



# FACTSHEET

SOCIO-ECONOMIC STUDY OF THE EUROPEAN  
POLYURETHANES INDUSTRY BASED ON ALIPHATIC  
DIISOCYANATES

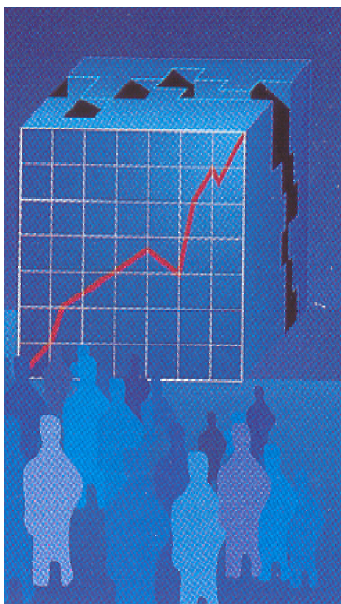
## INTRODUCTION

This publication summarises the value of the polyurethanes industry, based on aliphatic diisocyanates, to the European economy. The data contained in it has been produced by an independent consultant during 2005 looking back at the status of the industry in 2004.

This project was commissioned by ALIPA so that it could communicate the contribution of the industry to a range of stakeholders. The consultant's brief included the investigation of the industry along the entire value chain from the chemicals suppliers to their direct customers and then to the final producers of consumer goods. In addition, the study includes the associated but indirect industry including service providers such as the logistics and maintenance companies.



## SUMMARY



This publication shows that, starting from a modest number of chemical suppliers, a vast range of European industry is served and it, in turn, provides essential goods and articles for consumers in Europe and, through exports, to consumers further afield. The aliphatic diisocyanates industry serves six major sectors and information is given for each of these.

Summarising the key parameters for the industry value chain based on aliphatic diisocyanates

- Directly involves about 87,000 companies
- Employs nearly 400,000 workers
- Generates a market value of nearly €8 billion.

In addition, the associated but indirect activities involve more than 90,000 companies employing about 380,000 people.

It is important to note that the majority of companies in the polyurethane industry are small and medium-sized enterprises (SMEs).

Aliphatic isocyanates are used to produce polyurethane materials which are widely used in coatings, adhesives & sealants, elastomers and other applications such as leather finishing formulations, textile & fibre treatments, inks and optical.

Polyurethane based on aliphatic isocyanates show exceptional durability and UV-light stability, chemical and mechanical performances which couldn't be achieved otherwise.

In addition to the continuous search of enhanced performances, the producers of aliphatic isocyanates focus on designing products which have less effect on the environment and are safer to use by reducing free monomer content in the formulations, designing low viscosity polyisocyanates (for VOC reduction) and developing water-based materials.

A summary of the key parameters for each stage in the value chain is given in the table below:

	<b>Raw Material Producers</b>	<b>Formulation Manufacturers</b>	<b>End Users</b>	<b>Indirect</b>	<b>Totals*</b>
Companies	<b>4</b>	<b>1,460</b>	<b>86,950</b>	<b>90,300</b>	<b>180,000</b>
Workers	<b>2,200</b>	<b>27,600</b>	<b>394,800</b>	<b>376,200</b>	<b>800,000</b>
Workers per Company	<b>550</b>	<b>18</b>	<b>4.5</b>	<b>4</b>	<b>4.5</b>

The market value of the formulations is nearly €8 billion and the volume is 950ktons. The value of exports of formulations from the EU is €2 billion.

*\* Note that the data in the "Totals" column (or row) in this and subsequent tables have been rounded to two significant figures for ease of use.*

## A NOTE ON ALIPA

ALIPA, the European Aliphatic Isocyanates Producers Association, has been founded by the major European producers of aliphatic isocyanates and polyisocyanates.

The main objective of ALIPA is to encourage the safe and proper use of aliphatic isocyanates by providing information about aliphatic isocyanates and their related products and applications.

