

**THE MARKET FOR
POLYURETHANE
CHEMICALS AND PRODUCTS
IN ASIA-PACIFIC**

Volume 1 – East Asia

**© IAL CONSULTANTS
DECEMBER 2010**

CP House, 97-107 Uxbridge Road, Ealing, London W5 5TL
Tel: +44 (0) 20 8832 7780 Fax: +44 (0) 20 8566 4931
Email: ial@brg.co.uk
Web site: www.ialconsultants.com

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form, or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission of the copyright owner.

NOTE

The information given in this report has been compiled from published sources and interpreted from fieldwork based on informed opinions. Whilst every care has been taken in the preparation of the report, there may have been some errors in the information obtained. Although it is impossible to verify every single detail by cross checking, we believe the general picture provided is reasonably accurate and comprehensive.

Many IAL reports contain an overview of selected company financial information and capabilities based on published sources where available. Although the companies represented are believed to be the major suppliers the profiles are meant to be indicative rather than definitive.

It is fundamental to the philosophy of IAL Consultants to constantly seek to extend and improve our service to clients. In pursuit of these aims, we shall be pleased to consider all requests for regular or periodic updating of all or any part of the information contained in this report, or for extensions in coverage in terms of product areas, market sectors and/or geographic regions.

We are, of course, always happy to discuss with any subscriber the possibility of undertaking further work, whether arising out of this report or in different business areas.

MORE INFORMATION ON IAL CONSULTANTS

Should you require more information on either our published reports or our private client services, please contact us at the address given.

Full details on all IAL Consultants published studies (including full tables of contents and tables of tables) and ad-hoc research services can be found on our website:

www.ialconsultants.com

CONTENTS

1. INTRODUCTION	1
1.1 SCOPE OF STUDY	1
1.2 METHODOLOGY	2
1.3 UNITS OF VOLUME	2
1.4 FORMULATIONS	2
1.4.1 Flexible Foam	3
1.4.2 Rigid Foam	4
1.4.3 Coatings	5
1.4.4 Adhesives & Sealants	6
1.4.5 Elastomers	7
1.5 ABBREVIATIONS	8
2. MARKET SUMMARY AND FORECAST TO 2014	9
2.1 TOTAL EAST ASIA PU PRODUCTION AND RELATED RAW MATERIAL CONSUMPTION 2009-2014	9
2.2 TOTAL EAST ASIA PU PRODUCTION BY COUNTRY, 2009-2014	12
2.3 TOTAL EAST ASIA PU RAW MATERIAL CONSUMPTION BY COUNTRY, 2009-2014	14
2.4 HISTORICAL DATA	17
2.5 SUMMARY OF TRENDS AND ISSUES AFFECTING THE POLYURETHANE INDUSTRY IN EAST ASIA	18
3. RAW MATERIALS	21
3.1 INTRODUCTION	21
3.2 MDI	22
3.2.1 MDI Producers	23
3.3 TDI	27
3.3.1 TDI Producers	27
3.4 ALIPHATIC ISOCYANATES	31
3.4.1 Producers of Aliphatic Isocyanates	32
3.5 POLYOLS	36
3.5.1 Polyether Polyol Producers	39
3.5.2 Graft Copolymer Polyols	42
3.5.3 Producers of Polyester Polyols	44
3.5.4 Producers of PTMEG Polyols	46
3.5.5 Bio-based Polyols	48
3.5.6 Polyol Precursors – Propylene Oxide	50
3.6 TRENDS AND ISSUES AFFECTING RAW MATERIAL PRODUCTION	51
3.6.1 Isocyanates	51
3.6.2 Polyols	54
4. MARKET REVIEW BY PU PRODUCT	57
4.1 FLEXIBLE FOAM	57
4.1.1 Flexible Slabstock	59
Trends and Issues Affecting Flexible Slabstock Production	60
Major Producers of Flexible Polyether Slabstock	65
Major Producers of Flexible Polyester Slabstock	66
4.1.2 Flexible Moulded Foam	69
Trends and Issues Affecting Moulded Foam Production	72
Major Producers of Moulded Flexible Foam for Transport Seating	77
Major Producers of Integral Skin Foam	78
Major Producers of Semi-Rigid Foam	79
Major Producers of Moulded Foam Automotive Components	79
4.2 RIGID FOAM	80
4.2.1 Sandwich Panels	81

