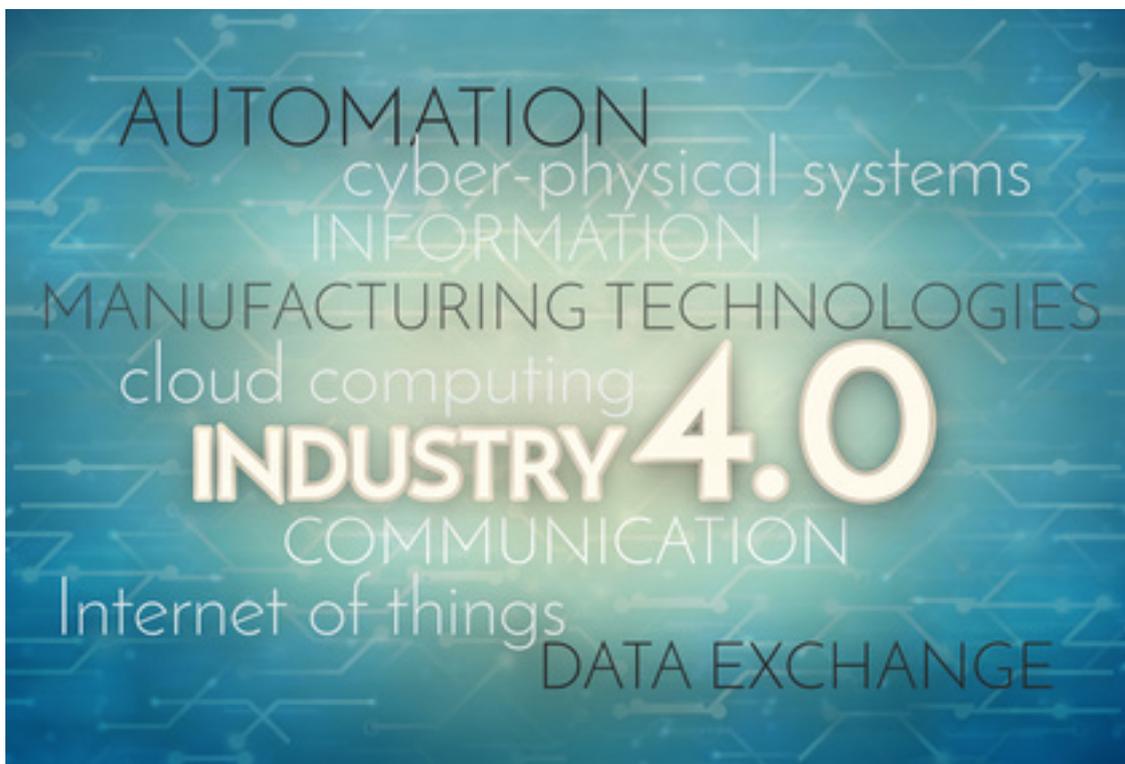


***The current process of the realization  
of Industry 4.0 in machine automation  
and its prospect  
in the German machinery industry***



**Highlights, table of contents, budget**

***The current process of the realization  
of Industry 4.0 in machine automation  
and its prospect in the German machinery industry***

**- Highlights -**

**The structure of the realization of Industry 4.0 in the German machinery industry**

This part 1 opens up the study as one cannot analyze a process fairly comprehensively, whose structures are not known good enough.

So the analysis identifies substantial structural components of the realization of Industry 4.0:

- The feature of Industry 4.0 that is the crucial one for the current realization as well as for the foreseeable future
- The demarcation of Industry 4.0 from the current predominant high automation
- The future development stages of Industry 4.0
- The development types of Industry 4.0 that can be expected
- How Industry 4.0 can meaningfully be divided for the machine-builder
- What Industry 4.0 means for the machine and which general sequences result from it for the machine-builder and its end-users
- The five medium-term sequences of Industry 4.0 for automation manufacturers
- The economic conditions for Industry 4.0 in machinery industry and which countertrend appears.

This structural analysis serves as base for the development of product and market strategies for automation manufacturers and machine-builders.

### **Focus on changes in all substantial automation areas**

---

The study investigates

- eleven machine-related changes regarding machine automation toward Industry 4.0 (part 3, table of contents page 7 to 10).
- five machine-overall changes toward Industry 4.0 (part 4, table of contents page 11).

The study classifies all changes into five development stages regarding Industry 4.0 and determines them contentwise for everyone of the altogether 16 changes.

Machine-builders provided more than 500 statements, automation manufacturers may directly derive from the starting points for their product evolution toward Industry 4.0.

### **The degree of the realization of Industry 4.0 in the sectors as bench mark**

---

For each of the ten sectors the study provides the percentage, which indicates the realization of Industry 4.0.

