



The IIoT Market Size and Structure

The investor community is challenged by company presentations which calculate market share based on widely different definitions of the total market. In most cases the company is using a “served market” definition.

A webinar to review and debate the market definition and size on January 9, 2019 will compare McIlvaine market figures to the various figures used by major automation companies. In the intervening months companies will have a chance to review data as we add it to the analysis below. They can then add comments. The January webinar will be free and will be an open discussion of this analysis. The segmentation definitions and forecasts will all be subject to debate and discussion. Automation suppliers and investors are invited to submit comments and participate.

The analysis displayed below presents data relative to those companies which comprise more than 30 percent of this market. This data with revisions and expansions will be used as a basis for discussion of the market. The discussion will also address the impact of the Industrial Internet of Wisdom (IIoW) to empower this market and impact the market shares of participants.

Detailed background information is contained in a series of YouTube presentations by product and industry. These can be accessed at **Free Market Webinars**

This analysis is focused on process and hybrid automaton and does not include discrete automation. It includes utility and industrial but not commercial and residential automation. The major categories of guide, control, and measure have been utilized since at least one of the top world automation suppliers uses this segmentation.

Guide: includes process management, data analytics and subject matter expertise. McIlvaine has introduced a new category - subject matter ultra-expertise and subject matter ultra-experts (IIoW)

Control: includes SCADA, PLCs, wireless transmission, and cloud hardware (not software)

Measure: includes sensors, analyzers, and edge computing technology to measure parameters relative to liquids, gases, and free flowing solids. Since fans and pumps are used in the pertinent processes, the category also includes vibration measurement, corrosion and other measurements used in combustion, separation, transport, heat exchange, evaporation etc.

The McIlvaine services include one on Industrial Valves. Since some of the automation suppliers also have valve divisions, we have included some figures from the valve report.

The following analyses will be continually expanded and revised.

Automation Revenues

Automation Revenues - \$ millions - 2018

	Guide	Control	Measure Air & Gases	Measure Liquids	Measure Powders
Chemical	6003	12698	2001	2001	1719
Electronics	232	491	66	110	44
Food	2034	4302	582	968	388
Iron and Steel	2069	4377	593	985	395
Metals	496	1048	142	236	95
Mining	817	1728	272	272	234
Oil and Gas	10926	23110	4702	4702	1043
Other Electronics	278	589	80	132	53
Other Industries	5078	10741	1454	2416	969
Pharmaceutical	1405	2972	468	468	402
Power	4424	9357	1267	2105	845
Pulp and Paper	2376	5026	680	1130	454
Refinery	6567	13889	1880	3124	1254
Wastewater	2326	4920	226	1776	226
Water	3014	6374	292	2301	292
Total	48045	103641	14706	22727	8413

World 2018 Revenues - \$ millions

Guide	Control	Measure Air & Gases	Measure Liquids	Measure Powders	Control Valves	On/Off Valves	Total
48045	103641	14706	22727	8413	15032	47279	259842

Valve Split by Function

Function	\$mil - 2018
Ball	12999
Butterfly	9478
Check	1869
Gate	12503
Globe	13806
Industrial Plug	6106
Other	4403
Safety Relief	1241

Valve Split by Industry

Industry	\$ mil - 2018
Chemical	7,318
Electronics	508
Food	1,636
Iron & Steel	2,368
Metals	1,030
Mining	1,371
Oil & Gas	9,596
Other Electronics	549
Other Industries	7,332
Pharmaceutical	1,661
Power	8,468
Pulp & Paper	3,025
Refining	8,485
Wastewater	4,644
Water	4,415

Emerson

Emerson sales and analysis before and after PNR (Tyco) acquisition - \$ billions

	World (According to Emerson)	Emerson 2016	Emerson 2017	McIlvaine (2018)
Automation Solutions	206	10.5		259
Intelligent Control	38	5.5		48 (guide)
Final Control	31.8	3.7		104 (control)
Fisher Flow Control		1.4	3.4 Fisher, Bettis, Anderson, Vanessa	15 (control valves)
Pressure Relief		0.8		1.2 (valves only)
Isolation Valves		1		47 (on/off valves)
Flow And Measure			3.1 (Rosemount)	26 (measure)