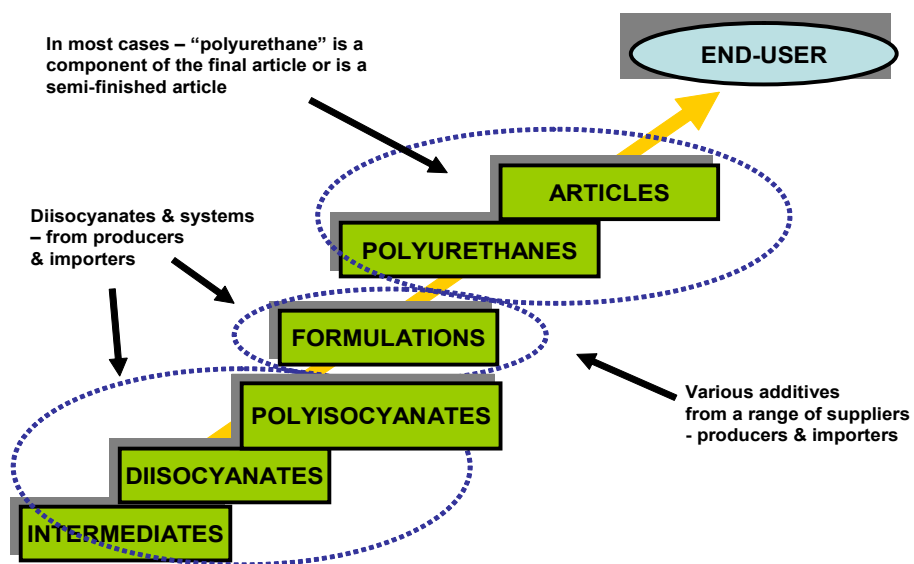
Main objectives of ALIPA are:

- To maintain and improve a high level of technical understanding by identifying and initiating appropriate toxicological, environmental and other work programs;
- To monitor and support legislative developments in the areas of health, safety and environment relevant for the industry working with aliphatic isocyanates;
- To develop and communicate common industry positions to relevant audiences such as regulators, opinion leaders and the general public;
- To cooperate with other relevant industry organisations.

ALIPA is a sector group of CEFIC (European Chemical Industry Council) and the members are BASF, Bayer MaterialScience, Degussa and Rhodia Operations.

## THE CHEMICAL PRODUCERS

### VALUE CHAIN



The aliphatic diisocyanate industry produces a range of intermediate chemicals which are used in a wide variety of applications in industry. The demand for these products creates jobs and generates wealth along the whole value chain. ALIPA has commissioned independent specialists to research the value chain starting from aliphatic isocyanates and generate data on jobs, wealth generation, the number of companies involved and their size distributions.

	Raw Material Producers
Companies	4
Workers	2,200
Workers per Company	550
Market Value (€M)	400
Tons of product ('000)	68
Exports (€M)	167

## END USE SECTOR SUMMARY

The table below summarises the key socio-economic information for the EU industry sectors supplied by the aliphatic diisocyanate suppliers.

	<b>Isocyanate Raw Materials (k Tons)</b>	<b>Formulation (k Tons)</b>	<b>Formulators – Number Of Companies</b>	<b>Downstream Market Value (€M)</b>	<b>Users – Number Of Companies</b>
<b>Coatings</b>					
Auto / Transportation	24.7	286	225	4,004	58,000
General Industrial	12.5	182	330	1,016	6,700
Materials (non-metallic)	13.4	250	280	1,550	9,500
<b>Total Coatings</b>	<b>51</b>	<b>720</b>	<b>840</b>	<b>6,600</b>	<b>74,000</b>
<b>Adhesives</b>	<b>6</b>	<b>130</b>	<b>330</b>	<b>640</b>	<b>5,800</b>
<b>Elastomers</b>	<b>7</b>	<b>57</b>	<b>140</b>	<b>500</b>	<b>2,200</b>
<b>Others</b>	<b>3.5</b>	<b>42</b>	<b>160</b>	<b>260</b>	<b>5,000</b>
<b>Totals</b>	<b>67</b>	<b>950</b>	<b>1,500</b>	<b>8,000</b>	<b>87,000</b>

The following pages focus on the socio-economic information for the six main end-use sectors.