This percentage is immanently derived from the development stages of the changes and not results of an external, abstract scale.

So the ranking of the sectors regarding the realization of Industry 4.0 provides the balance of technological changes and customer benefits.

Out of this automation manufacturers may directly derive the bench mark he will use for his product evolution. (Part 2)

### **Cutting-edge demand trends**

---

You will use cutting-edge demand trends based on a period of February/April 2016. The demand trends are representative as they are based on detailed denominations of 23% of the scarcely 650 machine-builders with 100 and more employees in the 10 automation-relevant sectors of the German machinery industry (148 companies).

Exclusive personal interviews by telephone or face to face were conducted.

The interviewees are composed of

- 11% companies with 1,000 and more employees
- 16% companies with 500 and under 1,000 employees
- 27% companies with 250 and under 500 employees
- 46% companies between 100 and less than 250 employees.

The ten sectors are building/glass/ceramic machines, printing/paper-handling machines, conveyor, rubber and plastics machines, wood processing machines, food processing machines, robotics and automation, textile machines, packaging machines and machine tools.

### **The study does not talk about Industry 4.0 but with the machine-builders**

This study does not talk about Industry 4.0 but with the machine-builders

- what the practical relevance of Industry 4.0 constitutes for machine automation
- which changes in this direction are to be undertaken
- how these changes are to be arranged in the total process to Industry 4.0
- which role the end-users are playing regarding the realization of Industry 4.0
- which business models for the machine-builders and their end-users appear.

So this study provides substantial cornerstones for product and market strategies that want to actively manage the process of the realization of Industry 4.0 in the machinery industry.

### **Reports, based on the study, published in the Quest Trend Magazine**

Please find the main heading Industry 4.0 on <http://www.quest-trendmagazine.com/en/industry-40.html>

There you will find reports based on the study:

- The development stages of the networking of machines toward Industry 4.0
- To which extent machine-builders acknowledge the relevance of Industry 4.0 in practice

The approach of the study presents Thomas Quest in an interview, who distinguishes this approach from other studies.

***The current process of the realization  
of Industry 4.0 in machine automation  
and its prospect in the German machinery industry***

- Table of contents -

Note: Industry 4.0 is partly abbreviated as I4 and cyber-physical system as CPS

<b>Preface</b>	1
<b>Guide</b>	2
<b>Part 1 The structure of the realization of Industry 4.0 (I4) in the machinery industry</b>	
<b>Chapter 1 The task of this part</b>	
The task of this part	7
<b>Chapter 2 The development types that can be expected with Industry 4.0</b>	
The determination of Industry 4.0 for the survey in the machinery industry	8
How Industry 4.0 demarcates itself from the high automation	9
Which development types can be expected with Industry 4.0	11
<b>Chapter 3 How I4 can meaningfully be divided for the machinery industry</b>	
The two aspects of I4 as base for benefit potentials and business models	13
The four starting points for machine-builders to realize Industry 4.0	14
<b>Chapter 4 The change of the machine as CPS and the sequences</b>	
The machine resp. plant as CPS and the impacts	15
The five medium-term sequences of Industry 4.0 for automation manufacturers	19

<b>Chapter 5 To the economic conditions for the realization of Industry 4.0</b>	
The industry structure in machinery industry and with the investigated companies	20
Stagnating production of the machinery industry restrains the realization of I4	22
I4 fits the strategy of product differentiation but there is a countertrend	23
The current driving power of the realization of Industry 4.0	24
Economic and political factors that restrain the realization of Industry 4.0	25
<b>Chapter 6 The position of the machine-builders to Industry 4.0</b>	
The crucial position of the machine-builders with the realization of Industry 4.0	26
The acceptance profile of the machine-builders regarding Industry 4.0	27
<b>Chapter 7 The position of the end-users to Industry 4.0</b>	
The current balance between supply and demand	29
The impact of the end-users on changes toward Industry 4.0	30
The status of the inquiries of the end-users to Industry 4.0	31
<b>Chapter 8 High loyalty of the machine-builders to automation suppliers</b>	
Changes to Industry 4.0 with high loyalty to the automation supplier	33
The requirements of the machine-builders to the automation manufacturers to I4	34
<b>Chapter 9 The process character of the realization of Industry 4.0</b>	
Evaluating process progresses by external or internal scale?	40
The immanent scale in five development stages of the Industry 4.0 quality	41

## **Part 2      The degree of the realization of I4, aspects of benefit and prospects**

### **Chapter 10 The task of this part**

The task of this part 43

### **Chapter 11 The degree of the realization of Industry 4.0 in the machinery industry**

The degree of the realization resp. changes to Industry 4.0 in 2016 44

The development stages of the realizations/changes to Industry 4.0 in the sectors 46