In 2017 14 percent of Emerson solutions were in discrete applications which are not included in the McIlvaine Scope. Eight percent was upstream oil and gas. Ten percent was mid-stream, 10% was refining, 42% was chemical, and 10% power. McIlvaine automation forecasts include a 10+ contribution from municipal water, and wastewater which would fall in the 11% other in the Emerson figures. The McIlvaine figures include substantial figures in pharmaceutical, food,

pulp, paper, metals, and mining which would also be lumped into the Emerson “other category”. The assumption is that their market share is small in these “other applications”.

The \$1 billion isolation valve figure for 2016 does not include Tyco. The acquisition gave Emerson a leading position in isolation valves.

Yokogawa

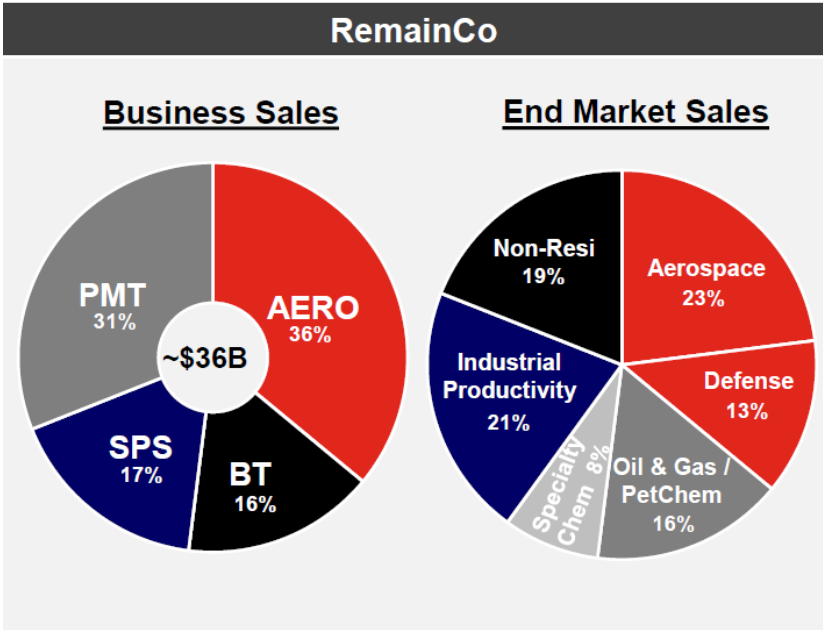
Yokogawa is predicting 2018 sales of \$3.6 billion of which 88% will be control and 5.5% will be measure. Upstream and downstream account for 38% of the present business. Chemical accounts for 17% and power for 5%. The market share for control for Yokogawa is predicted at 3%. However it is only 2% if you include ‘guide’ along with “control”. Yokogawa pursues the market as defined in this analysis which excludes discrete and commercial/residential segments.

	Guide	Control	Yokogawa Control	Yokogawa Measure	Measure Air & Gases	Measure Liquids	Measure Powders
Chemical	6003	12698	530	34	2001	2001	1719
% market share			4.2	0.6			
Food	2034	4302			582	968	388
Iron and Steel	2069	4377			593	985	395
Metals	496	1048			142	236	95
Mining	817	1728			272	272	234
Oil and Gas	10926	23110	1200	75	4702	4702	1043
% market share			5.2	0.7			
Other Industries	5078	10741			1454	2416	969
Pharmaceutical	1405	2972			468	468	402
Power	4424	9357	158	10	1267	2105	845
% market share			1.7	0.2			
Refinery	6567	13889	included		1880	3124	1254
Wastewater	2326	4920			226	1776	226
Water	3014	6374			292	2301	292
Total	48045	103641	3160	198	14706	22727	8413
% market share			3	0.44			

