-0.7</td>
</tr>
<tr>
<td>Scrap in stranding &amp; insulating</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Copper Content of Wire &amp; Cable Production</td>
<td>424.2</td>
<td>186.4</td>
<td>237.8</td>
<td>225.8</td>
<td>12.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Copper Strip &amp; Shapes (’000 tonnes)</th>
<th>Total Copper</th>
<th>Winding Strip</th>
<th>Earthing Strip</th>
<th>Small Busbar</th>
<th>Other Strip &amp; Shapes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrap in processing</td>
<td>-16.3</td>
<td>-4.8</td>
<td>-12.5</td>
<td>-11.8</td>
<td>-0.7</td>
</tr>
<tr>
<td>Scrap in processing</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Copper Content of Strip &amp; Shapes Consumption</td>
<td>47.3</td>
<td>37.3</td>
<td>24.8</td>
<td>12.5</td>
<td>4.2</td>
</tr>
</tbody>
</table>

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What has driven copper rod demand in China from the cable sector? We will look at the Consumer Electronics sector as an example.

We can look at Japanese set maker investment in China – part of globalisation.

Number of Plants

<table>
<thead>
<tr>
<th>Year</th>
<th>India</th>
<th>Indonesia</th>
<th>Philippines</th>
<th>Malaysia</th>
<th>Singapore</th>
<th>Thailand</th>
<th>Vietnam</th>
<th>Taiwan</th>
<th>Hong Kong</th>
<th>China</th>
<th>South Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before 1980</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981-1990</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1991-1995</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996-2000</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001-2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data: Integer, in part taken in part from paper by Toomo Marukawa – Investments in East Asia
Japanese Set Maker investment by company in Asia – which drives electronic wire demand

Number of Plants

- NEC
- Sharp
- Sony
- Sanyo
- Toshiba
- Hitachi
- Fujitsu
- Matsushita
- Mitsubishi Electric

Set maker investment by province in China, 1960-2010

Number of Plants in China

- Shaanxi
- Guangxi
- Guangdong
- Hubei
- Henan
- Shandong
- Jiangxi
- Fujian
- Anhui
- Zhejiang
- Jiangsu
- Shanghai
- Liaoning
- Hebei
- Tianjin
- Beijing

Data: Integer, in part taken in part from paper by Toomo Marukawa – Investments in East Asia
Japan and Taiwanese cable makers have dominated inward investment in China

**Structure of the Electronic wire market in China**

- Value added Electronic Wire Market may consume copper wire from Japan.
- Increased value, technology, complexity & customer service, also means segmented copper rod & wire purchases in the supply chain.
- Wide range of UL listed producers, more than 900.
- 400 Chinese companies producing simple PVC UL1007 style cable.
- 600 Chinese companies producing simple PVC UL1007 style cable, to CCC standards? They may use low grade wire.

Major players include SEI, Tyco, Belden, LS, Furukawa, Daiden, Hitachi & Fujikura.

Potential barrier from Halogen Free Cables – Ricoh/Canon/Samsung/Apple

Potential barrier from RoHS

Data: Integer, Industry Sources

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• In Europe, major trend to start using aluminium drawing and stranding machines in the automotive wire sector. Leading companies like Leoni already developing new generation of thin wall aluminium cables for High voltage electrical systems in Electric Vehicles for weight saving.
Renewables driving demand for a range of transformers and switchgear – potentially some of this will be aluminium

Key Comments
- A range of shaped products are used in transformers.
- There are a limited number of producers of flat strip globally, which is then consumed by transformer producers worldwide.
- There are a limited number of producers of high voltage, power transformers, although there has been a large increase in production in China in the last decade.
- Renewables will drive utility fixed investment in a range of products, such as switchgear, transformers, power cable, aluminium overhead conductors, and range of low cost HVDC power interconnect cables.

Data: Integer, ASTA/Metrod

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