

Environmental protection and resource efficiency by utilization of rice straw for the MDF production

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Abstract

Panel producers and the wood-based panel industry are facing far-reaching change processes: What will the board of the future look like if you think ahead to the challenges that limited resources and climate protection create? To what extent do annual plants open up alternatives? Together with the American company CalAg, LLC/CalPlant I, LLC, Siempelkamp has been breaking new ground for years - now research and development is followed by the first project.

A win-win situation in multiple ways is the contract Siempelkamp received in June 2017: The American CalPlant I, LLC ordered a production line for fiberboard from rice straw for the use of annual plants including a Generation 9 ContiRoll®.

This project is regarded as a milestone for the economic use of a raw material that would otherwise remain unused as a waste product: Rice straw is available in North America in very large quantities; in the USA approx. 10,000,000 metric tons of rice is cultivated annually. This makes the United States one of the 20 largest rice producers in the world. The main growing areas are in Arkansas, California, Louisiana, Texas and Mississippi.

Wet rice cultivation and the consequences: a process with many facets

In Northern California mainly classic wet rice is cultivated, which achieves premium qualities compared to those of sushi rice due to the optimal soil and weather conditions. This is also an advantage from a business point of view: while selling one ton of rice in standard quality yields approx. 100 dollars, the same quantity in sushi quality generates six times the sales amount!

Hence, insofar the best prospects for wet rice cultivation in California apply, if only the region would not be considered a water shortage area. California banned the burning of straw after the annual harvest. And due to continuing droughts, the administration of the West Coast state decided a few years ago to impose water-saving measures. These also had an impact on wet rice cultivation. The 4-month rice growing process is dependent on a constant flow of water: Fields are flooded before the rice can be planted. Later, the water is drained, the fields dry and the rice is harvested. After burning was banned, the common process is to chop the remaining straw and leave it in the fields. A second water filling is then required to allow the chopped straw to rot. However, during drought years this second water filling has been banned in California. In this respect, CalAG's focus was on exploring

other options in order to use the straw sensibly and adequately from the point of view of resource efficiency. The nearly year-round watering of the soil also has a negative effect on the earth's atmosphere: This creates an almost oxygen-free habitat for anaerobic methane producers.

On this basis, the vision was born to develop a plant for the use of annual rice straw, which was fed by numerous advantages. On the one hand, the raw material solves many of the problems caused by the shortage of wood, because many countries do not even have the amount of wood necessary for industrial use. On the other hand the use of rice straw in panel production considerably enhances the value of the raw material.

CalAg began its research and development of using rice straw as a raw material for the production of MDF in 1996; Siempelkamp began to assist their R&D effort in 2009. The project finally achieved financial closing in 2017 and the plant, which is the first of its kind, is expected to start up soon. Siempelkamp planned, designed and supplied the entire machine technology for the Willows, CA site - including commissioning. CalPlant CEO Jerry Uhlund announced that the plant will significantly reduce water consumption for flooding rice fields in the Sacramento Valley. The project will create 115 full-time and over 500 part-time jobs during the straw collection period.

Technological concept

The production process is comparable to that of traditional wood-based MDF production. The straw preparation, on the other hand, requires specific adjustments. The quality of the board is considered to be at least equivalent to that achieved with standard wood-based boards.

Latest resonance

In December, the Egyptian company Wood Technology Co. (WOTECH) placed a milestone project regarding "Green Technology" at Siempelkamp. Representatives of both companies signed the contract for an MDF plant with an annual production capacity of 205,000 m³ which will process Egyptian rice straw as raw material.

With this plant, WOTECH is positioning itself in the areas of environmental protection and resource efficiency, because the value-added use of rice straw opens up new perspectives for a raw material that would otherwise be burned as a waste product. The concept is also attractive for countries such as Egypt, which do not have sufficient wood resources for industrial use. WOTECH is the second customer after CalAg, LLC, California, to ask Siempelkamp for an MDF plant based on rice straw.