

Contents

Foreword	3
Editorial	5
Contents	8
Executive Summary World Robotics 2021 Industrial Robots	12
1 Introduction: Sources and methods	18
1.1 Contents, access to data for previous years, and contact.....	18
1.2 Data sources, revisions, reliability and validity	20
1.2.1 Sources	20
1.2.2 Quality, reliability and validity	21
1.2.3 Data revisions since the previous edition	21
1.3 Compliance.....	23
1.4 Forecasts.....	25
1.5 Definition of “shipments” and “installations”.....	26
1.6 Definition of “operational stock”	27
1.7 Definitions: “robot”, “service robot”, “industrial robot”	28
1.7.1 ISO 8373:2012 vocabulary definitions.....	28
1.7.2 Deviations of IFR definitions from ISO Definitions and IFR refinements of ISO definitions –industrial Robots	29
1.7.3 IFR definition: Multipurpose industrial robot	30
1.8 Scope of IFR industrial robot statistics	31
1.9 IFR definition of robot types.....	32
1.10 IFR classification of industries	40
1.11 IFR classification of applications	42
1.12 IFR geography classification	43
1.13 Distribution and sales channels for industrial robots and their impact on IFR data collection.....	46
1.13.1 Definition of the market players	47
1.13.2 Distribution channels	47
1.13.3 Sales channels	48
1.13.4 Data collection for IFR industrial robot statistics.....	49
2 Worldwide distribution of industrial robots	52
2.1 Unit installations	53
2.2 Worldwide operational stock of industrial robots	60
2.3 Worldwide market value of robots in 2015 – 2020	65
2.4 Collaborative robots.....	67
2.5 Analysis of the development of robot density in selected countries/regions	70

2.5.1	Definition of robot density and sources of data	70
2.5.2	Robot density in the manufacturing industry	72
2.5.3	Robot density in the automotive industry and in all other industries.....	76
2.6	Installations and stock of industrial robots in 2015 – 2020 by application areas.....	82
2.7	Installations and stock of industrial robots in 2015 – 2020 by customer industries	91
2.8	Comparison between the automotive industry and all other industries .	103
2.9	Installations of industrial robots in 2019 and 2020 by mechanical structure (type) and country/region.....	120
3	The structure of the distribution of industrial robots in individual countries/regions	132
3.1	Introduction	132
3.2	The Americas	133
3.2.1	North America.....	142
3.2.2	Brazil.....	171
3.2.3	Rest of South America.....	177
3.3	Asia/Australia.....	182
3.3.1	People’s Republic of China	191
3.3.2	India.....	209
3.3.3	Indonesia	220
3.3.4	Japan.....	227
3.3.5	Republic of Korea	243
3.3.6	Malaysia	256
3.3.7	Singapore	264
3.3.8	Chinese Taipei.....	274
3.3.9	Thailand.....	285
3.3.10	Vietnam	295
3.3.11	Other South East Asia.....	304
3.3.12	Australia and New Zealand	309
3.4	Europe	316
3.4.1	Balkan Countries	325
3.4.2	Czech Republic	334
3.4.3	Hungary	345
3.4.4	Poland	355
3.4.5	Romania	366
3.4.6	Russian Federation	376
3.4.7	Slovakia	387
3.4.8	Other Eastern Europe.....	396
3.4.9	Austria	401
3.4.10	Belgium, LUXEMBOURG, and the Netherlands.....	412
3.4.11	France	426
3.4.12	Germany.....	438
3.4.13	Italy.....	453

3.4.14	Portugal	465
3.4.15	Spain	475
3.4.16	Switzerland	486
3.4.17	United Kingdom	496
3.4.18	Denmark	507
3.4.19	Finland	517
3.4.20	Norway	527
3.4.21	Sweden	536
3.4.22	Turkey	547
3.4.23	All other European countries	557
3.5	Africa	561
3.5.1	South Africa	561
3.5.2	Rest of Africa	570
3.6	Other countries	575
4	Forecast of industrial robot installations 2021-2024.....	578
4.1	The short run: Economic rebound and the pandemic “new normal”	578
4.2	The medium run: New markets and new business models	581
4.3	The long run: Robotics is an integral part of manufacturing	583
4.4	Trends in robot technology	587
4.5	Conclusion and forecast 2021-2024	591
5	Case studies on robots in manufacturing and beyond.....	598
5.1	Introduction	598
5.2	Case Study 1 – ABB’s collaborative robot takes the strain out of sampling at Karolinska University Laboratory	601
5.3	Case Study 2 – Epson SCARA robots enable high-performance automation at HEKUMA	604
5.4	Case Study 3 – Assembling by two robots on a 13 metre long linear axis	607
5.5	Case Study 4 – Robotic applications for the safeguard of the historical heritage.....	610
5.6	Case Study 5 – Automation of a traditional German brewery: Kawasaki robots move into Westheimer brewery in Sauerland	613
5.7	Case Study 6 – Automated derinding of cheese ensures fully automated production at Dupont Cheese	617
5.8	Case Study 7 – How 3D vision solution brings benefits to robot depalletizing for retail industry	620
5.9	Case Study 8 – Cobots give gear manufacturer a competitive production edge.....	624
5.10	Case Study 9 – Boost productivity even at SME factories cobots for machine tending	627
5.11	Case Study 10 – Automated inspection of heat exchangers	632

5.12	Case Study 11 – Emergency medical production: Stäubli makes the commitment	635
5.13	Case Study 12 – Segbert’s newly-developed CPA-10 cobot palletizer featuring a Yaskawa Motoman HC10	640
6	Special Feature: IERA Award	646
6.1	Introduction	646
6.2	Winner of the IERA Award 2020: Photoneo’s high resolution MotionCam-3D	647
6.3	Winner of the IERA Award 2021: ABB’s PixelPaint car painting	651
7	Annex.....	656
	References	672