## **SECTOR SNAPSHOT – AUTO /TRANSPORTATION COATINGS**

A very large proportion of the articles, structures and manufactured goods that we meet in our daily life are coated. Polyurethanes are present in most of the high quality, long lasting coatings used in a wide number of applications such as:



- Automotive Coatings, applied both as original equipment (OEM) and in car repair. Transportation applications such as aerospace, railway equipment, trucks and buses.
- Agricultural, construction and earth moving machinery.
- Plastic articles and components: bumpers, wheel covers, rear mirrors, door handles.

The **main benefits** given by aliphatic isocyanates based polyurethane coatings are:



- UV and weathering resistance: exceptional gloss retention and non-yellowing, even after a very long exposure time;
- excellent balance between hardness and flexibility;
- outstanding chemical resistance, particularly important in coatings for aircraft where very aggressive hydraulic fluid is used

Therefore, polyurethane-based coatings are used to answer to the highest requirements in terms of chemical and technical performance.

	<b>Chemical Producers</b>	<b>Formulation Manufacturers</b>	<b>End-Use Applicators</b>	<b>Indirect Industry</b>	<b>Total Industry</b>
Number of companies	<b>4</b>	<b>225</b>	<b>57,850</b>	<b>12,600</b>	<b>71,000</b>
% which are SMEs	<b>0</b>	<b>95</b>	<b>≈100</b>	<b>≈100</b>	<b>≈100</b>
Total Number of Workers		<b>5,000</b>	<b>271,000</b>	<b>83,400</b>	<b>360,000</b>
Average Number per Company	<b>All Segments</b>	<b>22</b>		<b>7</b>	<b>5</b>

The market of the formulations used in this sector is more than €4 billion and the volume is nearly 300,000 tons.

## **SECTOR SNAPSHOT – GENERAL INDUSTRIAL COATING**

A very large proportion of the articles, structures and manufactured goods that we meet in our daily life are coated. Polyurethanes are present in most of the high quality, long lasting coatings used in a wide number of applications such as:

- Maintenance & Protection Coatings: heavy industry anticorrosion (metallic structures), high performance decorative finishes.
- Marine: superstructure, topsides and decks of ships and yachts.
- Coil & Can Coatings: buildings (cladding and roofing), appliances, transport, packaging.
- General Industry: metal office furniture



The **main benefits** given by aliphatic isocyanates based polyurethane coatings are:

- UV and weathering resistance: exceptional gloss retention and non-yellowing, even after a very long exposure time;
- excellent balance between hardness and flexibility: this property is especially of interest to achieve the extreme flexibility necessary in Coil applications where coated steel is embossed to obtain complex shapes;

Therefore, polyurethane-based coatings are used to answer to the highest requirements in terms of chemical and technical performance.

	<b>Chemical Producers</b>	<b>Formulation Manufacturers</b>	<b>End-Use Applicators</b>	<b>Indirect Industry</b>	<b>Total Industry</b>
Number of companies	<b>4</b>	<b>330</b>	<b>6,700</b>	<b>18,900</b>	<b>26,000</b>
% which are SMEs	<b>0</b>	<b>95</b>	<b>≈100</b>	<b>≈100</b>	<b>≈100</b>
Total Number of Workers	<b>Common to All Segments</b>	<b>6,200</b>	<b>40,000</b>	<b>92,400</b>	<b>140,000</b>
Average Number per Company		<b>19</b>	<b>6</b>	<b>5</b>	<b>5</b>

The market of the formulations used in this sector is about €1 billion and the volume is over 180,000 tons.

## **SECTOR SNAPSHOT – MATERIALS (NON-METALLIC) COATINGS**

Plastic articles and components: phones, computers, skis, hi-fi equipment, kitchen ware.

Wood Coatings: parquet flooring, heavy duty and high quality furniture for kitchen, school, counters.



The **main benefits** given by aliphatic isocyanates based polyurethane coatings, in this end use sector, are their UV and weathering resistance: exceptional gloss retention and non-yellowing, even after a very long exposure time.