### **Chapter 12 The aspects of benefit of the machine-builders to Industry 4.0**

The expected aspects of benefit of the machine-builders toward Industry 4.0 48

The most frequent expected aspect of benefit of the machine-builders to Industry 4.0 49

Further expected aspects of benefit 51

### **Chapter 13 The aspects of benefit of the end-users to Industry 4.0**

The expected aspects of benefit for the end-users toward Industry 4.0 52

The most frequent expected aspects of benefit for end-users to Industry 4.0 53

### **Chapter 14 The prospects of the realization of I4 in form of the business models**

The five development stages of the business models for machine-builders 55

Business model 1: (*Business models are specified in the study*) 58

Business model 2: 59

Business model 3: 60

Business model 4: 61

Business model 5: 62

### **Chapter 15 Changes of business models of the end-users**

Five changes of business models of the end-users 64

Business model 1: 66

Business model 2: 67

Business model 3: 68

Business model 4: 69

Business model 5: 70

### **Part 3      The machine-related changes toward Industry 4.0**

#### **Chapter 16 The machine-related changes toward I4 in the overview**

The method to analyze these changes	71
The eleven machine-related starting points for the realization of Industry 4.0	73
The development stages of the machine-related changes toward Industry 4.0	74
The three starting points toward I4 that are difficulty to approach for machine-builders	75
The five most frequent starting points of the machine-builders toward Industry 4.0	76

#### **Chapter 17 The realization of the machine operation toward Industry 4.0**

The results in brief	77
The market share of the changes with the operation toward Industry 4.0	78
The development stages of the operation to the I4 quality	79
The changes of the operation to I4 quality in the sectors	81
I4 quality regarding machine operation sporadically realized	82
I4 quality regarding machine operation realized as subsystem	83
I4 quality regarding machine operation overall realized	84
Changing operation toward I4 but realized after 2016	85
Changes toward I4 but still no I4 quality regarding operation	86

#### **Chapter 18 The realization of networking toward Industry 4.0**

The results in brief	87
The market share of the changes with networking toward Industry 4.0	88
The development stages of networking to the I4 quality	89
The changes of networking to I4 quality in the sectors	91
I4 quality regarding networking sporadically realized	92
I4 quality regarding networking realized as subsystem	94
I4 quality regarding networking overall realized	95
Changing networking toward I4 but realized after 2016	97
Changes toward I4 but still no I4 quality regarding networking	98

<b>Chapter 19 The realization of a self-optimizing production</b>	
The results in brief	99
The market share of the changes for a self-optimizing production	100
The development stages of a self-optimizing production	101
The changes of a self-optimizing production in the sectors	103
I4 quality for self-optimizing production sporadically realized	104
I4 quality for self-optimizing production realized as subsystem	105
Changing self-optimizing production but realized after 2016	107
<b>Chapter 20 The realization of Plug and Produce abilities</b>	
The results in brief	108
The market share of the changes to Plug and Produce abilities	109
The development stages to Plug and Produce abilities	110
The changes to Plug and Produce abilities in the sectors	112
I4 quality to Plug and Produce abilities realized as subsystem	113
Changing Plug and Produce abilities but realized after 2016	114
Changes toward I4 but still no I4 quality with Plug and Produce	115
<b>Chapter 21 The realization of energy efficient, networked drives toward I4</b>	
The results in brief	116
The market share of the changes to energy efficient, networked drives	117
The development stages to energy efficient, networked drives	118
The changes to energy efficient, networked drives in the sectors	120
I4 quality to energy efficient, networked drives sporadically realized	121
I4 quality to energy efficient, networked drives realized as subsystem	112
I4 quality to energy efficient, networked drives overall realized	123
Changing energy efficient, networked drives but 2016 not yet implemented	124
Changes toward I4 but still no I4 quality with energy efficient, networked drives	125
<b>Chapter 22 The realization of mechatronic Intralogistics by linear motors</b>	
The results in brief	126
The market share of the changes to mechatronic Intralogistics by linear motors	127
The development stages to mechatronic Intralogistics by linear motors	128
The changes to mechatronic Intralogistics in the sectors	130
I4 quality to mechatronic Intralogistics via linear motors sporadically realized	131
I4 quality to mechatronic Intralogistics realized as subsystem	132
Changes to mechatronic Intralogistics but realized after 2016	133