	Trends and Issues Affecting Production of Rigid PU Sandwich Panels.....	81
	Major Producers of Sandwich Panels in East Asia.....	84
4.2.2	<i>Refrigeration</i>	85
	Trends and Issues Affecting Production of Rigid Foam for Domestic and Commercial Refrigeration.....	86
	Major Manufacturers of Refrigerators and Freezers	89
4.2.3	<i>Rigid Sprayed Foam</i>	90
4.2.4	<i>Pipe-in-Pipe Insulation (Pre-insulated Pipe)</i>	93
	Trends and Issues Affecting Production of Rigid PU foam for Pipe-in-pipe Insulation	94
	Major Producers of Pipe-in-pipe Insulation	96
4.2.5	<i>Rigid Foam Slabstock</i>	96
	Trends and Issues Affecting the Production of Slabstock	97
4.3	COATINGS.....	99
	Trends and Issues Affecting Production and Consumption of PU Coatings	101
	Major Producers of Polyurethane Coatings.....	111
4.4	ADHESIVES & SEALANTS	112
	Trends and Issues Affecting the Production of Adhesives and Sealants	115
	Major Producers of Adhesives and Sealants	117
4.5	ELASTOMERS.....	118
4.5.1	<i>Solid Elastomers</i>	120
	Trends and Issues Affecting Production of Solid Elastomers	121
	Major Producers of Cast Elastomers.....	124
	Major Producers of RIM/RRIM.....	124
	Major Producers of Thermoplastic Polyurethane Elastomers	125
	Major Producers of Elastomeric Fibres.....	128
4.5.2	<i>Microcellular Elastomers</i>	130
	Trends and Issues Affecting Production of Microcellular Elastomers for Footwear.....	131
	Major Producers of Microcellular Elastomers for Footwear	133
	Leading Manufacturers of Technical Elastomers	135
4.5.3	<i>Synthetic Leather</i>	135
	Trends and Issues Affecting the Production of PU Synthetic Leather	136
4.5.4	<i>Major Producers of PU Synthetic Leather and PU Resin</i>	137
5.	MAJOR END-USE MARKETS FOR POLYURETHANE.....	139
5.1	BUILDING & CONSTRUCTION.....	139
5.1.1	<i>Industry Overview</i>	139
5.1.2	<i>Production of Polyurethane for Construction Applications</i>	140
5.1.3	<i>Trends and Issues Affecting the Building & Construction Industry</i>	145
5.2	AUTOMOTIVE	150
5.2.1	<i>Trends & Issues Affecting the Automotive Industry</i>	158
5.3	REFRIGERATION	162
5.3.1	<i>Trends and Issues Affecting the Refrigeration Industry</i>	166
5.4	FOOTWEAR.....	170
5.4.1	<i>Trends and Issues Affecting the Footwear Industry</i>	174
5.5	FURNITURE AND BEDDING	176
	Major Trends & Issues Affecting the Furniture & Bedding Market	178
6.	DIRECTORY OF RAW MATERIAL SUPPLIERS	183
6.1	MANUFACTURERS OF ISOCYANATES	183
6.1.1	<i>China</i>	183
6.1.2	<i>Hong Kong</i>	184
6.1.3	<i>Japan</i>	184
6.1.4	<i>South Korea</i>	184
6.1.5	<i>Taiwan</i>	185
6.2	LEADING MANUFACTURERS OF POLYOLS	185
6.2.1	<i>China</i>	185
6.2.2	<i>Japan</i>	187
6.2.3	<i>South Korea</i>	189
6.2.4	<i>Taiwan</i>	191
7.	SOURCES OF INFORMATION.....	193
7.1	CHEMICALS AND PLASTICS ASSOCIATIONS	193
7.1.1	<i>China</i>	193

