

CHOCO EASY® – Die Innovation in der Schokoladeherstellung

Together with a Brazilian chocolate producer, NETZSCH-Feinmahltechnik GmbH developed an innovative plant concept for the production of high quality chocolate, achieving taste comparable or exceeding commercially available products.

Today, many types, qualities, shapes and flavors of chocolate are available, like dark, milk and white chocolate. The ingredients for dark chocolate are simply sugar, cocoa butter and cocoa liquor, vanilla and an emulsifier are added. Milk chocolate contains the same ingredients plus milk powder and milk fat; white chocolate does not contain cocoa liquor, only cocoa butter.

A new plant concept for the production of all types of chocolate – depending on the ingredients – is presented in the following article.



Using standard raw materials readily available on the market, dark, milk and even white chocolate can be produced on the CHOCO EASY® quickly, cost-efficiently and consistently. With the compact module CHOCO EASY® 50, batches from 25 – 50 kg can be made in one shift, 3 – 6 tons per shift are possible with the current largest plant size. (see table 1)

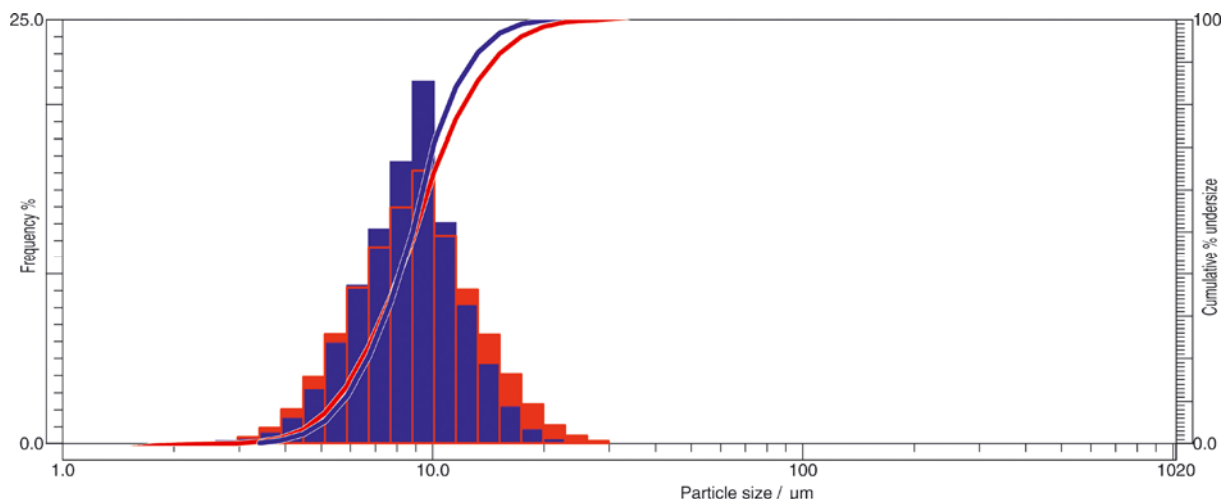
Table 1: Sizes and space requirement of the CHOCO EASY® plants

Type	Production capacity [kg/batch]	Space requirement [m ²]
CHOCO EASY® 50	25 – 50	approx. 2 – 4
CHOCO EASY® 300	150 – 300	approx. 4 – 6
CHOCO EASY® 750	375 – 750	approx. 40
CHOCO EASY® 1500	750 – 1500	approx. 60
CHOCO EASY® 3000	1500 – 3000	approx. 100
CHOCO EASY® 6000	3000 – 6000	approx. 120



Picture 1: Plant picture *CHOCO EASY*®

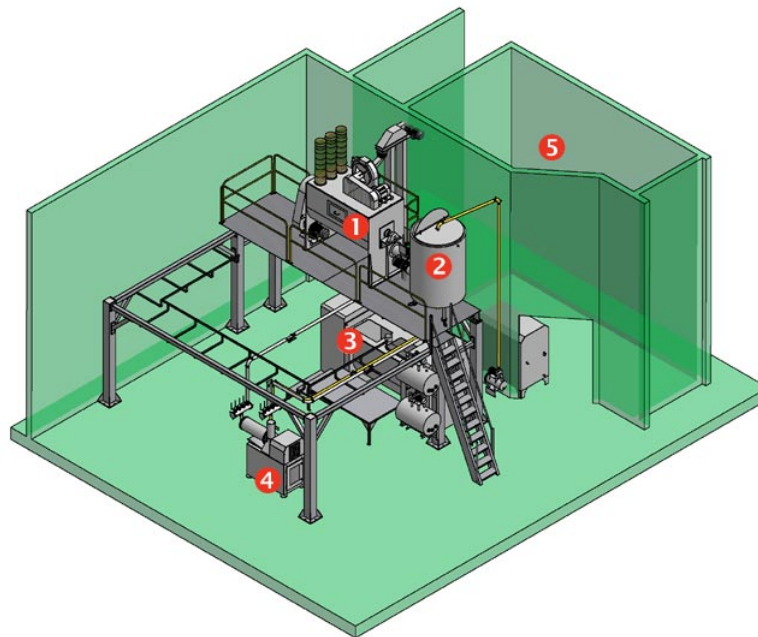
Starting from the raw materials, one can produce with this innovative plant all types of high quality chocolate, achieving taste comparable or exceeding commercially available products. A comparison of the particle size distribution of chocolate from a traditional production method to that produced with the *CHOCO EASY*® shows that, qualitatively equal, or more significantly, better chocolate can be produced with the *CHOCO EASY*® (see picture 2). We can see that the high flow circulation operation produces a finer top-size without producing more fines, providing the potential for use of less fat for viscosity control with a smoother taste.



