The 10 most critical challenges in tempering

And solutions to resolve them

It all start with tempering

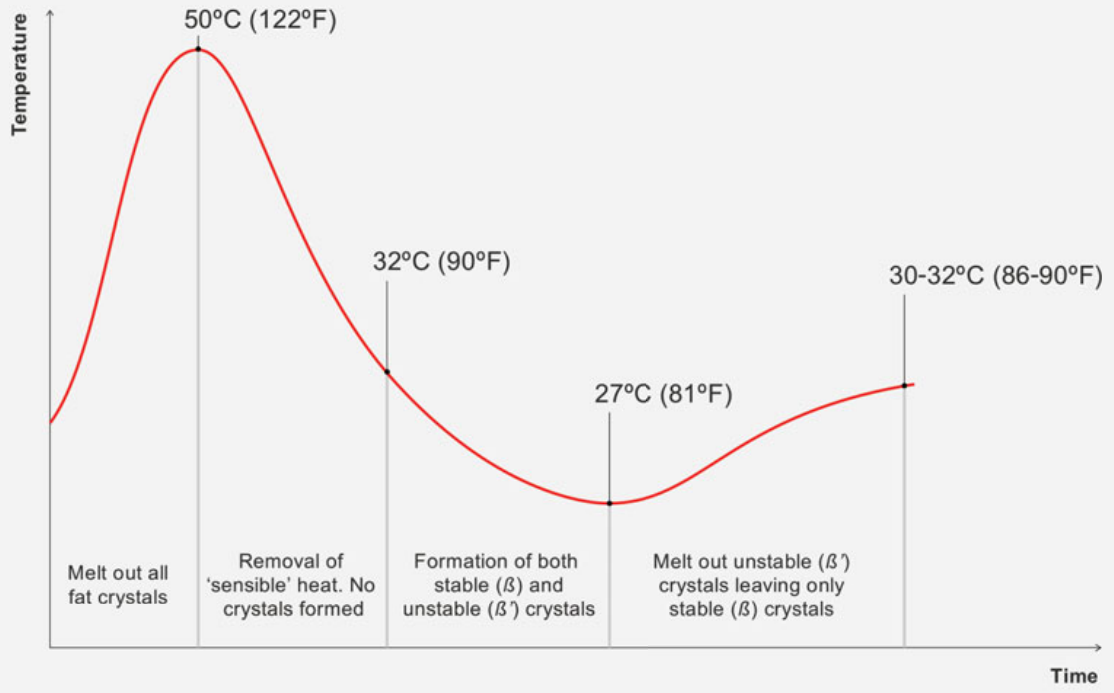
When it comes to chocolate production, everything revolves around tempering.
It is the starting point that defines your processing path and the final product quality.
Chocolate tempering can be incredibly frustrating, and no one knows that better than us!
It's temperamental, literally. It is susceptible to changes in temperature, humidity/moisture, agitation, etc. etc.!

Since 1946, when Dr. Kaj Christian Sophus Aasted invented the world's first patented continuous chocolate plate temperer, we have been continuously advancing and perfecting the chocolate tempering process. With more than 100 years of experience in the chocolate industry, we are sharing the 10 typical and most critical challenges we have discovered while working with tempering and how to solve them.

What is tempering?

Why tempering is important

- ✓ The chocolate tempering process induces high melting crystal seeds (Beta crystal) to the chocolate. This gives the chocolate the ability to crystalize at a higher temperature, thereby setting faster and harder. It affects the glossy appearance, the snap, and the heat resistance of the product.
- ✓ On the other hand, not well-tempered chocolate leads to a faster product bloom resulting in shorter shelf life.
- ✓ The ultimate goal of tempering is to make a chocolate product with the most extended shelf life.
- ✓ You must make sure to have a tempering process as a top priority since this is where the product's quality begins.