7.1.2	Japan	194
7.2	PAINTS & COATINGS ASSOCIATIONS	194
7.2.1	China	194
7.2.2	Japan	194
7.2.3	South Korea	194
7.2.4	Taiwan	195
7.3	ADHESIVES & SEALANTS ASSOCIATIONS	195
7.3.1	China	195
7.3.2	Japan	195
7.3.3	Taiwan	195
7.4	FOOTWEAR INDUSTRY ASSOCIATIONS	196
7.4.1	China	196
7.4.2	Japan	196
7.5	AUTOMOTIVE INDUSTRY ASSOCIATIONS	196
7.5.1	China	196
7.5.2	Japan	196
7.5.3	South Korea	197
7.5.4	Taiwan	197
7.6	REFRIGERATION INDUSTRY ASSOCIATIONS	197
7.6.1	China	197
7.6.2	Japan	197
7.6.3	South Korea	197
7.6.4	Taiwan	197
7.7	CONSTRUCTION INDUSTRY ASSOCIATIONS	198
7.7.1	China	198
7.7.2	Japan	198
7.7.3	South Korea	198
7.8	FURNITURE AND BEDDING INDUSTRY ASSOCIATIONS	199
7.8.1	China	199
7.8.2	Japan	199
7.8.3	South Korea	199
7.8.4	Taiwan	199

TABLE OF TABLES

1.	INTRODUCTION.....	1
1.1	SCOPE OF STUDY	1
1.2	METHODOLOGY	2
1.3	UNITS OF VOLUME	2
1.4	FORMULATIONS.....	2
	Flexible Foam: Raw Material Formulations Used (%).....	3
	Rigid Foam: Raw Material Formulations Used (%).....	4
	PU Coatings: Raw Material Formulations Used (%).....	5
	PU Adhesives & Sealants: Raw Material Formulations Used (%).....	6
	PU Elastomers: Raw Material Formulations Used (%).....	7
1.5	ABBREVIATIONS.....	8
	Polyurethane Abbreviations and General Terms.....	8
2.	MARKET SUMMARY AND FORECAST TO 2014.....	9
2.1	TOTAL EAST ASIA PU PRODUCTION AND RELATED RAW MATERIAL CONSUMPTION 2009-2014.....	9
	Total Production of all PU Products and Related Raw Material Consumption in East Asia, 2009 (Tonnes).....	9
	Forecast Total Production of all PU Products and Related Raw Material Consumption in East Asia, 2014 (Tonnes).....	10
	Total Production of all PU Products and Related Raw Material Consumption in East Asia, 2009-2014 (% Growth p.a.).....	11
2.2	TOTAL EAST ASIA PU PRODUCTION BY COUNTRY, 2009-2014	12
	Total Production of PU Products by Sector & Country, 2009 (Tonnes)	12
	Forecast Production of PU Products by Sector & Country, 2014 (Tonnes).....	12
	Total Production of PU Products by Sector & Country, 2009-2014 (% Growth p.a.).....	13
2.3	TOTAL EAST ASIA PU RAW MATERIAL CONSUMPTION BY COUNTRY, 2009-2014	14
