A060 - DOSAGE DE CO2 SUPERCRITIQUE POUR LA MOUSSE DE POLYSTYRÈNE EXTRUDÉE

APPLICATION NOTE A060-CM06

LIQUID CO2 DOSING FOR POLYSTYRENE FOAM EXTRUSION

Extrusion is an effective technique to manufacture products with a uniform, even complex cross section. The basics of this technique are simple: heat the to-be-extruded material until it can deform somewhat, and force this material to flow through a mould or extrusion head with the desired cross section and shape.

Extrusion of dense polymers results in dense products. However, incorporating a blowing agent in the process will add porosity to the products, leading to low-density and sometimes with excellent acoustic or thermal isolation properties. Non-flammable, non-toxic and cost-efficient chemically inert liquid CO_2 is one of the blowing agents that are used. A needle valve was used in the original setup to dose liquid CO_2 to the extruder. However, the stability of this kind of dosing was poor, and often lead to production breaks. A supplier of Bronkhorst equipment was requested to realise a better solution.



Polystyrene foam

Application requirements

To obtain a uniform polystyrene foam structure, accurate dosing of the liquid carbon dioxide in the presence of a fluctuating extruder pressure is essential. The extrusion process should be continuous - so without production breaks - and stable.

Important topics

- Stable extrusion process
- Very few production breaks

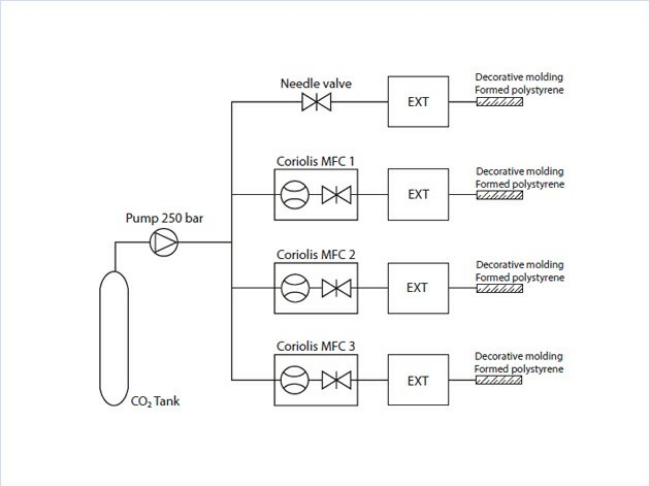
Process solution

An M14 mini CORI-FLOW Coriolis mass flow meter combined with a Badger valve is the solution here.

By compressing gaseous carbon dioxide at room temperature to more than 50 bars, it becomes a liquid. In the present application, the maximum applied pressure is even 250 bars, and the dosing equipment should be able to handle this pressure. The M14 mini CORI-FLOW mass flow meter/controller is capable of that, and doses 4 to 50 grams liquid carbon dioxide to the extruder, independent of the extruder pressure.

The Badger valve, which is positioned downstream of the M14, is pneumatically controlled. Liquid carbon dioxide expands to its gaseous form when subjected to a lower pressure near the extruder. For this evaporation the carbon dioxide requires heat, which it extracts from the surrounding that cools down. Kalrez seals can not handle the low temperature that is associated with this expansion, so teflon seals are used in the badger valve for this application. Using this flow controller/Badger valve setup, the manufacturer of the decorative polystyrene foam parts has been able to produce several weeks continuously, so the number of production breaks has decreased drastically.

As the customer is satisfied, he decided to order two more of these liquid carbon dioxide dosing systems for the other extrusion production lines.



Flow scheme

Recommended Products



MINI CORI-FLOW™ MXX

Débit min. 0,05…5 ml/h
Débit max. 3…300 l/h

Pression jusqu'à 200 bar

Temps de réponse rapide

Grande précision



EL-PRESS P-502C

Pression min. 2...100 mbar
Pression max. 1,28...64 bar

Pression absolue ou relative

Grande précision



IN-FLOW F-110CI

Débit min. 0,014…0,7 mln/min, débit max. 0,06…9 mln/min

Pression 100 bar

Conception compacte, IP65

Grande précision

BRONKHORST (SCHWEIZ) AG

Gewerbestrasse 7

4147 Aesch BL (CH)

Tel. +41 617159070

info@bronkhorst.ch