

Design of a moisture reduction unit for minimizing the drying time of foam blocks

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Bachelor programme of Electromechanical Engineering Technology

SITUATION

Federal Eco Foam

This **bachelor thesis** is being conducted in collaboration with **Federal Eco Foam**, a recycling company located in Lommel. As a specialist in sustainable manufacturing, Federal Eco Foam transforms polyurethane waste into high-quality bonded foam products for the automotive, construction, and sports industries.



Fig. 1: Logo Federal Eco Foam [1]

PROBLEM DEFINITION

During the formation of the foam blocks, a large amount of **water residue** accumulates at the base, creating a "wet zone" that significantly **delays** the following processes. These subsequent stages, including precision cutting the blocks to size and necessary post-processing, are hindered by the uneven moisture distribution, which can also compromise the structural integrity of the material during handling

Project goal

This project involves designing a machine to **extract excess water** from foam blocks, lowering their internal humidity. This efficiency ensures the blocks dry faster and spend significantly less time in storage.

DESIGN

Vacuum chamber

To rapidly remove moisture from the steam-injected foam blocks (70°C), the system utilizes vacuum pressure to lower the boiling point of water.

- **Liquid Ring Vacuum Pump:** Specifically selected to handle high volumes of water vapor and saturated air without loss of performance.
- **Efficient Evaporation:** By reducing pressure, moisture evaporates at a lower temperature, ensuring the block dries from the core within 6 minutes.
- **Dovetail Sealing:** A 6-meter EPDM dovetail O-ring ensures a leak-tight, steam-resistant seal for the 316L stainless steel tunnel.



Transport & handling

- Transporting & buffering
- Chain driven conveyor rollers
- Two lanes to divide the load

Augmented Reality Vuforia View (app)



OBJECTIVES

Process requirements

- Lower internal humidity 
- Max. size of block: 205cm x 255cm x 76cm 
- Max. weight of block: 420 kg 
- Include a buffer 
- Capacity: 9 blocks per hour 
- Process runs 24/7 
- Electrical power source: 400V 50Hz 

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[1] Federal Eco Foam. [Online]. Available: <https://www.federalectofoam.com/en/>. [Consulted 2 Mai 2026].