	Total PU Raw Material Consumption in East Asia by Country, 2009 (Tonnes).....	14
	Total Forecast PU Raw Material Consumption in East Asia by Country, 2014 (Tonnes).....	15
	Total PU Raw Material Consumption in East Asia by Country, 2009-2014 (% Growth p.a.)	16
2.4	HISTORICAL DATA	17
	Total Polyurethane Production in East Asia, by Country, 1990-2014 (Tonnes)	17
	Changes in PU Market Breakdown by Product Type in East Asia, 2003 & 2009 (Tonnes).....	17
2.5	SUMMARY OF TRENDS AND ISSUES AFFECTING THE POLYURETHANE INDUSTRY IN EAST ASIA.....	18
3.	RAW MATERIALS.....	21
3.1	INTRODUCTION.....	21
	Polyurethane Raw Material Capacity in East Asia, 2003-2014 (Tonnes)	21
	Estimated Polyurethane Raw Material Production in East Asia, 2009-2014 (Tonnes)	22
3.2	MDI.....	22
	Demand for MDI in East Asia, 2009 (Tonnes)	22
	Forecast Demand for MDI in East Asia, 2014 (Tonnes).....	23
	Demand for MDI in East Asia, 2009-2014 (% CAGR).....	23
	MDI Production Capacity in East Asia, 2009 (Tonnes).....	24
	Forecast MDI Capacity Expansions in East Asia by 2014 (Tonnes).....	26
3.3	TDI	27
	Demand for TDI in East Asia, 2009-2014 (Tonnes & % CAGR).....	27
	TDI Production Capacity, East Asia, 2009 (Tonnes).....	28
	Possible TDI Capacity Expansions by 2014 in East Asia (Tonnes)	30
3.4	ALIPHATIC ISOCYANATES	31
	Demand for Aliphatic Isocyanates in East Asia, 2009 (Tonnes).....	31
	Forecast Demand for Aliphatic Isocyanates in East Asia, 2014 (Tonnes).....	31
	Demand for Aliphatic Isocyanates in East Asia, 2009-2014 (% Growth p.a.)	32
	Aliphatic Isocyanate Production Capacity in East Asia, 2009 (Tonnes).....	34
	Aliphatic Isocyanate Production Capacity in East Asia, 2014 (Tonnes).....	35
3.5	POLYOLS	36
	Estimated Supply and Demand for Polyols in East Asia, 2009-2014 (Tonnes)	37
	Demand for Polyols in East Asia by Country & Type, 2009 (Tonnes)	37
	Forecast Demand for Polyols in East Asia by Country & Type, 2014 (Tonnes).....	37
	Demand for Polyols in East Asia by Country & Type, 2009-2014 (% Growth p.a.).....	38
	Polyether Polyol Production Capacity in East Asia, 2009 (Tonnes)	39

