Robots & Job Creation

Mike Wilson
Introduction

• Study background & methodology
• Factors affecting robot use
• Employment in manufacturing
• Effect of robots on employment
• Future
• Results of Study
Study Findings

Direct employment due to robotics:

2 to 3 million jobs created in world manufacturing

That is 2 to 3 jobs per robots in use
Background

- Sponsored by International Federation of Robotics
- Conducted by Metra Martech
  - Specialist market research company
  - Established for over 50 years
  - Extensive industrial experience
  - Significant international experience
Scope of Study

• Impact of robots on employment in manufacturing
  • Automotive
  • Electrical & Electronics
  • Food & Beverage
  • Rubber & Plastics
  • Chemical products
  • Metalworking & Foundries

• Six country focus
  • USA, Brazil
  • Japan, Korea, China
  • Germany
Methods

• Initial analysis
  • Economic data
  • IFR robot data

• Validity of assumptions tested
  • 18 experts identified via IFR

• More detailed analysis
  • Selected experts via questionnaire & interview
Economic Factors

- Displacement & re-employment
- Globalization
- Speed of technological development
- Age & skill profiles
- Wage levels
- Health & safety legislation
Market Factors Affecting Robot Use

- Growth of China and India
- Continuing technology development
- Environment and lifestyle trends
- Population growth
- Availability of low cost labour
- Ageing population
- Skills gaps generally
Population Picture

Population
Index of growth 2000 = 100

Workforce age 22 to 64

Brazil
China
Germany
Japan
Republic of Korea
United States
Different wage levels and regulations on working conditions create different needs for robots.

**High cost areas**: robotics maintain competitiveness [and keep jobs], or meet more stringent [and costly] working conditions requirements.

**High and low cost areas**: robotics provides quality, consistency and large volumes of intricate production at low cost.
## Labour Cost Comparison

<table>
<thead>
<tr>
<th>Country</th>
<th>Labour cost index [2008]</th>
<th>Robots per 10,000 employed in manufacturing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>26</td>
<td>5</td>
</tr>
<tr>
<td>China</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Germany</td>
<td>149</td>
<td>236</td>
</tr>
<tr>
<td>Japan</td>
<td>86</td>
<td>361</td>
</tr>
<tr>
<td>Rep of Korea</td>
<td>50</td>
<td>214</td>
</tr>
<tr>
<td>USA</td>
<td>100</td>
<td>110</td>
</tr>
</tbody>
</table>
In 5 of the 6 countries studied, use of robotics increased between 2000 and 2008, in Japan there was a small reduction.

Overall unemployment fell in 5 of the 6 countries, USA experienced a slight increase.
in the industrialised countries has decreased, but output has gone up.

USA Food and Drink is an example:
Employment in Manufacturing

in the industrialising countries has increased, and output has gone up too.

Brazil Food and Drink is an example:
Employment - Service Sectors

Share of Nonfarm Employment by Major Industrial Sector, 1950 to 2007

Other Service-Producing Industries
Government Services
Trade, Transportation, Utilities
Other Goods-Producing Industries
Manufacturing

Robots Create or Keep Jobs, where:

Manufacturing:
- Only robots can produce to satisfactory precision and consistency standards, at an affordable cost.
- Work conditions are unsatisfactory, but where a robot will operate.
- Manufacturing in a high labour costs country is threatened by a low labour cost area.

Jobs are also created by the Robot industry itself.

The third and largest job creator is:
- Downstream distribution, marketing, selling and servicing the Robot manufactured products.
Opportunity for protecting local manufacturing employment in situations where:

- Total cost of producing locally can be kept equal to or below the lower cost overseas manufacture (+ transport cost).
- Benefits of having local service and support almost outweigh the lower cost overseas manufacture (+ transport cost) but would be a clear advantage if cost could be lowered.
- A company cannot get enough production in the local market to be viable, but with robotics could increase production at lower cost and export.

Each 1% of manufacturing industry gained or saved in USA is equivalent to 1.45 million employees.

Note: Also protects jobs in local service industries.
More Robots, Fewer Jobs Lost

- German and US use of robots has doubled, but Germany has twice as many per employee.
- German job loss in manufacturing is much less than the US job loss.

![Graph showing Industrial production and Employed in manufacturing for Germany and USA from 2000 to 2010.](image)
Jobs Created in Manufacturing

Jobs created *directly* by robotics, by application

- Robotics industry and operation
- Where precision or consistency requires robots
- Where poor working conditions are overcome by use of robots

Thousands

- Minimum
- Maximum
Jobs Created in Manufacturing

Jobs created *directly* by robotics by sector

- **Robotics industry and operation**
  - Minimum: 200
  - Maximum: 400

- **Food and drink**
  - Minimum: 100
  - Maximum: 200

- **Chemicals and plastics**
  - Minimum: 100
  - Maximum: 200

- **Foundries**
  - Minimum: 10
  - Maximum: 20

- **Electronics**
  - Minimum: 100
  - Maximum: 200

- **Automotive**
  - Minimum: 1,500
  - Maximum: 3,000

Legend: Minimum, Maximum
# Total Employment Created by Robotics

<table>
<thead>
<tr>
<th>Application type</th>
<th>Jobs created by robotics</th>
<th>Areas where the jobs are created</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robotics industry and operation</td>
<td>300,000</td>
<td>Mainly industrialised countries</td>
</tr>
<tr>
<td>Where precision or consistency requires robots</td>
<td>2 to 3 million</td>
<td>All countries with these industries</td>
</tr>
<tr>
<td>Where poor working conditions are overcome by the use of robots</td>
<td>150,000 to 300,000</td>
<td>Mainly industrialised countries</td>
</tr>
<tr>
<td>Where a sector which fails to use robots would be uncompetitive in world terms</td>
<td>2 to 3 million</td>
<td>Mainly industrialised countries</td>
</tr>
<tr>
<td>Downstream jobs created by new products and services</td>
<td>3 to 5 million</td>
<td>All countries where these products are sold.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8 to 10 million</strong></td>
<td></td>
</tr>
</tbody>
</table>
Will be caused by (up to 2016):

- New products which need robots
  - Food, Renewable energy, Consumer electronics
- Protecting companies in industrialised countries
- Robot industry including Service Robots
- Dirty, unpleasant jobs - changes in legislation
- Continued growth of Chinese [and Indian] consumer markets
Study Findings

Direct employment due to robotics:
2 to 3 million jobs created in world manufacturing
That is 2 to 3 jobs per robot in use.

Indirect employment downstream of this, more than doubles this number.

700,000 to 1 million new jobs to be created by robots in the next five years.
Marlin Steel Wire

1998
- Pay = $6/hr
- Output = 300 bends/hr

2011
- Pay = $30/hr
- Output = 20,000 bends/hr

Workforce increased by 25%

Introduced Robots
Thank You

Mike Wilson
Chairman

Robots create jobs!