	<b>Chemical Producers</b>	<b>Formulation Manufacturers</b>	<b>End-Use Applicators</b>	<b>Indirect Industry</b>	<b>Total Industry</b>
Number of companies	<b>4</b>	<b>280</b>	<b>9,500</b>	<b>23,500</b>	<b>33,000</b>
% which are SMEs	<b>0</b>	<b>95</b>	<b>≈100</b>	<b>≈100</b>	<b>≈100</b>
Total Number of Workers	<b>Common to All Segments</b>	<b>5,250</b>	<b>36,500</b>	<b>83,500</b>	<b>125,000</b>
Average Number per Company		<b>19</b>	<b>4</b>	<b>4</b>	<b>4</b>

The market of the formulations used in this sector is more than €1.5 billion and the volume is 250,000 tons.



## **SECTOR SNAPSHOT – ADHESIVES & SEALANTS**

Adhesives are indispensable for manufacture of many daily life products, and aliphatic isocyanate-based raw materials help adhesives to meet high demands.

Derivatives of aliphatic isocyanate are usually used as crosslinkers for 2 packs adhesives. Furthermore, aliphatic isocyanate monomers are employed to make urethane based polymers which can be formulated in hot-melt, heat-activated or contact adhesives. The main applications are: wood on wood, PVC lamination on wood, automotive, footwear and construction. The benefits are mainly to improve heat resistance and to achieve a better resistance to moisture and water, as well as a better adhesion on fat or oily substrates.



Aliphatic isocyanate based raw materials are also used in sealants for applications in the construction industry. Durability, resistance and stability, also in critical areas, are the key specifications for these products.

	<b>Chemical Producers</b>	<b>Formulation Manufacturers</b>	<b>End-Use Applicators</b>	<b>Indirect Industry</b>	<b>Total Industry</b>
Number of companies	<b>4</b>	<b>325</b>	<b>5,800</b>	<b>16,500</b>	<b>22,000</b>
% which are SMEs	<b>0</b>	<b>95</b>	<b>≈100</b>	<b>≈100</b>	<b>≈100</b>
Total Number of Workers	<b>Common to All Segments</b>	<b>4,650</b>	<b>20,400</b>	<b>50,100</b>	<b>75,000</b>
Average Number per Company		<b>14</b>	<b>4</b>	<b>3</b>	<b>3</b>

The market of the formulations used in this sector is more than €630 million and the volume is nearly 130,000 tons.

## SECTOR SNAPSHOT – ELASTOMERS



Aliphatic isocyanates are also base materials for polyurethane elastomers. These high-quality engineering materials are used e.g. for rollers and belts and in a manifold of applications where high load-bearing capacity, durability, elasticity and chemical resistance are required.



	<b>Chemical Producers</b>	<b>Formulation Manufacturers</b>	<b>End-Use Applicators</b>	<b>Indirect Industry</b>	<b>Total Industry</b>
Number of companies	<b>4</b>	<b>140</b>	<b>2,200</b>	<b>6,800</b>	<b>9,100</b>
% which are SMEs	<b>0</b>	<b>95</b>	<b>≈100</b>	<b>≈100</b>	<b>≈100</b>
Total Number of Workers	<b>Common to All Segments</b>	<b>3,000</b>	<b>8,900</b>	<b>23,800</b>	<b>36,000</b>
Average Number per Company		<b>21</b>	<b>4</b>	<b>3</b>	<b>4</b>

The market of the formulations used in this sector is nearly €500 million and the volume is over 50,000 tons.

## **SECTOR SNAPSHOT – OTHER APPLICATIONS**

Some other applications: Leather finishing formulations, Textile & Fibre treatments, Inks, Optical and other special applications also use aliphatic isocyanates in order to mainly provide protection and durability.



	<b>Chemical Producers</b>	<b>Formulation Manufacturers</b>	<b>End-Use Applicators</b>	<b>Indirect Industry</b>	<b>Total Industry</b>
Number of companies	<b>4</b>	<b>160</b>	<b>5,000</b>	<b>12,000</b>	<b>17,000</b>
% which are SMEs	<b>0</b>	<b>95</b>	<b>≈100</b>	<b>≈100</b>	<b>≈100</b>
Total Number of Workers	<b>Common to All Segments</b>	<b>3,500</b>	<b>18,000</b>	<b>43,000</b>	<b>65,000</b>
Average Number per Company		<b>22</b>	<b>4</b>	<b>4</b>	<b>4</b>

The market of the formulations used in this sector is more than €250 million and the volume is over 40,000 tons.



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