

CONTENTS

FOREWORD		iii
CONTENTS		v
EXECUTIVE SUMMARY		ix
I	INTRODUCTION	1
	I.1 Sources and methods	1
	I.1.1 Coverage	1
	I.1.2 Data sources and reliability of data	1
	I.1.3 Two types of stock data	2
	I.1.4 Interpretation of the concepts of shipments, sales and yearly supply	3
	I.1.5 Revision of time-series data on the robot stock	4
	I.1.6 Data coverage and where to access data for previous years	4
	I.2 Multipurpose manipulating industrial robots - definition and classification	6
	I.2.1 Definition (ISO 8373) and delimitation	6
	I.2.2 Classification by industrial branches	12
	I.2.3 Classification by application areas	13
	I.2.4 Classification by types of robots	14
	I.3 Service robots: definition and classification	15
	I.3.1 Provisional definition	15
	I.3.2 Classification of service robots by application areas	15
II	WORLDWIDE DISTRIBUTION OF INDUSTRIAL ROBOTS	19
	II.1 Unit sales	19
	II.2 Estimate of the worldwide operational stock of industrial robots	23
	II.3 Estimate of the value of the world robot market in 2002 - 2007	26
	II.4 Degree of concentration in the robot industry	29
	II.5 Analysis of the effects of the business cycle on investments in industrial robots	29
	II.6 Analysis of the development of robot density in selected countries	31
	II.6.1 Definition of robot density	31
	II.6.2 Measurements of robot density based on the total number of persons employed	32
	II.6.3 Measurements of robot density based on the total number of production workers	36
	II.7 Analysis of the stock and supply of multipurpose industrial robots in 2002-2007 by major application areas	39
	II.8 Analysis of the stock and supply of multipurpose industrial robots in 2002- 2007 by major industrial branches	46
	II.9 Comparison between the motor vehicle industry and all other industrial branches	55
	II.10 Supplies of multipurpose industrial robots in 2007 by types of robots	62

III	PRICES AND WAGES	69
III.1	Introduction.....	69
III.1.1	Variables and indicators in selected industrial branches.....	69
III.1.2	Sources	69
III.2	Average unit price of robots in robot systems.....	69
III.3	United States - robot prices and labour cost indices and wages.....	72
III.4	Germany - robot prices and labour cost indices and wages.....	74
III.5	France - robot prices and labour cost indices and wage	75
III.6	United Kingdom - robot prices and labour cost indices and wages	76
IV	THE STRUCTURE OF THE DISTRIBUTION OF INDUSTRIAL ROBOTS IN INDIVIDUAL COUNTRIES	79
	Introduction	79
	Americas:.....	80
	Brazil and Argentina	87
	North America	94
	All other American countries	104
	Asia / Australia:.....	105
	China	113
	India.....	117
	Indonesia	121
	Japan.....	124
	Republic of Korea.....	137
	Malaysia	147
	Singapore.....	150
	Taiwan, Province of China	152
	Thailand.....	157
	All other Asian countries.....	160
	Australia and New Zealand	161
	Europe:	166
	Austria	174
	Belgium/Luxembourg and Netherlands.....	182
	Czech Republic and Slovakia.....	192
	Denmark.....	199
	Finland.....	208
	France	217
	Germany.....	227
	Hungary.....	239
	Italy	244
	Norway	254
	Poland	263
	Portugal	269
	Russian Federation	274
	Spain	277
	Sweden.....	288
	Switzerland.....	297
	Turkey.....	303
	United Kingdom.....	308
	All other European Countries	319
	Africa:	320
	South Africa.....	320

V	FORECAST OF WORLDWIDE INVESTMENT IN INDUSTRIAL ROBOTS IN THE PERIOD 2007-2011	323
V.1	Determining factors	323
V.2	International Business Outlook	
	V.2.1 Situation.....	323
	V.2.2 Outlook.....	324
V.3	Assumptions	326
V.4	Customer and technical trends.....	326
V.5	Forecasts for 2008-2011	327
	V.5.1 Historical development.....	327
	V.5.2 Predictions	328
	V.5.3 Conclusion	329
	V.5.4 Forecasts for 2008-2011	329
VI	THE PROFITABILITY OF INDUSTRIAL ROBOTS: ANALYSIS OF CASE STUDIES	335
VI.1	Introduction and conclusions	335
	VI.1.1 Introduction	335
	VI.1.2 Benefits of robot automation	335
	VI.1.3 Conclusions	336
	Table VI.1-1d Analysis of case studies – summary of profitability of robot investment	338
VI.2	Case study 1: Salami under control	
	By: David Marshall, ABB Limited, United Kingdom	346
VI.3	Case study 2: A sunny outlook for Solar Valle	
	By: David Marshall, ABB Limited, United Kingdom	349
VI.4	Case study 3: KUKA robots build houses	
	By: Katrin Stuber, KUKA Roboter, Germany	351
VI.5	Case study 4: How many cups can a robot handle?	
	By: Katrin Stuber, KUKA Roboter, Germany	354
VI.6	Case study 5: Extreme versatility in tight spaces, the unique 7-axis MOTOMAN robot saves valuable floor space	
	By: Kajsa Pettersson, MOTOMAN robotec, Germany	357
VI.7	Case study 6: Robotic food palletising system, with less than 22 months payback time	
	By: Kajsa Pettersson, MOTOMAN robotec, Germany	359

VII	SERVICE ROBOTS	361
	VII.1 Introduction.....	361
	VII.2 Distribution of service robots.....	362
	VII.3 Major application areas for service robots	369
	VII.3.1 Introduction	369
	VII.3.2 Service robots for professional use	371
	VII.3.2.1 Field robotics	371
	VII.3.2.2 Professional cleaning	378
	VII.3.2.3 Inspection systems	384
	VII.3.2.4 Construction and demolition.....	388
	VII.3.2.5 Logistic systems	393
	VII.3.2.6 Medical robots	397
	VII.3.2.7 Defense, rescue & security applications	402
	VII.3.2.8 Underwater systems.....	411
	VII.3.2.9 Mobile platforms in general use	412
	VII.3.2.10 Robot arms in general use	414
	VII.3.2.11 Public relation robots.....	415
	VII.3.3 Service robots for personal/domestic use	418
	VII.3.3.1 Robots for domestic tasks	418
	VII.3.3.2 Entertainment robots including toy robots and hobby systems.....	423
	VII.3.3.3 Handicap assistance	425
	VII.3.3.4 Personal transportation (Automated transportation of persons)	427
	VII.3.3.5 Home security and surveillance	428
	VII.3.3.6 Humanoid robots	428
	Inventory of Service Robot Manufacturers by Application Area.....	430
	Pictures of Service Robots.....	445
Annex A	Time series of accumulated sales, operational stock and shipments of multipurpose industrial robots	453
	Table A-1 Estimated yearly shipments of multipurpose industrial robots in selected countries. Number of units.....	453
	Table A-2 Estimated yearly shipments of multipurpose industrial robots in selected countries. Annual percentage change	455
	Table A-3 Estimated operational stock of multipurpose industrial robots in selected countries. Number of units.....	457
	Table A-4 Estimated operational stock of multipurpose industrial robots in selected countries. Annual percentage change	459
	Table A-5 Total accumulated yearly sales of multipurpose industrial robots in selected countries. Number of units.....	461
	Table A-6 Total accumulated yearly sales of multipurpose industrial robots in selected countries. Annual percentage change	463