SWITZERLAND GLOBAL ENTERPRISE

SWITZERLAND – YOUR SMART MANUFACTURING HUB

MACHINERY EXPORTS PER CAPITA

in thousand euro, 2016

Country	
Singapore	4.1
Switzerland	2.3
Denmark	2.2
Austria	2.1
Luxembourg	2.0
Germany	1.9
Belgium	1.8
Netherlands	1.8
Sweden	1.5
Finland	1.3

Source: Swissmem "Panorama 2018", VDMA

INTRODUCTION

The art of the possible, redefined through ever-evolving operating models and advanced manufacturing techniques. Together with developments in technology and material science, there are truly game-changing developments afoot. Known as Industry 4.0, the combination of cyber-physical systems such as the Internet of Things and the Internet of Services, leads to the vision of smart manufacturing. As a manufacturer, be sure you are keeping pace.

You need a number of factors to turn Industry 4.0 to your advantage: fewer but very well educated employees, a high-tech environment with leading research centers, a top IT and transportation infrastructure and an agile legal, fiscal and political environment. Look no further than Switzerland – one of the world's leading locations for high value added manufacturing – and uniquely well positioned to accommodate manufacturers on their journey to Industry 4.0 and smart manufacturing.

WHY SHOULD YOU CONSIDER SWITZERLAND?

Switzerland may be an ideal manufacturing hub if you:

- Are a manufacturer of durable and consumer goods looking for the best European location to support your journey to smart manufacturing and Industry 4.0
- Utilize complex biotechnological and chemical processes (biotech and pharmaceutical products)
- Produce high tech mechanical, microelectronic and electromechanical systems (renewable energy and power systems, sensors and robotics etc.)
- Are a medical devices company requiring exceptional precision manufacturing
- Are a high-end consumer products business (fragrances, cosmetics, watches etc.)
- Manufacture items that might benefit from the "Made in Switzerland" label

KEY TRENDS FOR MANUFACTURING

Trend 1: Rising demand for a highly skilled, increasingly international workforce

Emerging and mature markets share a similar problem: a shortage of highly skilled workers who possess the capacity to work in smart manufacturing. This provides a huge competitive advantage to the rare locations that can provide a steady stream of qualified, motivated workers.

The challenges:

- Availability of highly skilled machinists, toolmakers and machine programmers
- Well-developed internal training and career development, e.g. via apprentice programs, leading to skilled, experienced and motivated employees
- Ability to attract highly skilled workers from abroad to benefit from the best, internationally experienced workers
- A flexible labor environment that can cope equally with good and challenging times

Why Switzerland:

1. Switzerland is a magnet for qualified personnel from abroad. In an international comparison of the most attractive countries, it has been ranked first for several years in a row (IMD World Talent Ranking 2017).

2. The Swiss system of vocational training enables good availability of technical staff, which play a key role in high-tech sectors. Particularly in the precision manufacturing industry, thousands of young, well-trained individuals enter the labor market every year.

3. Switzerland's dual model, which combines work experience with education, is increasingly seen as best practice.

4. Switzerland has Europe's most flexible labor environment and is highly attractive to foreign workers.

Case Studies:

Celgene Switzerland SA is a subsidiary of the leading American life sciences group. It recently announced an upgrade of its existing plants in Switzerland and the establishment of a new production site in La Chaux-de-Fonds in the canton of Neuchatel. Management indicated that while the production process requires quantitatively less human labor involvement, the qualitative demands have increased and the company must therefore attract workers who are more than just production experts.

CSL Behring AG is an affiliate of the Australian-based CSL group, a world leader in the plasma-protein biopharmaceuticals industry, with more than 12,000 employees worldwide and more than 1,300 employees in Switzerland. The company's primary production site is in Bern, Switzerland, and the company benefits from first-rate apprentices, students and scientists.

Trend 2: Cluster Manufacturing

Of special significance for smart manufacturing, cluster manufacturing refers to the importance of a regional concentration of interrelated companies operating along an entire value chain (manufacturers, service providers, suppliers, key customers, research institutes and universities). Manufacturing more than ever depends on an environment which provides the critical mass necessary for successful collaboration, the possibility of rapid scalability of operations and an industry-specific "business culture" that nurtures innovation and fosters competition.

The challenges:

- Innovation through co-operation with peer manufacturing companies and suppliers
- Innovation through collaboration with academic institutions
- Suppliers and peer companies that can deliver high precision products

Why Switzerland:

1. Switzerland is exceptionally highly industrialized. The proportion of GDP stemming from the manufacturing industry is among the highest in the industrialized world – an impressive sign of its manufacturing cluster strength.

   The main manufacturing clusters in Switzerland are:
   - Aerospace + defense
   - Pharmaceuticals + biotechnology
   - Medical equipment
   - Precision instruments
   - Watches
   - Semiconductors
   - Micro- + nanotechnology
   - Industrial equipment (textile, robotics, printing, etc.)

2. The technical universities and institutes of applied sciences across the French, Italian and German-speaking regions of the country are a main pillar of Switzerland's scientific and technical excellence. The two Federal Institutes of Technology in Lausanne (EPFL) and Zurich (ETHZ) both have widely recognized manufacturing faculties.

   - EPFL Lausanne maintains 11 chairs focusing on manufacturing, with around 550 scientists.
   - ETHZ offers Master's programs at its Department of Mechanical and Process Engineering at 13 different institutes ranging from Machine Tools and Manufacturing to Material Sciences and Nanotechnology.
   - A dense network of seven Universities of Applied Sciences conduct research in collaboration with the private sector. Such collaboration is supported financially by a program funded by the Swiss Federal Government (Innosuisse).

3. If you have medical device and/or pharmaceutical manufacturing operations in Switzerland, you can rely on a long tradition of precision manufacturing stemming from the watch and related industries.

Selected Product Areas
Switzerland's position in international rankings, 2016

Product area	Switzerland's position
Paper processing machines	4
Packaging machines	5
Textile machines	5
Machine tools	6
Food processing machinery	8
Scales	7
Turbines	6
Printing machines	8
Precision tools	9
Compressors/vacuum equipment	11
Plastic/rubber machinery	11

Source: Swissmem "Panorama 2018", VDMA

Case Studies:
The US-based General Dynamics group, which is active in the defense industry, has more than 1,500 highly skilled technical staff employed in its subsidiary **General Dynamics European Land Systems – Mowag GmbH**, based in the Canton of Thurgau. Its technology and advanced engineering programs are managed from its Swiss site, which is also responsible for coordinating R+D technology and system design and development projects between various manufacturing sites. Thanks to the dense Swiss manufacturing cluster, the company benefits from the presence of many suppliers of high precision product components.

Stryker GmbH is a subsidiary of the US-based Stryker group, one of the world's leading medical technology companies which is active in more than 100 countries. It manufactures medical and surgical implants at its site in Selzach in the Canton of Solothurn. The excellence of Switzerland's manufacturing environment and regulations helps the business mitigate any exposure to patient claims and liability risks.

Medtech manufacturer **Hamilton Bonaduz AG**, a subsidiary of the US-headquartered Hamilton group, produces its life science and medical technology products in Bonaduz in the Canton of Grisons. It has more than 1,000 employees in the country. In April 2018, the company built a new, highly automated plant in the Vial industrial park to produce consumables for its medical equipment. It thereby created 180 new jobs. Hamilton chose Switzerland due to its attractive employment environment, its tradition of precision and quality and its high-quality workforce.

Trend 3: Successfully managing disruptive technologies and processes

The main features of Industry 4.0 are shortening innovation cycles with constant new technologies and related integrated processes. Flexibility, together with high technological capabilities and a readiness to embrace change, are essential to survive in this environment. The use of sophisticated robotics and additive manufacturing (also known as 3D printing) are currently at the forefront of manufacturing technologies.

The challenges:
- Reliable IT and energy supply infrastructure to run complex manufacturing operations
- Increasing cost efficiency considerations
- A business environment which embraces change

Why Switzerland:
1. A large number of manufacturing companies in Switzerland already work with some features of Industry 4.0 (e.g. additive manufacturing and robotics technology etc.).

2. Switzerland has a sophisticated infrastructure and strikes and other labor disputes are rare. This allows for undisrupted production which increases cost efficiency.

3. The attractive labor law environment enables adjustments to the workforce to be carried out quickly.

Overview of Labor Regulations in the Industrial Sector

Country	Minimum salary	Labor representation	Average working hours in industry
CH	no	no	1,850
NL	yes	yes	1,600
FR	yes	yes	1,750
DE	yes	yes	1,800
UK	no	yes	1,850

Source: KPMG, IMD

Case Studies:
Patek Philippe SA, a Geneva-based watchmaker, successfully produces prototypes of its luxury watches in Switzerland through additive technology. The company relies on cooperation with the Swiss Advanced Manufacturing Research Center (SAMARC) at EPFL Lausanne. In January 2015, the company announced a CHF 450 million investment in a new production site in Geneva.

Swiss global player **ABB Ltd** presented its new dual arm robot solution called YuMi in April 2015. It is specifically designed to address the needs of small parts assembly. A unique feature and key attribute of YuMi is its "inherently safe" rating, meaning it can work alongside humans without posing any risk to their safety. YuMi was invented, developed and designed in Switzerland.

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