Honeywell

On October 10, 2017, Honeywell announced a plan to spin-off its Homes product portfolio and ADI Global Distribution business as well as its Transportation Systems business into two publicly-traded companies. Post spin-off, Homes and Global Distribution company will be the leader in home heating, ventilation and air conditioning controls and security markets and a global distributor of security and fire protection products. On the other hand, Transportation Systems company will be providing turbocharger technologies with best-in-class engineering

capabilities for a broad range of engine types across global automobile, truck and other vehicle markets, while Honeywell will retain majority of Aerospace business, Performance Materials & Technologies, Building technologies and Safety and Productivity Solutions.



The SPS segment is expecting 2018 sales of \$10.6 to 11 billion. Honeywell Process solutions will have about 34% of the total or sales of \$ 3.6 billion.

Endress +Hauser

In 2017 net sales rose 4.8 percent to 2.241 billion euros.

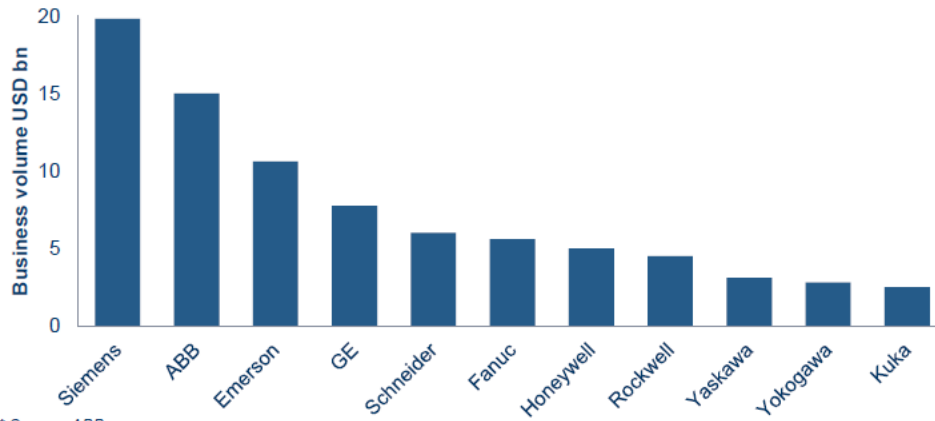
Rockwell

Rockwell Control products sales for the first 3 quarters were \$2.6 billion. Projected 2018 sales are \$3.5 billion.

Other players

Credit Suisse supplied a detailed analysis of the automation market and market shares in 2017 http://home.mcilvaineconomy.com/images/credit_suisse.pdf

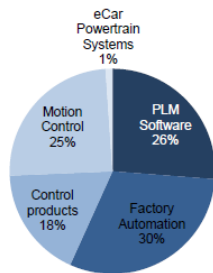
Business Volume of top players in Industrial Automation (Products, Software, Solutions, Services)



These include process, discrete and hybrid products.

Key European Players (i) – Siemens

Siemens digital Factory Employee Split*



* Indicative repartition

Siemens Software Offerings

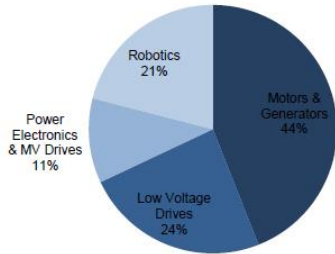


Siemens' Enterprise Control Level Software Offerings

PLM		
Teamcentre	Siemens Collaboration Platform	Flagship product for new product design and introduction
NX	Digital product development	Conceptual design
Tecnomatix	Digital manufacturing	Manufacturing and product engineering
LMS	Simulation and testing	
Fibersim	Composites design and manufacturing	Aerospace, automotive, marine, wind industries
MES Software/ MOM System		
SIMATIC IT MES	Manufacturing Execution System	
SIMATIC IT MES R&D Suite	R&D	
SIMATIC IT MES Preactor APS	Advanced planning and scheduling	
SIMATIC Win CC	Process visualization and monitoring	Software for all HMI applications
IBS	Quality management system	
CAMSTAR	Manufacturing Execution System	Designed for the semiconductor and medical devices industries
Automation software		
TIA Portal	Totally Integrated Automation - One integrated engineering framework	Seamlessly integrates controllers, distributed I/O, HMI, drives, motion control and motor management into a single engineering framework
SINUMERIK	CNC control	