<b>Chapter 23 The realization of Condition Monitoring toward Industry 4.0</b>	
The results in brief	134
The market share of the changes to Condition Monitoring toward Industry 4.0	135
The development stages to Condition Monitoring toward Industry 4.0	136
The changes to Condition Monitoring in the sectors	138
I4 quality to Condition Monitoring sporadically realized	139
I4 quality to Condition Monitoring realized as subsystem	140
Changing Condition Monitoring but realized after 2016	141
Changes to Condition Monitoring, but still no I4 quality	142
<b>Chapter 24 The realization of Predictive Maintenance toward Industry 4.0</b>	
The results in brief	143
The market share of the changes to Predictive Maintenance toward Industry 4.0	144
The development stages to Predictive Maintenance toward Industry 4.0	145
The changes to Predictive Maintenance in the sectors	147
I4 quality to Predictive Maintenance sporadically realized	148
I4 quality to Predictive Maintenance realized as subsystem	150
Changing Predictive Maintenance but realized after 2016	151
Changes to Predictive Maintenance, but still no I4 quality	152
<b>Chapter 25 The realization of asset tracking by RFID toward I4</b>	
The results in brief	153
The market share of the changes to asset tracking via RFID toward I4	154
The development stages to asset tracking via RFID toward Industry 4.0	155
The changes to asset tracking via RFID in the sectors	157
I4 quality to asset tracking via RFID sporadically realized	158
I4 quality to asset tracking via RFID realized as subsystem	159
I4 quality to asset tracking via RFID overall realized	160
Changing asset tracking via RFID but realized after 2016	161
Changes to the asset tracking via RFID but still no I4 quality	162

<b>Chapter 26 The realization of the product tracking by RFID toward I4</b>	
The results in brief	163
The market share of the changes of product tracking by RFID toward I4	164
The development stages of product tracking by RFID toward Industry 4.0	165
The changes of product tracking by RFID in the sectors	167
I4 quality of product tracking by RFID sporadically realized	168
I4 quality of product tracking by RFID realized as subsystem	169
I4 quality of product tracking by RFID overall realized	170
Changing product tracking by RFID but realized after 2016	171
<b>Chapter 27 The realization of the use of robots toward Industry 4.0</b>	
The results in brief	172
The market share of the changes to the use of robots toward Industry 4.0	173
The development stages to the use of robots toward Industry 4.0	174
The changes to the use of robots in the sectors	176
I4 quality to the use of robots sporadically realized	177
I4 quality to the use of robots realized as subsystem	178
I4 quality to the use of robots overall realized	179
Changing the use of robots but realized after 2016	180
Changes to the use of robots but still no I4 quality	181

## **Part 4      The machine-overall changes toward Industry 4.0**

### **Chapter 28 The machine-overall changes toward I4 in the overview**

The five machine-overall changes	182
The ranking of the machine-overall changes	183

### **Chapter 29 The changes for data storage by Clouds**

The market share of the changes to Clouds	184
The acceptance profile for data storage in Clouds in the overview	185
The changes to Clouds in the sectors	186
The acceptance profile for data storage in Clouds in five points	187

### **Chapter 30 The changes toward Systems Engineering**

The market share of the changes toward Systems Engineering	189
The two development stages toward Systems Engineering	190
The changes to Systems Engineering in the sectors	191
The engineering is modularized and standardized	192
The engineering is managed ever more in an integrated way	193

### **Chapter 31 The changes for virtual creation/simulation of machines**

The market share of the changes for the virtual creation/simulation	195
The development stages for virtual creation/simulation of machines	196
The changes for virtual creation/simulation in the sectors	197
Virtual creation and simulation of subsystems	198
Simulation of subsystems	199
Virtual creation and simulation of machines	200
Simulation of machines	202

**Chapter 32 The changes to the self-adjustment with line-ups**

The market share of the changes to the self-adjustment with line-ups	203
The three development stages to the self-adjustment with line-ups	204
The changes to the self-adjustment with line-ups in the sectors	205
The three development stages to the self-adjustment with line-ups	206

**Chapter 33 The changes for the use of 3D printers**

The market share of the changes for the use of 3D printers	207
The development stages for the use of 3D printers	208
The changes for the use of 3D printers in the sectors	209
The changes for the use of 3D printers	210

**Appendix**

T-1 - T-5

***The current process of the realization  
of Industry 4.0 in machine automation  
and its prospect in the German machinery industry***

**- Budget -**

**The current process of the realization of Industry 4.0  
in machine automation and its prospect  
in the German machinery industry**

**€11,600**

- 210 pages, 65 figures, 1 table, appendix 6 tables
- 518 statements of the machine-builders
- Contents according to transmitted table of contents
- spiralbound, colored print output in English language

Invoice after delivery. Terms of payment are 14 days net. VAT is in addition to the price.