	Possible Expansion of Polyether Polyol Production Capacity in East Asia, 2014 (Tonnes)	41
	Producers of Graft Copolymer Polyols in East Asia, 2009 & 2014 (Tonnes)	43
	Polyester Polyol Production Capacity in East Asia, 2009 & 2014 (Tonnes)	44
	PTMEG Production Capacity in East Asia, 2009 & 2014 (Tonnes)	47
3.6	TRENDS AND ISSUES AFFECTING RAW MATERIAL PRODUCTION	51
4.	MARKET REVIEW BY PU PRODUCT	57
4.1	FLEXIBLE FOAM	57
	Total Production of Flexible Foam in East Asia by Product Type, by Country, 2009 (Tonnes)	57
	Forecast Total Production of Flexible Foam in East Asia by Product Type, by Country, 2014 (Tonnes)	58
	Growth in Flexible Foam Production in East Asia, by Type and Country, 2009-2014 (% Growth p.a.)	58
	Major Producers of Polyether Slabstock in East Asia, 2009	65
	Major Producers of Polyester Slabstock in East Asia, 2009	66
	Capacity and Production of Major Flexible Slabstock Manufacturers in China, 2009 (Tonnes)	67
	Typical Foam Density for Automotive Seating by OEM (kg/m ³)	69
	Use of Moulded Foam in Transport Seating per Vehicle (kg)	70
	Patterns of TDI/MDI Usage in Moulded Automotive Seat Foam in East Asia, 2009 (Tonnes & %)	71
	Forecast Patterns of TDI/MDI Usage in Moulded Automotive Seat Foam in East Asia, 2014 (Tonnes & %)	71
	Major Automotive Seating Manufacturers in East Asia, 2009	77
	Producers of Integral Skin Foam Components for Automotive & Furniture Applications in East Asia, 2009	78
	Producers of Semi-Rigid Foam in East Asia, 2009	79
	Major Producers of Moulded Foam Components for Automotive Industry and Furniture in East Asia, 2009	79
4.2	RIGID FOAM	80
	Total Production of Rigid Foam in East Asia by Product Type and Country, 2009 (Tonnes)	80
	Forecast Production of Rigid Foam in East Asia by Product Type and Country, 2014 (Tonnes)	80
	Growth in Rigid Foam Production in East Asia by Type and Country, 2009-2014 (% Growth p.a.)	81
	Major Producers of Rigid PU Sandwich Panels in East Asia, 2009	84
	Capacity and Production of Major Continuous Sandwich Panel Manufacturers in China, 2009 (m ²)	85
	Major Manufacturers of Domestic Refrigerators & Freezers in East Asia, 2009	89
	Leading Manufacturers of Commercial Refrigerators, Freezers and Chillers in East Asia, 2009	89
	Major Producers of Rigid Sprayed Foam Products in East Asia, 2009	93
	Major Producers of Pipe-in-pipe Insulation/Pre-insulated Pipe in East Asia, 2009	96
	Major Producers of Rigid Foam Slabstock in East Asia, 2009	98
4.3	COATINGS	99
	PU Coatings Production and Growth in East Asia, 2003– 2009 (Tonnes)	99
	Total Production of PU Coatings in East Asia by Type & Country, 2009 (Tonnes)	99
	Forecast Production of PU Coatings in East Asia by Type & Country, 2014 (Tonnes)	100
	Growth in PU Coating Production in East Asia by Type & Country, 2009-2014 (% Growth p.a.)	100
	Major Producers of PU Coatings in East Asia, 2009	111
4.4	ADHESIVES & SEALANTS	112
	Production of PU Adhesives & Sealants in East Asia by Country, 2009 (Tonnes)	112
	Forecast Production of PU Adhesives & Sealants in East Asia by Country, 2014 (Tonnes)	112
	Growth in PU Adhesive & Sealant Production in East Asia by Country, 2009-2014 (% Growth p.a.)	112
	Major Producers of Adhesives and Sealants in East Asia, 2009	117
4.5	ELASTOMERS	118
	Production of PU Elastomers in East Asia by Product & Country, 2009 (Tonnes)	118
	Forecast Production of PU Elastomers in East Asia by Product & Country, 2014 (Tonnes)	119
	Growth in PU Elastomer Production in East Asia by Product & Country, 2009-2014 (% Growth p.a.)	119
	Major Cast Elastomer Suppliers in East Asia, 2009	124
	Major RIM/RRIM Suppliers in East Asia, 2009	124
	Major Thermoplastic Polyurethane Elastomer Suppliers in East Asia by Country, 2009	125
	Capacity of Major Thermoplastic Polyurethane Producers in East Asia, 2009 (Tonnes)	126
	Major Elastomeric Fibre Producers in East Asia by Country, 2009 (Tonnes)	128
	Capacity of Major Elastomeric Fibre Producers in East Asia, 2009 (Tonnes)	129
	Major Producers of Microcellular Elastomers for Footwear in East Asia, 2009	133
	Capacity of Major PU System Suppliers for Footwear in East Asia, 2009 (Tonnes pa)	134
	Manufacturers of Technical Polyurethane Elastomers in East Asia, 2009	135
	Major Producers of PU Synthetic Leather in East Asia, 2009	137
	Capacity of Major PU System Suppliers for Synthetic Leathers in East Asia, 2009 (Tonnes pa)	138
5.	MAJOR END-USE MARKETS FOR POLYURETHANE	139
5.1	BUILDING & CONSTRUCTION	139
	Production of Polyurethane Construction Materials in East Asia by Type, 2009 & 2014 (Tonnes & % Growth pa)	140
	Production of PU Foam for Sandwich Panels for Construction Applications in East Asia, 2009-2014 (Tonnes & % Growth pa)	140

