

Soybean toasting plant

1 THE CASE

A **Croatian cattle farm** grows soybeans used to feed the animals. Aware of the fact that **the high quality of the meat is especially the result of what the animals eat**, as well as their care in general, the customer is interested in feeding them with soybean of his own production carefully following the entire production cycle.

Farms usually need to entrust the harvested soybeans to subcontractors for drying and toasting with three important consequences:

- The handling of the product in specialised facilities
- The cost required for this service
- Not knowing whether the dried/toasted soybean is what was actually submitted.

Therefore **higher quality meat can be obtained** when being able to follow the growth/fattening cycle of the animals with one's own soybean compared to that managed by others or purchased on the market. The **beef can be sold at a higher price** with the ensuing economical/financial return for the company.



Figure 1 -T20 gas-fired toasting system with chiller in work configuration

2 ADVANTAGES OF TOASTED SOYBEAN

The use of soybean for animal feed is constantly growing due to its high nutritional value mainly because of the amino-acids making up the protein. Aside from rare exceptions, the use of the raw seed is limited because of the presence of anti-nutritional factors (antitripsyn) which make it indigestible, and therefore unable to be assimilated, resulting in reduced body growth of the animal. This makes it important to point out that the toasting treatment eliminates this factor.

Soybean is extremely significant in animal nutrition due to its **very high concentration of proteins** which reaches between 40 and 50%.

Especially for ruminants, it has been proven that a diet based on toasted soybean reduces the degradability of the proteins in the first stomach, increasing the bypass proteins absorbed in the second stomach, thus transferring more proteins to the animal. This way protein supplements are no longer needed to compensate protein deficiency in the diet.

Using toasted soybean makes it possible to reduce the lipid quota, also improving the quality of the fat with a better balance between saturated and unsaturated fatty acids with the special advantage of reducing cholesterol.

It was also shown that introducing soybean into animal feed enhances the quality of the meat.

3 THE SOLUTION ADOPTED

The Customer currently has a barn mainly dedicated to stocking soybean and where he is evaluating how to insert the new toasting system.

It requires a system that produces approximately **2 ton/h** of processed and cooled soybean. This parameter will dimension the entire system and the T20 toaster model was chosen.

Aware of the fact that a smaller system could be sufficient to cover the farm's needs, he prefers **a more powerful system both to reduce processing times and to be able to offer the toasting service to third parties**, thus quickly recovering the costs of the system and diversifying farm activities.

Since the toasted soybean comes out of the toaster at temperatures between 115 and 125°C, it needs to be cooled immediately to avoid the risk of self-combustion. Therefore the T20 toaster is **coupled to a 2-cell continuous chiller**.

The system features **augers with a nominal flow rate of 5 ton/h** to convey the soybean from the warehouse to the toaster, from the toaster to the chiller and from the chiller to the warehouse.

For space and safety-related issues, **the system is installed outside adjacent to the wall** of the storage site and the customer protects it with **a roof**. The overall size of the system is approximately 10m x 4m.

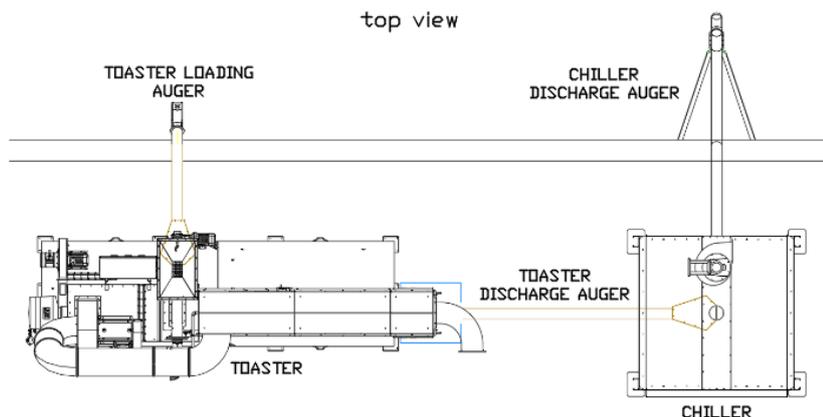


Figure 2 – Top view of the system

The customer has also chosen a **gas-fired heating system** instead of diesel oil mainly due to the **lower supply cost**, and because **gas combustion is cleaner** than diesel oil.

The entire system is controlled automatically by the toaster's electric panel and by a system of sensors which constantly monitor the main operating parameters, including:

- Air and soybean **operating temperature**
- **Filling level** of the toaster and of the chiller
- Blockage of the conveyor belt
- Motor overload

The entire system was designed, built and tested at Mecmar before delivery to reduce the installation and fine-tuning times at the customer's premises as much as possible.