It all starts on your application area

1

Bulk/block

2

Chips

3

End-product:
Plain

4

End-product:
Filled, book & cup

5

End-product:
Enrobed

The typical and most critical challenges we have discovered while working with tempering

Challenges	Consequences	Application
1. Incorrect handling of temper equipment	✓ Loss of production ✓ Poor quality of products	
2. Expensive night mode setup	✓ Increased operating hours ✓ Extra energy costs	
3. Energy costs and CO_2 footprint are too high	✓ Expensive energy consumption	
4. Blocking in enrobing applications	✓ Increased downtime	
5. Blooming due to filling	✓ Shorter shelf life ✓ Higher product scraps	

The typical and most critical challenges we have discovered while working with tempering

Challenges	Consequences	Application
6. Ineffective changeover process	✓ Unnecessary chocolate waste ✓ Loss of production	
7. Nonoptimal mass viscosity	✓ Chocolate loss ✓ Blocking during enrobing ✓ Poor quality of product	
8. Limited adjustment range	✓ Cost of extra machines required to do the same process	
9. Staying compliant to hygiene standards	✓ Lack of flexibility to enter new markets	
10. Cooling overload	✓ Long operating time ✓ Downtime ✓ Loss of production	

1. Incorrect handling of temper equipment

The industry challenge

What is the root cause of this challenge?

The standard tempering interface system and the machine itself are quite difficult to run. Machine operators don't have enough knowledge or education to run the machine correctly.

This can lead to:

- Expensive educated labor
- Higher likelihood of production stops
- Risk of variation in the quality of products

BULK CHIPS PLAIN FILLED ENROBED

The solution

- ✓ Aasted Smart Control user interface is intuitive to use and does not require expensive and timely education to run the machine.
- ✓ Features like help function, guided workflows and troubleshooting makes it easy to operate and reduces the likelihood of production stops.
- ✓ With Easy Mode, anyone can operate the machine, ensuring the highest quality output regardless of mass or fat percentage. The embedded algorithms enable the machine to adapt its tempering following the chosen mass and fat. It improves the quality and stability of your final products.

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1. Incorrect handling of temper equipment

Key data points

Key questions	Value
How many operators per year?	
% of operators that cause mistakes/downtime?	
Average downtime caused by operators?	
Total production time	

Value calculation

Formula

Downtime cause by operators [hours/day] x hourly production value [$/hour] + value of scrap [$/day] = Value of lost production [$/day]

Calculate

2. Expensive night mode setup

The industry challenge

What is the root cause of this challenge?

Tempering machines are required to run/idle at 45°C during nighttime to keep the mass decrystalized until re-use in production.

This can lead to:

- Increase in energy costs
- Increase in operating expenses (labor costs)
- Higher downtime due to timely start-up of the production

BULK CHIPS PLAIN FILLED ENROBED

The solution

- ✓ With QuickStart your chocolate temperature can be lowered without starting the crystallization process, therefore reducing your energy costs.
- ✓ The lower temperature allows for a fast start-up since it is already closer to a starting point temperature for the crystallization process.
- ✓ With Aasted technology, the temper can get ready for production in 8 minutes.
- ✓ On a yearly basis, this allows you to save up to 120 hours.

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2. Expensive night mode setup

Key data points

Key questions	Value
How many tempering machines do you own?	
How many hours/day does the machine run in night mode?	
How many days a year the machine is in night mode?	
How much power is needed during night mode?	
How much do you pay per kWh?	

Value calculation

Formula

tempers [-] x hours in night mode pr. day [h/day] x days with use of night mode per year [days/year] x power consumption in night mode [kW] x 50% (QuickStart savings)x price per kWh [$/kWh] = savings per year [$/year]

Calculate

3. Energy costs and CO_2 footprint are too high

The industry challenge

What is the root cause of this challenge?

Outdated tempering processes and operations aren't optimal/efficient. The machines are worn and not as effective, therefore require more energy.