Picture 2: Particle size distribution (red: standard, blue: produced with *CHOCO EASY*®)

The conventional process steps, known from classic production methods, are integrated in the compact plant. The patented *CHOCO EASY*[®] module consists of the following sub-systems (see picture 3 and table 2):

1. Feeding, pre-dispersing unit and intermediate storage for sugar and other drying materials
2. Melting unit and storage tanks for cocoa liquor and cocoa butter
3. Conch for dry and wet conching
4. Agitator bead mill for fine grinding of the chocolate
5. Complete control system for the plant, including temperature control



Picture 3: *CHOCO EASY*[®] 750

Table 2: Comparison of the traditional manufacturing process with the *CHOCO EASY*[®] plant

Traditional	with <i>CHOCO EASY</i> [®] -plants
Mixing	Dry grinding
Pre-grinding	Dry conching (with reduced fat portion)
Fine-grinding	Wet conching and grinding
Dry conching	
Wet conching	

Process description CHOCO EASY[®]

A special NETZSCH-CONDUX universal mill, type CUM, is used for the pre-grinding of granulated sugar and milk powder. The dry raw materials of the chocolate formulation are manually loaded into a hopper with a safety screen. The dry materials are conveyed by a screw feeder into the dry grinding mill, grinding to a particle size of $< 200 \mu\text{m}$. The transportation system from feeding station to dry mill is completely enclosed and all product-contact parts are polished stainless steel. The grinding process uses a special agitator design called a Wing Beater which provides a combination of impact and shear grinding. The compact stainless steel rotor is equipped with replaceable impact bars. Alternatively, a Two-Roll Roller Crusher Mill could be used.

Cocoa butter and cocoa mass are melted parallel to the feeding of the solids for the dry grinding. The liquid cocoa butter and/or cocoa mass is pumped through a strainer basket and magnetic filter into the storage tanks. These are equipped with an agitator to maintain good homogeneity of the mass.

The horizontally arranged, U-shaped conching tank of the CHOCO EASY[®] plant is designed with a double-wall for heating and cooling. After pre-tempering, the conch is fed with the pre-ground solids and a part of the liquid components. A specially formed, horizontal mixing shaft provides ideal mixing of the components. Dry conching process (picture 4) with a lower fat content than the classic conching process provides a larger specific surface area, exposing more of the product particles. This key process improvement results in faster and more effective reduction of moisture. The discharge of undesirable smell and flavor additives as well as the development of aroma is enhanced by an intensive hot air supply.



Pictures 4 and 5: Dry and wet conching with CHOCO EASY[®]

After the dry conching process, adding cocoa butter, lecithin and other components completes the formulation. The conch is then cooled to the desired temperature. The mass is homogenized and wet conched until full aroma and flavor are developed – this is the same as the classic chocolate production methods. However, during this wet conching stage, (picture 5) wet fine grinding by high flow circulation of the mass through an agitator ball mill, NETZSCH type LME occurs in conjunction with the wet conching. Continuous, trouble free product flow at a high volume rate for fine grinding and dispersing of the cocoa, sugar and milk particles is achieved due to the patented

NETZSCH DCC separation system. This system allows operation at high throughput rates and a constant temperature without the ball mill blocking or overheating the chocolate. The batch time is normally between 8 and 12 hours, depending on the desired particle size of the chocolate. The modular plant system can easily be enlarged by addition of one or more conches and/or ball mills. Therefore, production capacity can be increased without significant expense.

The *CHOCO EASY*[®] is distinguished by the fact that its easy operation has a direct influence on the product quality. "Fine-tuning" several parameters is not necessary, the desired chocolate properties are achieved by process time. A longer wet conching and fine grinding leads to a finer product; longer dry conching leads to less moisture, a better flowability and better aroma.



Picture 6: compact module *CHOCO EASY*[®] 300

Advantages of CHOCO EASY[®]

- The *CHOCO EASY*[®] module provides current purchasers of chocolate or those who have the desire to make their own chocolate in large or small batches a system to achieve their dream of producing their own chocolate.
- The *CHOCO EASY*[®] is an economical, pre-engineered module that is simple to install, simple to start up and requires no special training to operate on a day to day basis.
- Compared with current technology, the *CHOCO EASY*[®] is distinguished by its capability for producing high quality chocolate, ease of operation, reproducibility, low energy and space requirements and extremely short process times.
- The grinding and conching processes are performed at the same time. This new process enables not only the exact adjustment of fineness and quality but also saving of up to 5 % cocoa butter.
- Conching of white chocolate.
- Formulations for specific requirements are easily developed and brought to the market with the compact, enclosed *CHOCO EASY*[®] plant. You will have a high degree of flexibility and your own influence on the chocolate formulation and quality, you are ready to meet the demands of your market.

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