

# How Are Fiber Cement Panels Created?

The technical manager explains the production process.

At the start, train cars stand ready with cement and bales of fibers. A machine processes the mixture layer by layer into panels of the desired size and thickness. However, some specific production knowledge must be considered in the manufacture of the building material. Marco Ziethen, Swisspearl's head of production technology, explains.

Several factories in Switzerland, Austria, Germany, and Slovenia manufacture Swisspearl fiber cement products. Marco Ziethen, head of production technology, guides me through the plant in Niederurnen, which has been located here in the midst of the Swiss Alps for more than 100 years. His colleague Klemens Bösch joins us at times.

In 1901, Ludwig Hatschek patented his "Procedure for the manufacture of artificial stone plates from fibrous materials and hydraulic binding agents," and registered "Eternit" as a brand name. With this, he specified the mixture of cement and fibers as well as the production process using a rotating cylindrical sieve. The inventor's goal was to produce a light, durable building panel.

The products made by this process are weather-, corrosion-, frost-, and UV-resistant, rot- and fireproof, relatively light,

and mechanically processable. While the production process has basically remained the same, it is continually optimized; today, mostly for ecological reasons. More than 90 percent of the raw materials, primarily the cement, is delivered by train from the closest factory of Holcim (Switzerland) AG in Untervaz, and roughly one-third of the products are carried away by train. The engineers are proud of the closed water circuit with two wastewater treatment plants. Water and fresh "green" fibercement waste segments are directly returned back into the production process. The hard-aggregate waste can be recycled in the cement factory and remixed with the cement. Natural gas generates the production heat required for the paint and panel drying ovens. Since 2018, the factory

has been linked up with the district heating network; surplus heat from the nearby refuse incinerator is used to heat its production halls and warehouses.

Special customer wishes—which almost exclusively concern form, color, and format of the panels—are also taken into consideration; the team gladly complies after successful feasibility studies. However, long, elaborate tests forego any changes in the composition of the material as new materials might limit the panel's function, and must be newly licensed for export, which is tied with high costs and great effort. The production specialists rule out any compromises. Product quality has top priority.

*Michael Hanak*





Starting material:

## 1. What fibers are used to produce fiber cement panels?

The main raw materials are cement, synthetic fibers, pulp, and water; color pigments are added to that. Pulp is the term used for the fibrous mass that arises during the chemical decomposition of plant fibers, which is comprised primarily of cellulose.

After the danger of inhaling asbestos became known in the 1970s a broad research program was introduced in Niederurnen to find a replacement. The first trials and initial new production took place between 1981 and 1989. Since May 1, 1990, all products for building construction from the factories in Niederurnen and Payerne have been free of asbestos. The synthetic fibers (PVA), which provide reinforcement, are from Japan. The pulp is from various countries, including Austria.