This can lead to:

- Up to 50% more energy consumption than needed
- High electricity costs
- High CO_2 footprint

BULK CHIPS PLAIN FILLED ENROBED

The solution

- ✓ SuperNova Energy allows for up to 50% lower energy consumption. Combining it with Aasted Energy enrober, reduce up to 80% of your energy savings.
- ✓ SuperNova Orbit allows for lower exit temperature that leads to less cooling, doesn't require a re-heat in the tempering process and potentially saves up to 20-30% of energy consumption.
- ✓ StellaNova's revolutionary tempering process and a 60% smaller motor and column can save up to 50% of energy costs and reduce your CO_2 footprint.

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3. Energy costs and CO_2 footprint are too high

Key data points

Key questions	Value
What is the current energy consumption? [kWh/year]	
Cost of energy [$/kWh]	

Value calculation

Formula

50% x energy consumption [kWh/year] x cost of energy [$/kWh] = Savings per year [$/year]

Calculate

4. Blocking in enrobing applications

The industry challenge

What is the root cause of this challenge?

There could be multiple reasons for this challenge. One of them is overseeding of chocolate; in other words, the chocolate is over tempered, it solidifies too fast and leads to blocking. Another reason could be low temperature in enrober or unstable temperature in your surroundings, which again makes the chocolate solidify too fast.

This can lead to:

- Extended downtime as you have to stop production to re-heat and then to re-start your production
- In our experience, it can lead to approximately 1-hour loss in production

BULK CHIPS PLAIN FILLED ENROBED

The solution

- ✓ The combination of SuperNova Energy and Aasted Energy enrober provides a direct injection of tempered chocolate to the enrober curtain, securing that no blocking occurs.
- ✓ With StellaNova, the crystals are more heat stable; this enables higher temperatures. Hence the chocolate doesn't solidify too fast, allowing for smooth production. This solution can eliminate downtime by 1 hour per shift.
- ✓ Potentially saving up to 3 hours downtime per day, allowing for a 15% higher capacity.

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4. Blocking in enrobing applications

Key data points

Key questions	Value
How much downtime occurs due to blocking? [hours/day]	
Hourly production value? [$/hour]	

Value calculation

Formula

Downtime due to blocking [hours/day] x hourly production value [$/hour]
= Increased daily production value [$/day]

Calculate

5. Blooming due to filling

The industry challenge

What is the root cause of this challenge?

Traditional tempering machines, while tempering fillings, tempers the cocoa butter and lower melting fats simultaneously, allowing only limited options in personalizing the tempering process for fillings.

This can lead to:

- Poor quality in product and shorter shelf life
- Lower batch sizes/more changeover
- Waste of chocolate
- Potentially claims from customers

BULK CHIPS PLAIN FILLED ENROBED

The solution

- ✓ StellaNova and SuperNova Orbit provide you with the option to choose temperatures you want, temper the cocoa butter but not the lower melting fats of your fillings.
- ✓ This leads to the correct order of crystallization for your fillings and provides higher bloom stability, longer shelf life, and especially smooth filling.
- ✓ Having the right products leads to smooth production and reduction in downtime.

SUPERNOVA AMC | SUPERNOVA ENERGY | STELLANOVA | SUPERNOVA ORBIT

5. Blooming due to filling

Key data points

Key questions	Value
How many shifts per day?	
Standard shelf life of products?	
Scrap rate / returns	

Value calculation

Formula

Prolonged shelf life rate [eg. Double] -> Enlarged batch sizes
# of batches per time unit [eg. 2 per week] -> xx hours of increased daily production

Calculate

6. Ineffective changeover process

The industry challenge

What is the root cause of this challenge?

There are multiple reasons. Most of the tempering machines have a large internal volume, so flushing/cleaning the machine not only takes a long time but also a high volume of mass is wasted. Further, alternating between masses creates different outputs; therefore, machine settings are required to be adjusted for each change.

This can lead to:

- More chocolate waste than necessary
- Longer changeover time than necessary

BULK CHIPS PLAIN FILLED ENROBED

The solution

- ✓ StellaNova temper design holds up to 75% less chocolate while still being more efficient than the traditional tempering machines.
- ✓ This results in less chocolate waste and lower downtime during the changeover.
- ✓ Giving you up to 75% reduction in materials and, in our experience, can save 50 min per changeover shift.
- ✓ SuperNova Orbit also has a much smaller internal volume than a traditional tempering machine, meaning it results in less waste and lower downtime during the changeover.

SUPERNOVA AMC SUPERNOVA ENERGY STELLANOVA SUPERNOVA ORBIT

6. Ineffective changeover process

Key data points

Key questions	Value
How many shifts/downtime per day?	
How much material waste per shift?	
What is the value of daily production?	
What is the value of the material?	

Value calculation

Formula

1. Number of shifts/day [shift/day] x 0,8 hours saved per shift [hours/shift] x value of hourly production [$/hour] = Value of reduced changeover time per day [$/day]
2. Value of daily changeover material waste [$/day] x 75% = Daily value of saved material waste [$/day]

Calculate

7. Nonoptimal mass viscosity

The industry challenge

What is the root cause of this challenge?

The tempered chocolate's viscosity is too high or too low.

This can lead to:

- Inability to form the correct product during spinning/book moulding, dipping or enrobing
- Loss of production

BULK CHIPS PLAIN FILLED ENROBED

The solution

- ✓ With SuperNova Orbit and StellaNova, you can now adjust the settings of your tempering machine and make a specific setting for a particular product.
- ✓ Even if your mass is very liquid, with the new Aasted technology, you can lower its temperature and raise the viscosity to the level your production requires.
- ✓ With StellaNova you can set your chocolate temperature within the range of 27-32º degrees while maintaining the same amount of crystals.

SUPERNOVA AMC | SUPERNOVA ENERGY | STELLANOVA | SUPERNOVA ORBIT

7. Nonoptimal mass viscosity

Key data points

Key questions	Value
What is the minimal possible weight of your product now?	
What is the ideal/desired weight of your product?	
What is the price of your chocolate?	
How many products do you make per year?	

Value calculation

Formula

(Min. possible weight of product now [g/-] – desired weight [g/-]) x price of chocolate [$/g] x products per day [-/day] = Daily saved ingredients cost [$/day]

Calculate

8. Limited adjustment range

The industry challenge

What is the root cause of this challenge?

In general traditional tempering machines have a certain range they can produce in. If suddenly you need to lower your output or raise outside of the range the tempering process becomes unstable.

This can lead to:

- Buying new/additional machines
- Too much recycling in certain situations

BULK CHIPS PLAIN FILLED ENROBED

The solution

- ✓ StellaNova has a large capacity range. Meaning you can use one machine for multiple ranges.
- ✓ You can also set your chocolate temperature within the range of 27-32º degrees, giving you even a wider range for your production.
- ✓ This reduces the need to purchase additional equipment.
- ✓ Reduces energy expenses.

SUPERNOVA AMC | SUPERNOVA ENERGY | STELLANOVA | SUPERNOVA ORBIT

8. Limited adjustment range

Key data points

Key questions	Value
How large span on chocolate flow do you have?	
What is the mass flow of recirculated chocolate?	
Production time?	
Price per kWh?	

Value calculation

Formula

1. 0,060 [kW/(kg/hour)] x mass flow [kg/hours] x production time [hours/day] x price per kWh [$/kWh] x % of production time running low capacity = Saved cost on energy [$/day]
2. Potential cost of 1 extra temper, 1 DeTemper, and 1 tank

Calculate

9. Staying compliant to hygiene standards

The industry challenge

What is the root cause of this challenge?

Replacement of machinery, due to new food standards and regulations

This can lead to:

- Not compliant production
- Liability of penalties
- Difficulties entering a new market

BULK CHIPS PLAIN FILLED ENROBED

The solution

- ✓ The new Aasted tempering machines are built entirely in stainless steel materials.
- ✓ Being stainless steel makes it significantly safe and available to use for food production; in other words, it lives up to the latest food-grade standards.
- ✓ This solutions provide no risk for penalties.
- ✓ Provides a competitive advantage when entering new markets.

SUPERNOVA AMC SUPERNOVA ENERGY STELLANOVA SUPERNOVA ORBIT

9. Staying compliant to hygiene standards

Key data points

Key questions	Value
Does food grade compliance matter?	
Do you see food grade compliance becoming relevant in the future?	

Value calculation

Formula

Calculate

10. Cooling overload

The industry challenge

What is the root cause of this challenge?

Most tempering machines have a high and not adjustable exit temperature; therefore, it takes a longer time to cool products making the cooling process overloaded and hence lacking capacity.

This can lead to:

- Low throughput and a big footprint
- Purchasing additional cooling tunnels
- High energy consumption due to cooling overload

BULK CHIPS PLAIN FILLED ENROBED

The solution

- ✓ Aasted StellaNova temper and its new technology make it possible to set the exit temperature as low as 27ºC while producing the highest quality small uniform crystals, allowing for complete crystallization.
- ✓ Because of the low exit temperature, you can reduce up to 40% of your cooling needs, therefore, shorten your cooling tunnel length, reduce m^2 footprint, and not require additional cooling tunnels.
- ✓ Or you can increase your existing line's capacity.

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10. Cooling overload

Key data points

Key questions	Value
What is the current output per m^2?	
What is the current energy consumption per output?	
What is the value of daily production?	

Value calculation

Formula

% increase in capacity x value of daily production [$/day] =
Increased value of daily production [$/day]

Calculate

Which temper suits your production?

	 SuperNova AMC	 SuperNova Energy	 StellaNova	 SuperNova Orbit (for filings)
1. Incorrect handling of temper equipment	✓	✓	✓	✓
2. Expensive night mode setup	✓	✓	✓	✓
3. Energy costs are too high		✓	✓	✓
4. Blocking in enrobing applications		✓	✓	
5. Blooming due to filling			✓	✓
6. Ineffective changeover process			✓	✓
7. Nonoptimal mass viscosity			✓	✓
8. Limited adjustment range			✓	
9. Staying compliant to hygiene standards			✓	
10. Cooling overload			✓	

TEMPERING TECHNOLOGY NAVIGATOR

	SuperNova AMC	SuperNova Energy	StellaNova	SuperNova Orbit (for fillings only)
				
Main purpose of machine	Tempering of high and low viscosity masses at any scale.	High-quality tempering machine to temper chocolate with more than 30% of fat. Uses up to 50% less energy.	Tempering machine to temper all types of chocolates and fat fillings. You can set the exit temperature and temper index independent of each other. A stable and simple machine that optimizes your production and leads to the best quality results.	Tempering machine to temper all kind of fats and fat fillings with a fat content from 50 to 100%.
Typical masses	All types of chocolate.	All types of chocolate and fillings and especially masses that tend to build up.	All types of chocolate and fat fillings. Not for masses with inclusions.	For crystallization and aeration of fat-based center masses and crème fillings. Not for masses with inclusions.
Core technology	Multiple SuperShear scrapers designed for horizontal and vertical mixing and homogenous distribution of the crystals.	By keeping the chocolate at 1,5 to 2 degrees Celsius higher than the traditional method, you can eliminate B3 and B4 crystals. This leaves the chocolate exclusively with B5 crystals, resulting in the perfect coating. Keeps the chocolate in the crystallization zone for a longer time, uses unique scraper wings, and precise temperature control that results in immediate energy savings.	StellaNova has separate cooling and shearing processes. It's now possible to set the exit temperature as low as 27ºC while keeping the highest quality of crystals. The machine has a unique planet wheel design that ensures 400% more shear without creating additional shear heat.	The unique design of the SuperNova Orbit ensures constant velocity of the scraped surfaces and no possibility for the mass to bypass the cooling surfaces. Thus, we are able to provide both a totally homogenous crystallizing – and crystallizing to an almost solid state.
When to recommend	When running simple single mass production.	Works especially great with enrobing applications.	The best suited solution in most cases.	For both aerated and non-aerated fat-based masses: extruded, wire cut, and deposited centers for dessert chocolates and bars. It can be used for crème preparation on our molding lines.
Capacities and ranges	150 – 5500 kg/h.	200 – 5500 kg/h.	10 – 6000 kg/h.	600 – 2500 kg/h.

Aasted tempering technologies

World-class tempering machines with innovative solutions:

- ✓ Pioneering in tempering since 1946
- ✓ Various tempering machines for unique purposes
- ✓ Can handle any chocolate, compound, fat fillings, and masses with high water content, cocoa butter, and cocoa liquor
- ✓ Easily configures to an existing or a new production line
- ✓ For small or large multi-country production.

With Aasted tempering technologies, we have been able to:

- ✓ Crystalize filling mass to an almost solid state with SuperNova Orbit
- ✓ Save up to 80% of energy savings by installing SuperNova Energy and Energy Enrober
- ✓ Reduce up to 40% of cooling tunnel needs to fit to certain m^2 footprint with StellaNova
- ✓ Reduce 75% in materials during changeover with StellaNova.

Case story

Blooming issues with filled chocolates solved by tempering

Challenge

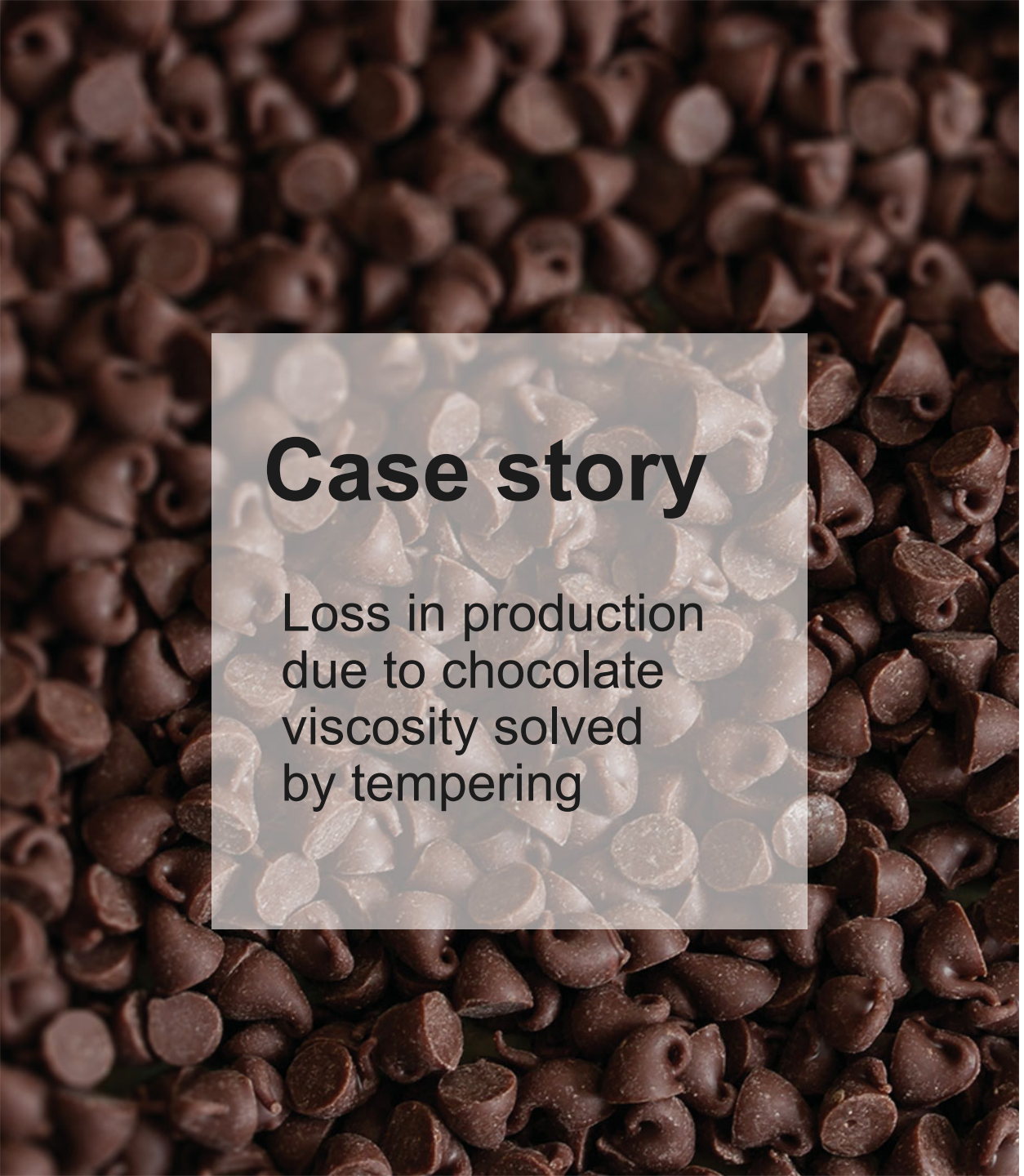
Filled chocolate products had a short shelf life of around 3-6 months due to blooming and gritty texture in the filling. This happened because traditional tempering machines were used and were not capable of tempering the fillings due to its complicated fat composition. When there are cocoa butter, laurin fats, and other vegetable fasts in a filling, it is important to temper the cocoa butter, or else it will change form and unavoidably get a gritty texture.

