

Asset Management Equity Business

Thematic Insights: Robotics, Security & Safety



Are you too small for Robotics?

Angus Muirhead, Senior Portfolio Manager, Credit Suisse Asset Management

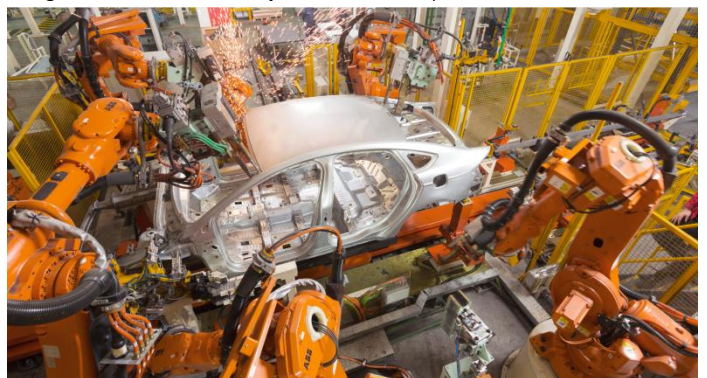
"Safety, mobility and flexibility are crucial for us. We don't need to fence it in like a normal robot and we can easily move it to different jobs without a programmer spending 3 days coding"

Bo Dellefsen, factory manager at Danish glass manufacturer Gern Glass¹

Robots - Cost and complexity

Walk the floor of a manufacturing plant today and the chances are you will find virtually no robots. You will see people working with machine tools and perhaps automated systems to carry product from one work cell to the next, but either no robots at all, or very few. This fact may surprise many people, since factory robots have been around for a long time. But factory robots have always been expensive, difficult to set-up and program, dangerous for people to work close to, and often dedicated to a single task. All of these issues mean that robots only generally make economic sense to very large scale manufacturers.

Image 1: Traditional factory robots in a car plant



Source: Photo owned by and used with kind permission from ABB Ltd.

Over the last few years however, advances in technology have started to change this picture. Not just in terms of price, but also in ease of use, safety and the versatility of robotics. Small and medium size manufacturers who have never used robots are now starting to experiment with robotics or at least considering the possibility. Larger scale manufacturers too, are now starting to adopt robotics more broadly across their production plants for a broader range of processes.

¹ Quote taken from, "Robotics as it should be: Simple, Flexible, Affordable," product brochure from Universal Robots, Odense, Denmark

As technology pushes down the cost and complexity of robotics, the opportunity for broad-based, “mass-adoption” of robots in manufacturing and other sectors of the economy is very significant, often “green-field” or at a very nascent stage.

Where are all the robots?

The International Federation of Robotics (IFR) estimate that in global manufacturing industries today there are on average just 7 robots for every 1,000 factory workers. Averages are often misleading, and this case is no exception. The reason the average is so low is that the only industries using robots today in any number are automobile and semiconductor manufacturers. Typically these industries use 100-150 robots for every 1,000 workers, and together they account for approximately 60% of all industrial robots in use today (see Figure 1). A few other industries, such as metal works, chemicals manufacturers, plastics producers and food processors use some robotics, but most industries today typically have no robots on their factory floor.

Safety – Robots in cages

Picture a car plant and we imagine rows of robots operating in elegant synchronization alongside an automated production line. Perhaps something similar to Image 1. This picture often helps perpetuate the myth that car plants are so fully automated that they employ very few human workers. The reality in most car plants is however, quite different. True, the average number of robots in the auto industry is approximately 120 for every 1,000 workers and this is far higher than the average across other manufacturing industries. Also, since people typically work one 8 hour shift while the robot runs for 3 shifts every 24 hours, the actual ratio during any shift is 120 robots to just 333 workers. However, that is still close to 3 times more people than robots.

The reason there are no people in the picture is that the robots are dangerous. Look carefully and you see that the robots are inside cages, in areas cordoned off from the human work force. Despite these precautions, accidents still occur. In 2015 a worker in a car plant in Germany was crushed by a robot and died from his injuries and later in the same year an engineer in a US car parts plant was trapped and killed by robotic machinery. The fact that robots are dangerous, greatly restricts their usefulness in manufacturing, because many processes in production require some level of human input. In some cases, automating an entire process is possible, but may be cheaper and simpler to involve people. Therefore the use of robots has generally been restricted to tasks where the robot can perform the process entirely autonomously.

Free the Robot

A new generation of robots, use a combination of sensors and smart algorithms allowing robots to be used without safety cages, operating in close proximity and often in collaboration with human workers. For this reason this new generation of robots is known as “collaborative robots”, or co-bots. These advances allow for a huge jump in the number and range of tasks that robots can be employed to perform.

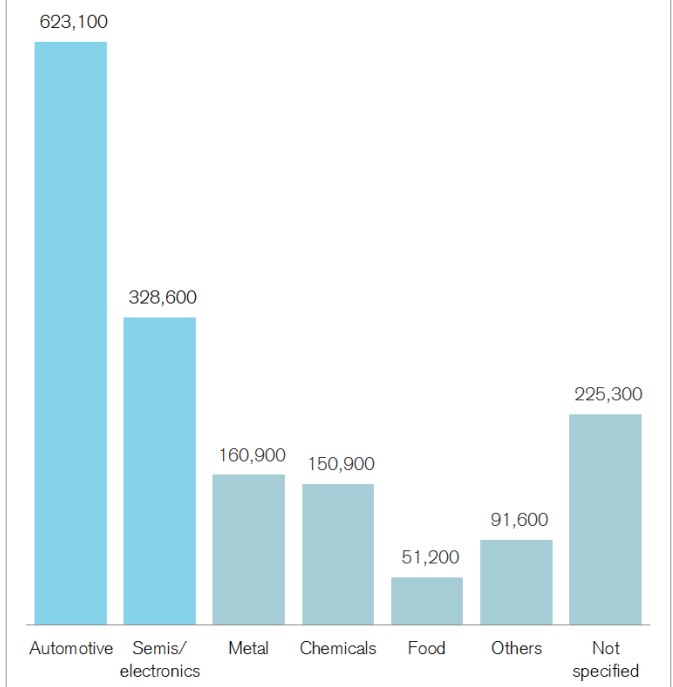
In fact, not only are many of these new robots safe to work with, they can also be used to perform dangerous tasks, eliminating the need for worker to put themselves at risk.

Price – Mass adoption

As technology advances robots are not only becoming safer to work with, but also cheaper and easier to use. Today even the smallest companies can benefit from some of the same productivity, efficiency and quality tools which the giants of industry have used for decades. The current leader in the market for “collaborative robots”, Universal Robots, recently published a booklet entitled, “Are you too small for Robotics?” which leads the reader through a series of questions and concludes:

“Cobots are an ideal option for small and mid-sized manufacturers of almost any type. Find out how you can grow your business, improve productivity and quality, and provide better and safer working condition for your employees.”

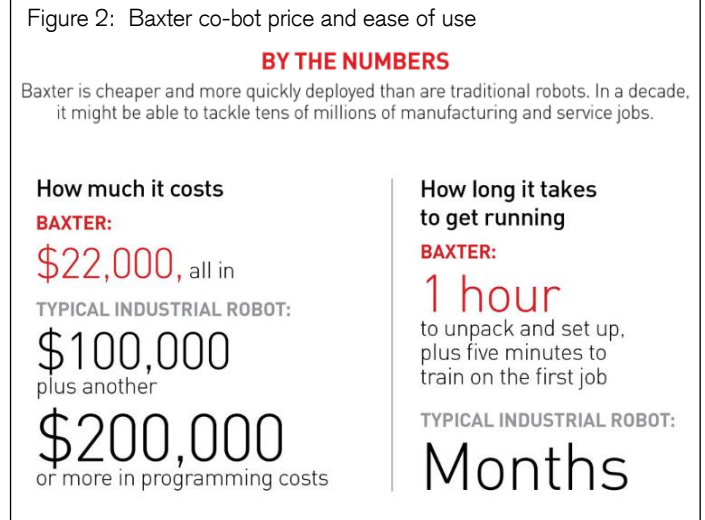
Figure 1: Global installed base of factory robots by industry (units)



Source: “World Robotics 2016”, by International Federation of Robotics

The price of traditional industrial robots varies widely depending on application and size, as well as the size of the customer's order, but typically ranges from USD 50,000 to 150,000 for a single robotic arm. The cost of setting up, calibrating and programming the robot adds a further 100% to the price, sometimes more if an automated system is needed to feed the robot with inventory. Part of the set-up cost is driven by the need to establish safety measures around the system, and once the robot is installed and operational for a certain task, if needs change and it is required to perform a different task, the cost of that re-programming can also be significant.

