

Polyurethane Foam

Liquid CO₂ alternative blowing agent

Reference Installation

Equipment: **Liquid CO₂ pump system for foaming processes**
 Customer: **Dunlopillo, France**

Polyurethane foams

In the production of polyurethane foams, the ozone depleting substances have been used as secondary blowing agents during many years.

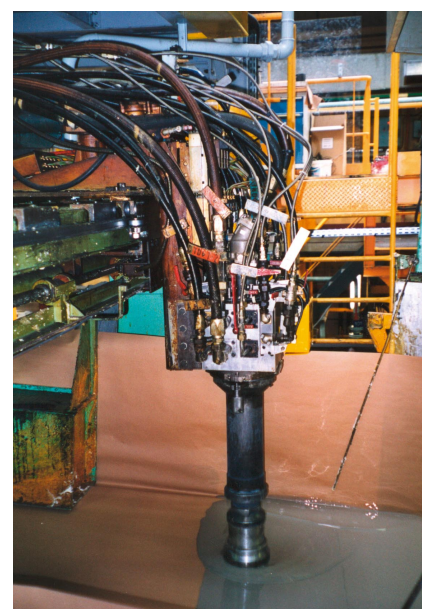
The environmental legislation forces producers to use more environmentally friendly substitutes. Even fluorinated hydrocarbons, which have been used during the last years as substitutes are going to be successively phased out.

Since carbon dioxide is produced by the reaction of water and isocyanate in the polyurethane reaction, it seems to be one of the best choices as an alternative blowing agent. Carbon dioxide used as a blowing agent is a by-product of other manufacturing processes and therefore, it has no impact on the global carbon dioxide concentrations.

The carbon dioxide technology developed during last years fulfils technical requirements on the high quality foams. Foams of lighter densities with more uniform cell structure can be produced.

The technology guarantees homogenous liquid, without any formation of gas as the temperature and pressure are carefully controlled from the feed line, through the pumps, the mixing head and into the pouring nozzle.

The carbon dioxide technology fulfils also the environmental requirements with regard to ecological aspects.



High pressure mixing unit

Dunlopillo plant in France

Dunlopillo is one of the biggest producers of polyurethane slabstock foams for furniture, bedding and automotive industry.

“Until last year the company used only methylene chloride as a blowing agent for production of foams confined to densities above 30 kg/m³.

Recently, the main part of foam is produced on CarDio installation and we get results with densities as low as 19 kg/m³” – says Mr. Cottenceau, technical manager at Dunlopillo.

Today the company is producing low density foams, from 21 kg/m³. We are using the same foaming machine. It has been retrofitted with the CarDio high-pressure mixing unit suitable for carbon dioxide technology. In this equipment, all chemical components and additives are mixed under sufficient pressure to keep the carbon dioxide fully dissolved in the liquid reactants.

"Carbon dioxide technology gives us more flexibility and a lot of savings. We can produce different foam grades of lower densities, which satisfies our customers. At the same time our consumption of isocyanate has been reduced. Also the amount of foam scrap produced in CO₂ technology gives a lot of savings", says Mr. Cottencaeu.

Carbon dioxide supply solution

The most critical parameter in PUR foam production is the ability to supply CO₂ to the mixing head in liquid form and at high pressure.

This has been solved by installing a well-insulated liquid CO₂ storage tank with a cooling unit and a recycling pump system, which allows continuous supply of liquid CO₂ to the metering pump of foaming equipment.

The system has been on stream since August 1999, performing very well and the Dunlopillo management is very satisfied with the CO₂ technology. The production of low density foams is growing very fast.



Liquid CO₂ pump system

Technical data CO₂ pump system, type CFA5-18 II

Medium:	Liquid carbon dioxide
Temperature:	-20 °C
Pump:	3 piston pump
Input pressure:	16 – 18 bar
Pump capacity:	15 kg/min
System pressure:	45 bar
Valves:	high-grade steel
Motor:	4 kW
Voltage:	400V/50 Hz

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