



ChapmanBlack Insights

Advanced Manufacturing in Germany



Table 1. Federal funding of research programs in advanced manufacturing technology

Advanced Manufacturing Technology	Number of people employed by sector (2011)	Technology-based industries	Federal programs and funding in new technological areas
Materials	5 million	Mechanical/electrical engineering, chemical industry, vehicle construction, information and communication technologies, energy supply, electronics and metal production and processing	Framework "WING - Innovative Materials for Industry and Society" aimed to integrate research and knowledge in different areas for boosting materials innovation
Biotechnology	33,000	Medicine, food and chemistry industry, energy production	Two funded programmes are found: "The Health Research Programme 2014" and "Research Strategy BioEconomy 2030"
Nanotechnology	63,000	Energy, environment and information technologies	The Federal Government's "Nanotechnology 2015 Action Plan"
Photonics	120,000 (2013)	Laser, lighting, microscopy and imaging technology	Funded program "Photonics Research Germany" (10 years development plan, from 2011, with 1 billion investments)
Micro/nano-electronics	766,000 with a growth rate about 10% per year	Has a broad range of use, from medicine, aerospace / automotive industries to information/ telecommunication sectors	This area of research is defined as "High-Tech Strategy"

Source: Research in Germany, 2014

From a deeper look into current trends in advanced manufacturing technology as well as an overview of advertised vacancies of major German manufacturing companies certain conclusions can be drawn:

Electronics Manufacturing:

In Europe Germany is one of the leaders of semiconductor production and at the same time it is ranked the third worldwide as the embedded software supplier.

The biggest share of German semiconductor market takes production of automotive and industrial semiconductors (37% and 24% respectively); while globally these figures are 8,4% and 10,6% respectively. Moreover, German companies are focused on the frontend production and have customer

centric approach, while Asian leaders are focused on the backend production and mainly manufacture for consumer electronics goods. Thus, Germany is well position in this market segment.

Industrial application of semiconductors is for control and power electronics; the most installed components are MCUs, DSPs and logics. Automotive industry applies semiconductors in engine control, navigation, safety and driving dynamics systems, entertainment systems, and others. The most installed components are MCUs, DSPs, analogue components and power electronics. The overall production of semiconductors in Germany is focused on design and manufacturing of integrated circuit components; hence, the job market demands engineers with skills and experiences in this area of development. At the same time the semiconductor industry is focused on finding new ways of the extension physical capacity of the components; therefore, specialists with strong knowledge of lithography are required.

The demand on semiconductors and consequently on workforce in this area is determined by the number of units (utilized) produced in relate industries. As can be seen from the Table 2 the industrial usage of semiconductors proportionally remained (approximately) on the same level throughout the shown period of time; while the automotive industry proportionally consumed more. In addition, the employment growth in electronics industry in Germany is influenced by governmental policies. Micro electronics is a high prioritized, R&D intensive sector (Please see Table 1) which was included into “High-Tech Strategy” – technology development plan up to 2020. Currently this sector employs 766, 000 persons and it is expected to engage by 10% more people each year. Consequently, qualified engineers specialised in semiconductor development and production will be in demand for the next decade.

Table 2. Percentage of applications to the relation of the total semiconductor market (2008-2012)

Application	2008	2009	2010	2011	2012
Data processing	38,2%	39,6%	38,1%	37,3%	36,7%
Communications	25,5%	24,2%	24,4%	24%	23,6%
Consumer Electronics	18,2%	19,6%	20,1%	20,3%	20,7%
Automotive	7,7%	5,4%	6,5%	7,7%	8,4%
Industrial	10,4%	11,2%	10,9%	10,7%	10,6%

Source: SIA, PWC analysis

Embedded systems:

Germany has a strong demand for embedded systems. This is because the product is an integral part of many industrial sectors, in which the country holds a leading position, such as automotive, automation and mechanical engineering, medical, environmental and energy technology. Although Germany is an important exporter of embedded systems, especially to Europe and Asia, it imports embedded products for consumer electronics and entertainment as it does not hold a leading position in manufacturing of consumer electronics, especially telecommunication products.