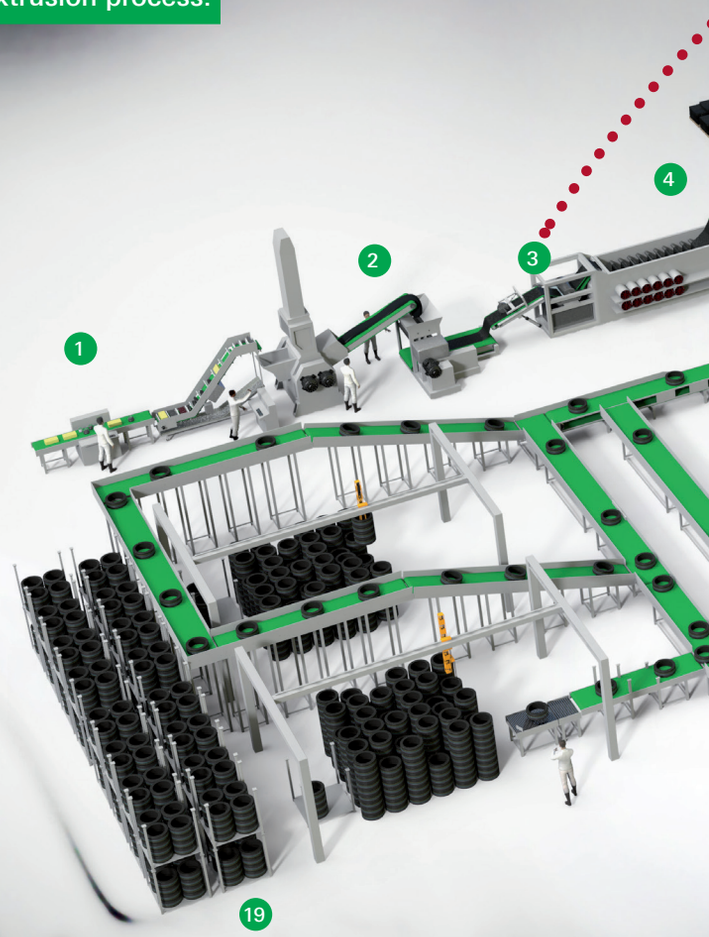
Tire Industry
Dip Tank Application

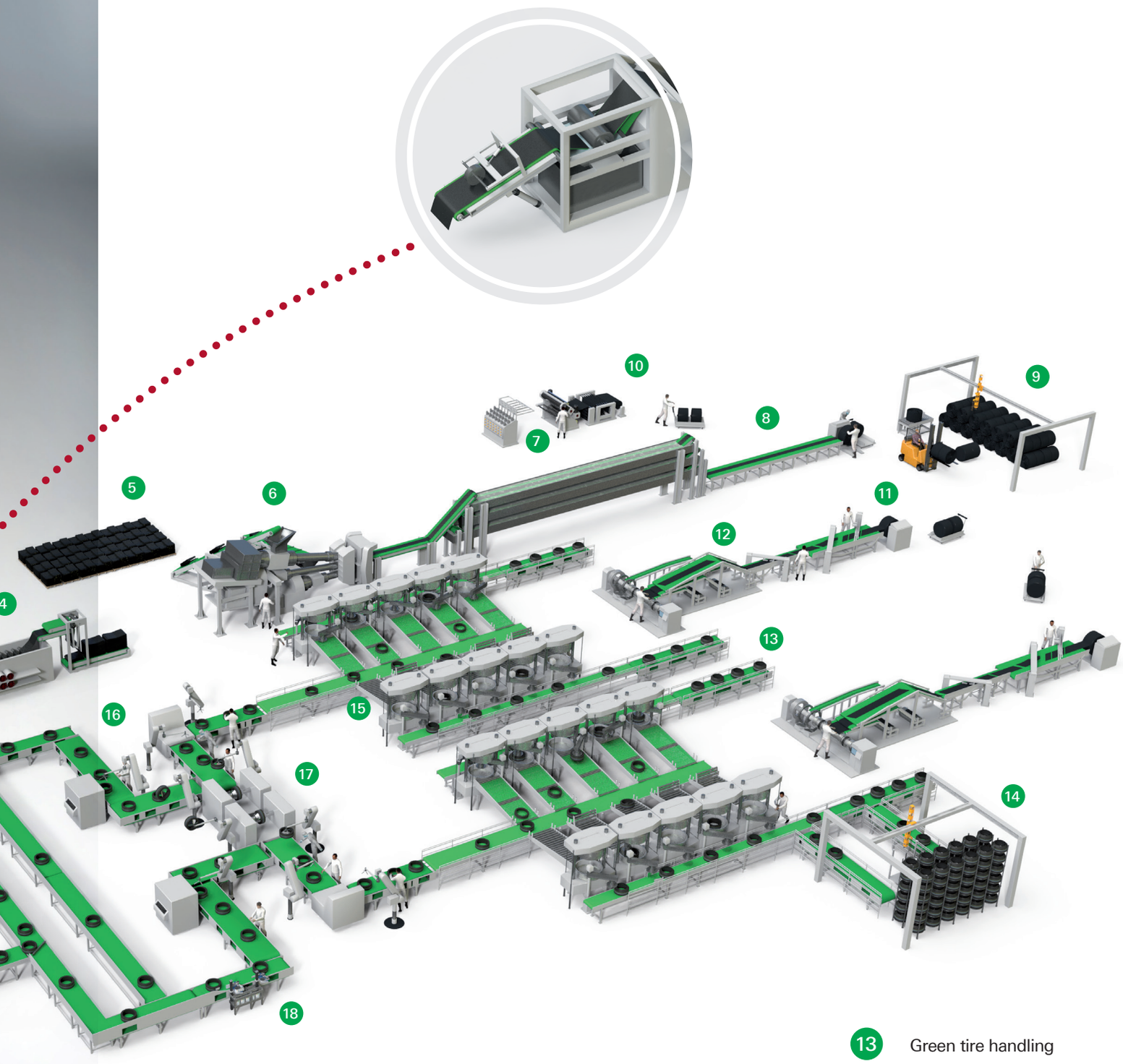
Habasit plastic modular belts in rubber processing