Key European Players (ii) – ABB

ABB DA & M Revenue Split by Product*



* Indicative repartition

ABB DA & M Product Offerings

Engineered solutions that address specific customer needs

- Robotics:** Controllers, Motion controllers, Drive-based controllers, AC500 PLC
- Drives:** Micro, 1ph servo, 3ph servol motion drives, AC drives
- Motors:** Linear motors, Servo motors, AC motors
- Accessories:** Jokab Safety, HMI + IO

Customer Segments:

- Food and beverage
- Automotive
- Computing, Communication, and Consumer Electronics (3C)

ABB Group

Chart 16



ABB's Market Positioning by Product

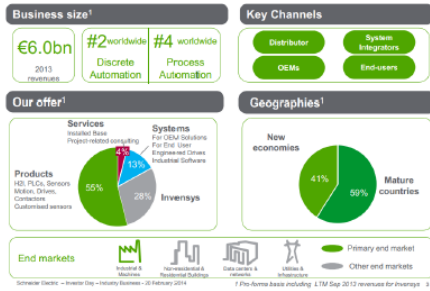
	Market position ¹	1	2	3	4
Low-voltage drives		ABB	Siemens	Mitsubishi	Yaskawa, Rockwell
Power electronics & medium-voltage drives		ABB	Siemens	Robicon	Alstom, Rockwell
Low-voltage systems ²		ABB	Siemens	Schneider	KM, GE, GEC
Low-voltage motors		ABB	Baldor	Siemens	Emerson, WEG
Machines		ABB	Siemens	Teco	GE, Alstom
Breakers & switches		Schneider	ABB	Siemens	GE, KM, Socomec
DIN rail comp. ²		Schneider	ABB	Hager	Siemens, GE
Wiring accessories ²		Legrand	ABB	Schneider	
Control products ²		Schneider	Siemens	ABB	KM, Rockwell, GE
Instrumentation		Rosemount	Yokogawa	ABB	E+H, Invensys
Enclosures		Schneider	GE	Hager	ABB Legrand

		Software		Control systems (software & hardware)				Hardware		
		PLM	MES	HMI/ SCADA	PLC	DCS	CNC	Discrete	Process	Robotics
Europe	ABB		✓	✓	✓	★		★	✓	★
	Schneider	✓	✓	★	★	✓		★	✓	
	Siemens	★	✓	★	★	✓	★	★		
	Rotork								★	
	IMI								✓	
	Spectris			✓					✓	
	Kuka									★
US	Emerson					✓		✓	★	
	Rockwell		✓	✓	★	✓				
	Eaton			✓	✓			✓		
	Honeywell		✓			★				
	GE		✓		✓				✓	
	Pentair								★	
	Flowserv								★	
Japan	Fanuc						★			★
	Mitsubishi Electric				★			★		✓
	Yaskawa							★		★
	Yokogawa					★				
	Omron				★			✓		
China	Supcon		✓			✓				
	Hollysys					✓				
	Weinview			✓						
	Baosight		✓							

The * indicates industry leader while the check indicates a meaningful position such as the top five in China.

Key European Players (iii) – Schneider

Overview of Schneider's Automation Business

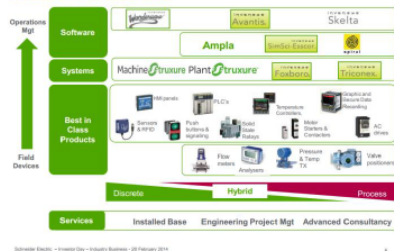


Schneider's Presence in the Industrial Automation Market

	Discrete	Process
Software	Industrial software – Invensys/ (AVEVA)	
	HMI/ SCADA – Schneider/ Invensys	
Controls	PLC – Schneider	DCS – Invensys
Instrumentation	Instrumentation – Schneider	Robot – not present

Schneider's Product Portfolio

We have a comprehensive portfolio for all Industrial customers



Mettler Toledo

Net sales were \$2.7 billion for the year ended December 31, 2017, compared to \$2.5 billion in 2016 and \$2.4 billion in 2015. This represents an increase of 9% in 2017 and an increase of 5% in 2016 in U.S. dollars and an increase of 8% and 7% in local currencies, respectively Net sales of industrial-related products and services, which represented approximately 42% of total net sales in 2017, increased 8% in U.S. dollars and 8% in local currencies during 2017. In 2017, MT experienced strong growth in product inspection and core industrial. Core-industrial results include very strong results in China.

Preliminary Summary

The following rough aggregations of revenues of leaders will be the basis for input and discussion over the next two months. In all cases the leaders have published financial statements. So debate will be regarding the allocation of those revenues based on the definitions we have selected.

IIoT Revenues - \$ millions - 2018					
Company	\$ or Share	Guide	Control	Measure	Total
All	\$	50,000	103,000	46,000	199,000
	%	100	100	100	100
ABB	\$	1000	8000	1000	10,000
	%	2	7.8	2.2	5
Emerson	\$	5,000	5,000	3,000	13,000
	%	10	4.9	6.5	6.5
Endress	\$	300	100	2,200	2600
	%	0.6	0.1	4.8	1.3
GE	\$	1000	2500	500	4,000
	%	2	2.4	1.1	2
Hach	\$	100	100	800	1,000
	%	0.2	0.1	1.7	0.5
Honeywell	\$	1200	2300	100	3600
	%	2.4	2.2	0.2	1.8
Mettler	\$	200	100	1000	1300
	%	0.4	0.1	2.2	0.7
Rockwell	\$	800	2500	200	3500
	%	1.6	2.4	0.4	1.8
Schneider	\$	700	3,000	200	3,900
	%	1.4	2.9	0.4	1.9
Siemens	\$	2000	10,500	500	13,000
	%	4	10.2	1.1	6.5
Thermo	\$	200	100	700	1000
	%	0.4	0.1	1.5	0.5
Yokogawa	\$	1000	2100	200	3300
	%	2	2	0.4	1.7
Leaders	\$	13,500	36,300	10,400	60,200
	%	27	35.2	22.6	30.2
Unidentified	\$	36,500	66,700	35,600	138,800
	%	73	64.7	77.4	69.7

The guide section includes what the industry classifies as subject matter expertise along with process management and data analytics. Part of the discussion will be about the growth potential in this sector. McIlvaine will argue that the Industrial Internet of Wisdom (IIoW) will empower IIoT and will result in high growth rates for the guide segment. How much of this market will be captured by the leaders? This will also be a subject of debate.

Siemens, GE, and Emerson all made presentations and participated in a series of McIlvaine webinars to help BHE select a more cost effective approach to an air pollution problem. The application of ItoW with interconnection of 80 people resulted in a path which would save hundreds of millions of dollars for BHE. The solution included not only process optimization but insights on chemicals and hardware. This broader knowledge grasp can be labeled subject matter ultra-expertise.

Several of the leaders have subject matter ultra-experts by virtue of their multi division structure. The question is how effectively will this knowledge be leveraged. GE and Siemens have deep power plant knowledge. Honeywell leads the world in refining knowledge. All of the other leaders have designated industry and product specialists. Danaher combines the instrumentation expertise of Hach with the process knowledge of Pall, and the chemicals knowledge of Chemtreat. Harnessing all this expertise represents a very significant route to high profitability.

The latest version of this analysis is shown at [N031 Industrial IOT and Remote O&M](#)

Comments and proposed additions to this analysis will be welcomed by Bob Mcilvaine. You can submit them to him at rmcilvaine@mcilvainecompany.com or call Bob at 847 784 0012 ext. 122.