	Production of Sprayed PU Foam for the Construction Industry in East Asia, 2009-2014 (Tonnes & % Growth pa)	141
	Production of OCF for Construction Applications in East Asia, 2009-2014 (Tonnes & % Growth pa)	142
	Production of Slabstock Foams for Construction Applications in East Asia, 2009-2014 (Tonnes & % Growth pa)	143
	Production of PU Floor Coatings in East Asia, 2009-2014 (Tonnes & % Growth pa)	144
	Production of PU Waterproof Coatings in East Asia, 2009-2014 (Tonnes & % Growth pa)	144
	Production of PU Adhesives for Construction Applications in East Asia, 2009-2014 (Tonnes & % Growth pa)	145
	Production of PU Sealants for Construction Applications in East Asia, 2009-2014 (Tonnes & % Growth pa)	145
5.2	AUTOMOTIVE	150
	Total Vehicle Production in East Asia by Country, 2009 (Units)	150
	Forecast Total Vehicle Production in East Asia by Country, 2014 (Units)	151
	Production of Motorcycles in East Asia, 2009-2014 (Units)	151
	Leading Vehicle Manufacturers in East Asia, 2009	152
	Leading Motorcycle Manufacturers in East Asia, 2009	152
	Production of Polyurethane for the Automotive Industry in East Asia, 2009-2014 (Tonnes & % Growth pa)	153
	Production of PU Moulded Foam for Transport Seating in East Asia by Country, 2009-2014 (Tonnes & % Growth pa)	154
	Major Automotive Seating Manufacturers in East Asia, 2009	154
	Production of Automotive Semi-Rigid PU Foam in East Asia by Country, 2009-2014 (Tonnes & % Growth pa)	155
	Manufacturers of Instrument Panels in East Asia, 2009	156
	Production of Automotive Integral Skin PU Foam in East Asia by Country, 2009-2014 (Tonnes & % Growth pa)	156
	Manufacturers of Steering Wheels in East Asia, 2009	157
	Production of Automotive Acoustic Insulation in East Asia by Country, 2009-2014 (Tonnes & % Growth pa)	158
5.3	REFRIGERATION	162
	Estimated Production of Refrigerators and Freezers in East Asia, 2009-2014 (Units & % Growth pa)	163
	Estimated Production of Commercial Refrigerators and Freezers in East Asia, 2009-2014 (Units & % Growth pa)	163
	Estimated Production of Refrigerated Containers in East Asia, 2009-2014 (TEU)	164
	Production of Refrigerated Vehicles in East Asia, 2009-2014 (Units)	164
	Production of PU Rigid Foam for the Manufacture of Commercial Refrigerators & Freezers in East Asia, 2009-2014 (Tonnes & % Growth pa)	165
	Production of PU Rigid Foam for Sandwich Panels used in Refrigerated Transportation and Cold Storage in East Asia, 2009-2014 (Tonnes & % Growth pa)	166
5.4	FOOTWEAR	170
	Footwear Production in East Asia, 2009-2014 (Million Pairs & % Growth pa)	170
	Production of PU Microcellular Elastomers for Shoe Soles in East Asia, 2009-2014 (Tonnes)	171
	Production of Major PU System Suppliers for Footwear in East Asia, 2009 (Tonnes)	172
	Production of Major Synthetic Leather Resin Manufacturers in East Asia, 2009 (Tonnes)	173
5.5	FURNITURE AND BEDDING	176
	Production of PU Flexible Slabstock for Furniture & Bedding in East Asia, 2009-2014 (Tonnes & % Growth pa)	176
	Production of PU Flexible Moulded Foam for Furniture & Bedding in East Asia, 2009-2014 (Tonnes & % Growth pa)	177
6.	DIRECTORY OF RAW MATERIAL SUPPLIERS	183
6.1	MANUFACTURERS OF ISOCYANATES	183
6.2	LEADING MANUFACTURERS OF POLYOLS	185
7.	SOURCES OF INFORMATION	193
7.1	CHEMICALS AND PLASTICS ASSOCIATIONS	193
7.2	PAINTS & COATINGS ASSOCIATIONS	194
7.3	ADHESIVES & SEALANTS ASSOCIATIONS	195
7.4	FOOTWEAR INDUSTRY ASSOCIATIONS	196
7.5	AUTOMOTIVE INDUSTRY ASSOCIATIONS	196
7.6	REFRIGERATION INDUSTRY ASSOCIATIONS	197
7.7	CONSTRUCTION INDUSTRY ASSOCIATIONS	198
7.8	FURNITURE AND BEDDING INDUSTRY ASSOCIATIONS	199