These costs put robots well out of reach for most small and medium size companies, but in just the last few years a number of companies have developed robots commercially available at for as little as USD 20,000. These new robots use innovative technologies, such as force resistance, machine vision and "program by demonstration", making the robots safe to work with, easy to set-up and program. Earlier this year, a maker of tools for robots, Robotiq Corp, published a "Buyer's Guide to Collaborative Robots", comparing systems from 20 companies, with typical prices around USD 20,000 to 40,000. At these price point robots are becoming accessible to even the smallest manufacturers, and can in fact be used in far greater number by the largest manufacturers. Rethink Robotics, a Boston based maker of a co-bots, summarizes some of the key differences of their "Baxter" co-bot compared to traditional industrial robots (Figure 2.)



Source: Rethink Robotics product brochure, "Introducing Baxter"

Car makers, who have invested in traditional industrial robots for decades and understand well the productivity and efficiency benefits available from robotics in productivity and efficiency, have been some of the earliest adopters of these new technologies. The plants currently experimenting with these new robotic technologies are known as "factories of the future". Volkswagen is using collaborative robots to help workers tighten difficult to reach screws in power-train assembly; Audi now produces its R8 model on a modular and mobile work cell format, rather than a traditional linear production-line; BMW uses 3D printers to make more than 10,000 parts used in the Rolls-Royce Phantom; and Porsche now appears to have one of the highest ratios of robots to workers in the world in their new Leipzig body shop for the Panamera model.

Spatial economics

With lower prices and less complexity, robots can now be used by companies with smaller production volumes, and companies with production spread over a broad range of products. No longer are robots the preserve of high volume, low mix industrial giants. Cheaper prices make robotics economically accessible to even the smallest manufacturer.

But robotics might also change the economics of manufacturing sectors in other more fundamental ways. Economic theory suggests that factories exist to maximize utilization of the capital invested in the machines and equipment of production. But if the cost of that production equipment declines significantly, then some manufacturers may be tempted to break up their manufacturing centres into smaller, distributed regional bases, bringing finished product closer to the end customer, shortening delivery times and enabling more product customization.

We already starting to see examples of this. According to Boston Consulting,² Daimler Benz believes that customers will soon be able to make last minute changes to the customization of their vehicle while it is in production. Adidas' highly automated plant in Ansbach, Germany, known as the "Speedfactory", is designed to produce running shoes in a single day, rather than the 2 or 3 months needed in the traditional supply chain production process.³ The cost of the robotics and the cost of production in high cost countries such as Germany, are expected to be more than offset by the ability to produce small volumes or highly customized shoes to match local tastes and meet current demand.

² "The Factory of the Future," Boston Consulting Group, 6 December 2016

³ "Adidas Automates to make shoes faster," Bloomberg Businessweek, 9 October 2017

Conclusion

As technologies continue to advance, robotics and automation systems are becoming cheaper, but also safer, smarter and easier to use. These developments suggest that robots are likely to be adopted by an increasing broader range of manufacturers, and in fact by other areas of the economy, such as hospitality, healthcare and service industries. This process is likely to be slow and gradual long-term phenomenon, as most manufacturers and most industries are still unaware of the potential of robotics and of how best to use them in their processes.

As the world adopts an increasing number of automated and robotic systems, to increase productivity, enhance the quality of life, or perhaps to perform dirty or dangerous tasks, the security of these systems will become increasingly critical. The relationship between robotics and security is symbiotic, with more automated systems requiring more security and controls, and in turn, more security and controls necessitate more automated management and coordination tools to operate efficiently. Credit Suisse Asset Management have designed two strategies to provide clients with “pure-play” exposure to these compelling and complementary long-term secular growth themes: robotics & automation and security & safety.

For further information (such as current fund factsheet, performance or quarterly comments) please click [here](#) (Security) or [here](#) (Robotics).

Credit Suisse Thematic equity strategies attempt to identify long term secular changes in industries and societies globally, and to deliver to investors “pure-play” exposure to those themes. Our investment horizon of 7-10 years allows us to look beyond short-term market noise and sector cycles, to focus on long term structural opportunities. The last 100 years have shown a compelling upward trend in equity markets, however, in the short term markets are unpredictable, prone to crashes and corrections, and subject to swings in sentiment and psychology. We encourage investors to take the long view, in the same way we take the long term horizon when making investment decisions for our strategies. Short term moves in the market, both up and down, can with a long term perspective be viewed as opportunities to reduce or increase exposure. We remain focused on the long term opportunity in our themes and the structural forces of change which over time drive these themes forward.

***Happy Holidays to all our readers and best wishes for a harmonious New Year.
There will not be a publication in January 2018, the next edition will be available in February 2018.***

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Overview of Fund Characteristics

Key Facts	Credit Suisse (Lux) Global Security Equity Fund	Credit Suisse (Lux) Global Robotics Equity Fund
Portfolio manager	Dr. Patrick Kolb since March 1, 2007	Angus W. H. Muirhead since July 01, 2017
Location	Zurich	Zurich
Fund domicile	Luxembourg	Luxembourg
Fund currency	USD, CHF, EUR	USD, EUR, SGD
Inception date	Oct 19 th , 2006	June 30 th , 2016
Management fee p.a.	For unit class AH, B, BH and CB: 1.92% For unit class IB, IBH, EB and EBH: 0.90% For unit class MBH: 0.70% For unit class UA, UB and UBH: 1.15%	For unit class AH, B, BH and CB: 1.60% For unit class EB and EBH: 0.90% For unit class UA, UB and UBH: 1.15% For unit class IB: 0.90%
TER (as of 31.05.2017)	Unit class B 2.19%, unit class IB 1.18%, CHF unit class BH 2.19%, EUR unit class BH 2.19%, USD unit class EB 1.13%, USD unit class UB 1.43%, CHF share class UBH 1.43%, EUR unit class UBH 1.43%, CHF share class IBH: 1.18%	Unit class B 1.94%, unit class EB 1.19%, unit class UB 1.49%, unit class SB 0.97%, unit class IB 1.22%
Maximum Sales Charge	5% for all unit classes except unit classes IB, IBH, EB and EBH (max. 3%) and MBH (max. 1%)	5% for all unit classes except for unit class EB, EBH and IB (max. 3%)
Single Swinging Pricing (SSP) ¹	Yes	Yes
Benchmark	MSCI World (NR)	MSCI World (NR)
Unit classes	Unit class B, IB, UA, UB, EB, CB in USD, unit class BH, IBH and UBH in CHF, unit class AH, BH, EBH, IBH, MBH and UBH in EUR	Unit class B, CB, EB, UA, UB, SB, IB in USD, unit class AH, BH and EBH in EUR, unit class BH in SGD, unit class BH and UBH in CHF
ISIN	USD unit class B: LU0909471251 USD unit class UB: LU1144416432 USD unit class IB: LU0971623524 CHF unit class UBH: LU1144416515 USD unit class CB: LU1546464857 (newly launched in Feb 17) CHF unit class BH: LU0909471681 EUR unit class UBH: LU1144416606 EUR unit class BH: LU0909472069 USD unit class EB: LU1042675485 (QI only*) CHF unit class IBH: LU1457602594 EUR unit class AH: LU1584043118 (launched in Mar 17) EUR unit class EBH: LU1575200081 (launched in Mar 17) USD unit class UA: LU1557207195 (launched in Feb 17) EUR unit class IBH: LU1644458793 (launched in July 17) EUR share class MBH: LU1692472852 (launched in Oct 17)	USD unit class B: LU1330433571 USD unit class EB: LU1202667561 (QI only*) USD unit class UB: LU1330433738 USD unit class SB: LU1422761277 (seeding share class, closed for investments) USD unit class IB: LU1202666753 USD unit class CB: LU1546464774 (newly launched in Feb 17) EUR unit class BH: LU1430036985 (newly launched in Mar 17) EUR unit class EBH: LU1575199994 (newly launched in Mar 17) SGD unit class BH: LU1599199277 (newly launched in Apr 17) EUR unit class AH: LU1616779572 (newly launched in May 17) USD unit class UA: LU1330433811 (newly launched in Aug 17) CHF unit class UBH: LU1430037280 (newly launched in Jul 17) CHF unit class BH: LU1430036803 (newly launched in Jul 17)

Source: Credit Suisse, November 30, 2017

¹ SSP is a method used to calculate the net asset value (NAV) of a fund, which aims to protect existing investors from bearing indirect transaction costs triggered by in- and outgoing investors. The NAV is adjusted up in case of net inflows and down in case of net outflows on the respective valuation date. The adjustment in NAV might be subject to a net flow threshold. For further information, please consult the Sales Prospectus.

*May only be held by qualified investors as defined in article 10 CISA and article 6 CISO.

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