Process fibers



Cement delivery



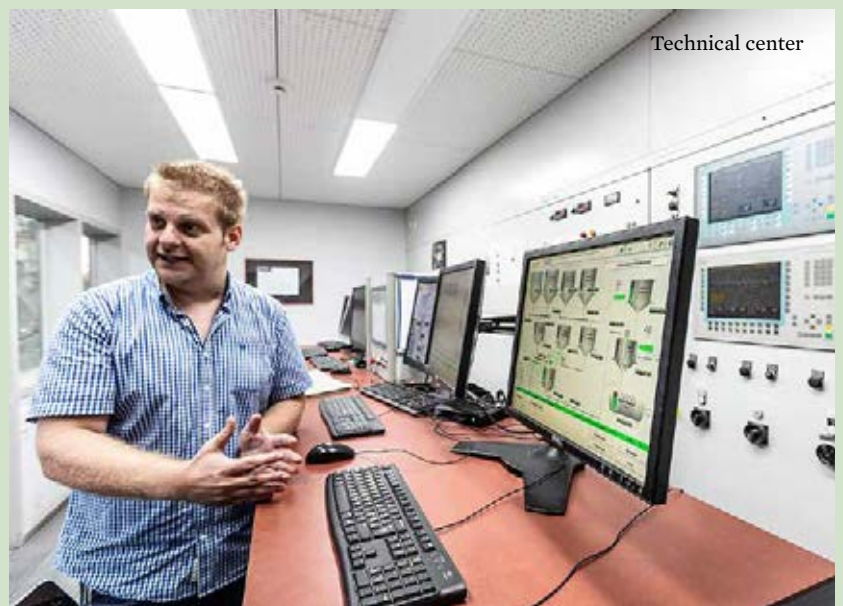


Synthetic fibers

Mixture

## 2. How and in what order are the starting materials processed and mixed?

First, bales of pulp are dissolved in water and milled to the desired fineness. This slurry is added to the pulp and synthetic fibers. The mixture is prepared in large vats in such a way that hydrogen bridges form during the chemical process, which hold the ingredients together. Finally, the cement is added in the intensive mixer. Now the setting process begins.



Technical center





Slurry





Format roll

Panel machines

### 3. How does the so-called panel machine work?

The panel machine, which was supplied by the swiss company Bell, is the heart of the production facility. Three cylindrical sieves rotate in the cement-fiber-water slurry. The rotation leads to the formation of a ca. 0.9-millimeter-thin layer, which is wound around the format roll as often as is required until the necessary thickness has been achieved. This process takes between 20 and 100 seconds, depending on the panel's dimension and format.

The diameter of the format roll determines the length of the panel, which achieves its raw format by means of an appropriate cutting blade. To produce a different format, these units have to be changed. Only experienced employees work on the panel machines. They control the measuring devices, but also use their eyes and hands.



Panel machine



Pressing and drying facility

#### 4. How are the raw panels dried?

First, the piled-up panels are pressed under a pressure of up to 10,000 tons with steel sheets as intermediary layers, in order to release the extra water. The water content of the panels thereby is reduced from 28 to 15 percent, and the panel density is increased.

The cement continues to harden by chemical reaction with water. Heat is released during this process. The material has enough time to hydrate and solidify. After three weeks of setting, the water content remains only at 7 to 8 percent, and the panels are ready for further processing. In a first step, the panels are dried in an oven. In contrast to autoclaved fiber cement, which is steam hardened in autoclaves, air-dried fiber cement is less porous and can be processed more easily.



Panel press



Transport of a stack





Drying oven

Coating plant

## 5. What colors can be applied?

A standard assortment of color shades is available, which covers most customer demands. On request, however, almost any color can be applied to the panels. The standard range includes glazes and opaque colors as well as the Carat family for which the colors are applied onto panels with molded-in color. The paints are poured or sprayed onto the panels. Reflex coating offers also an iridescent series of hues with a hammer blow effect. With the Avera range, introduced three years ago, no additional color pigments are used in the coating and thus Avera shows the mass-colored fiber cement in its most natural form.



Coating line



Cut and finish

## 6. What formats and surface finishes are possible?

The maximum standard format that we produce is  $3,070 \times 1,250$  millimeters. We are currently adapting to market demand and are increasing the standard panel width by 20 millimeters. There are five standard formats for large-format panels, from which all formats can then be cut. We are constantly in search of special surface finishes. Last year we introduced the Incora panel, which has marble granulate sprinkled in. This year, the Texial panels with a textile weave imprint are ready for production. Other exciting surface finishes are under development at the moment, but unfortunately, I'm not able to say anything about them yet.





# Recipe for Eternity

Natural raw materials and enduring ingenuity shape the recipe for success for our product, which has been manufactured for more than 100 years. Thanks to our firm's long tradition, experienced employees are able to use their expertise, precision, and craftsmanship to produce the well-known building material from the preprocessed raw materials. Cement, cellulose, and reinforcing fibers combined with water form a raw mass. This is ap-

plied layer by layer to panels of the desired size. Following that, the panels are pressed, dried, and finally, dyed and cut to order. Constant quality controls assure a consistent material composition and homogeneous surfaces. After all, what distinguishes fiber cement is its recognizable texture and its equally diverse and durable coatings.

Fiber cement consists of the following five main components:

