

Drying of Grain Legumes – Small Batches up to 5t

Graduate



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Objective: Small batches of cereals and grain legumes (pulses) up to five tons fall below the typical minimum intake quantities of industrial plants. For these amounts, standardized and affordable drying systems are currently lacking. Therefore a high entry barrier is in place that prevents many farms from diversifying their crop rotations. The aim is thus to design a technically simple, cost-effective, and flexible system that can reliably process different small batches directly after harvest. A key requirement is uniform airflow through the bulk material to prevent moisture pockets and mold formation. The goal of this work is the design of the necessary airflow system for that.

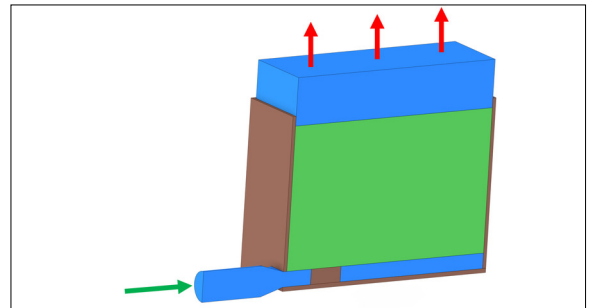
Approach: To develop a suitable airflow design, numerous variants were created and compared. In addition, relevant bulk parameters were determined experimentally. Based on this, extensive flow simulations were carried out and complemented by coupled thermal simulations in order to account for the influence of temperature control on the drying process.

Result: The best result was achieved with the concept of ground pressure ventilation. In this process, air is fed into a subfloor equipped with specially designed flow control elements. From there, the air is forced upwards through the fill. The present design made it possible to achieve uniform flow with moderate pressure losses. The previously developed concept is now being implemented in a real test setup and tested for its practical suitability by means of test measurements. This enables a cost-effective solution with low application effort for drying small harvest quantities.

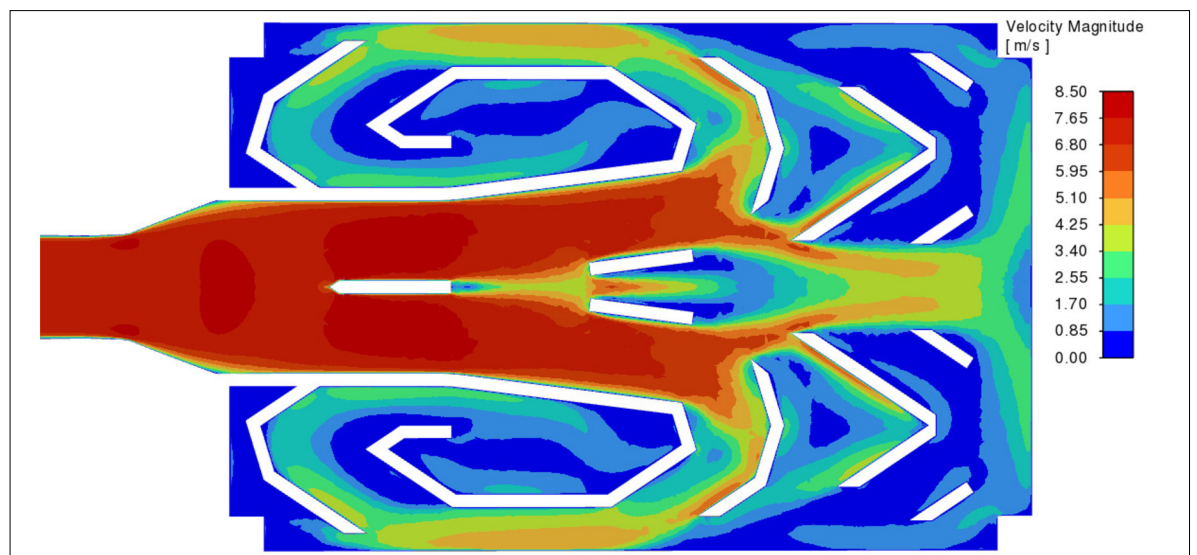
Grain legumes processed in the system
Own presentation



Drying system – functional principle (half view)
Own presentation



Airflow simulation, shown as velocity field [m/s]
Own presentation



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Subject Area
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