Solution

Aasted's SuperNova Orbit tempering technology allowed the customer to temper the filling on a much warmer surface inside the Super Nova Orbit and prolong the crystallization of the laurin fats and other vegetable fats until it was inside the chocolate shell.

Result and value created

Aasted SuperNova Orbit provided higher bloom stability and a smoother feel filling. It prolonged the shelf life from 3-6 months to 12 months. This resulted in less product waste and fewer customer claims/returns.



Case story

Loss in production due to chocolate viscosity solved by tempering

Challenge

A producer of chocolate chips, with a very liquid, low viscosity chocolate, was faced with two problems. The first problem was that a standard depositor could not handle the mass; therefore, pistons tended to leak, and special depositor parts were needed. The second problem was the size and thickness of the chip; this led to a lower throughput when using a traditional temper machine on this particular mass.

Solution

StellaNova technology was implemented, and because it is possible to adjust exit temperature and amount of crystals separately, it allowed us to make the chocolate more viscous so that a standard depositor can handle it without build up in the hopper. Simultaneously, this allows for the same size and thickness chips and the same throughput as average chocolate chip production.

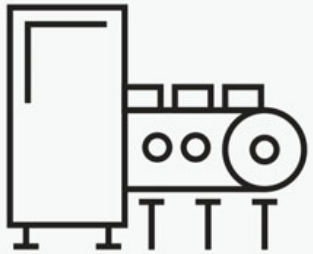
Result and value created

Aasted technology improved the mass by making it thicker, which allowed the customer to use a standard depositor and high throughput. Furthermore, by changing the tempering machine, the company was able to reduce its CAPEX by not requiring expense for new specialized depositors or a whole new line in general.

What if you could lower your chocolate output temperature by 3º degrees?

Reduce m² footprint

Up to 40% reduction
in cooling time need



Increase production output

Up to 40% increase
in capacity

Reduce maintenance

Up to 25% reduction
in maintenance costs

Don’t believe us?

Welcome to our world

www.aasted.eu