The dip tank in the tire production process

When manufacturing vehicle tires, the production of the rubber is key to the tires' performance, service, lifetime, safety, and ability to meet drivers' highest expectations. Multiple different rubber mixtures are prepared on the production line. The dip tank is the essential step that makes every batch of rubber storable, manageable, and ready for the extrusion process.



By putting the focus on the dip tank and how to run it optimally, Habasit helps you to increase your production output and quality while reducing the total cost of ownership at this important stage in the tire manufacturing process.



01 Material preparation
02 Mixing
03 **Dip tank**
04 Wig-wag and palletizing
05 Rubber sheet storage
06 Extrusion
07 Cooling line
08 Treadliner
09 Rubber rolls storage area
10 Calendering
11 Slitting / cutting line
12 Tire building
13 Green tire handling
14 Green tire storing
15 Trench conveyor
16 Inspection
17 Uniformity checker
18 Labeling
19 Storage and warehouse

The dip tank application

After the mixing process, the basic rubber compound band must be covered with an anti-sticking liquid film, usually containing clay or talcum-based powders, to stop the rubber layers sticking together during storage. The “wig-wag” process then folds the continuous rubber material into stacks that are easy to store on pallets.

To receive its anti-sticking film coating, the freshly mixed rubber is transported to the dip tank on a conveyor belt. A dunk drum forces the rubber band to submerge into the non-adhesive liquid bath.

Dip tank layouts with steel mesh belts or fabric belts are still common, but these require a lot of maintenance due to the abrasive conditions in the dip tank. As a result, increasing numbers of tire manufacturers are now switching to plastic modular belts for their high-performance plants.

HabasitLINK plastic modular belts are available in a variety of materials, pitches, designs and individual configurations. With their robust belt design and well-engineered features, they reduce maintenance, shrink downtime, and lower costs in this harsh manufacturing environment.

Working with our highly experienced Habasit tire industry engineering team, even retrofits can be completed smoothly and easily, as Habasit plastic modular belts can adapt to almost any dip tank layout.

Typical dip tank belt and process parameters:

Width	m	0.7 – 1.5
	inch	*27.5 – 59*
Length	m	4 – 20
	feet	*13 – 65.5*
Temperature	°C	50 – 80
	°F	*122 – 176*
Load	kg/m^2	5 – 30
	lbs/ft^2	*1 – 6*
Incline angle	Deg	15° – 60°

Typical belt requirements

Robust belt design

Advanced sprocket design

Open belt area

High incline angles

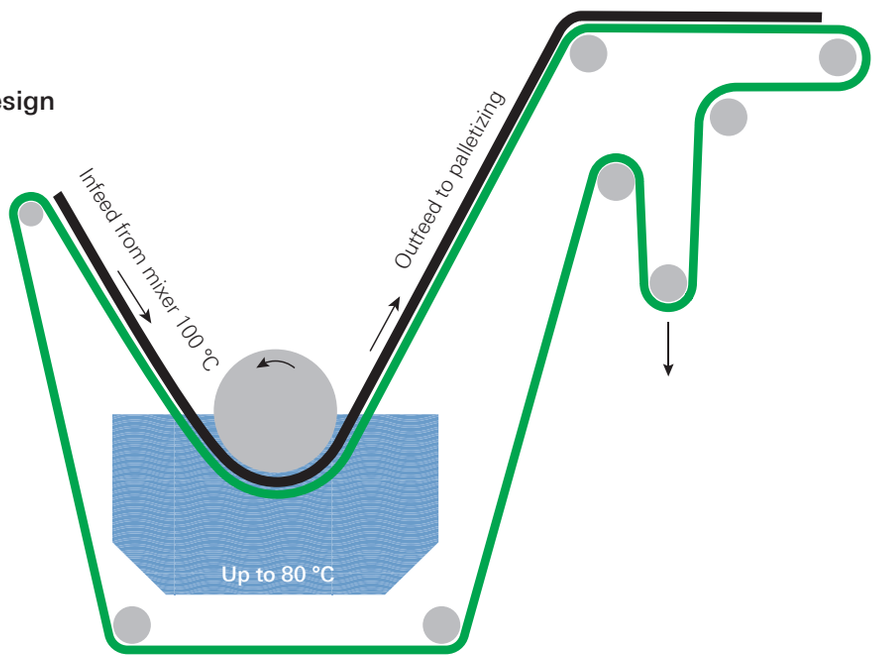
High abrasion resistance

High strength

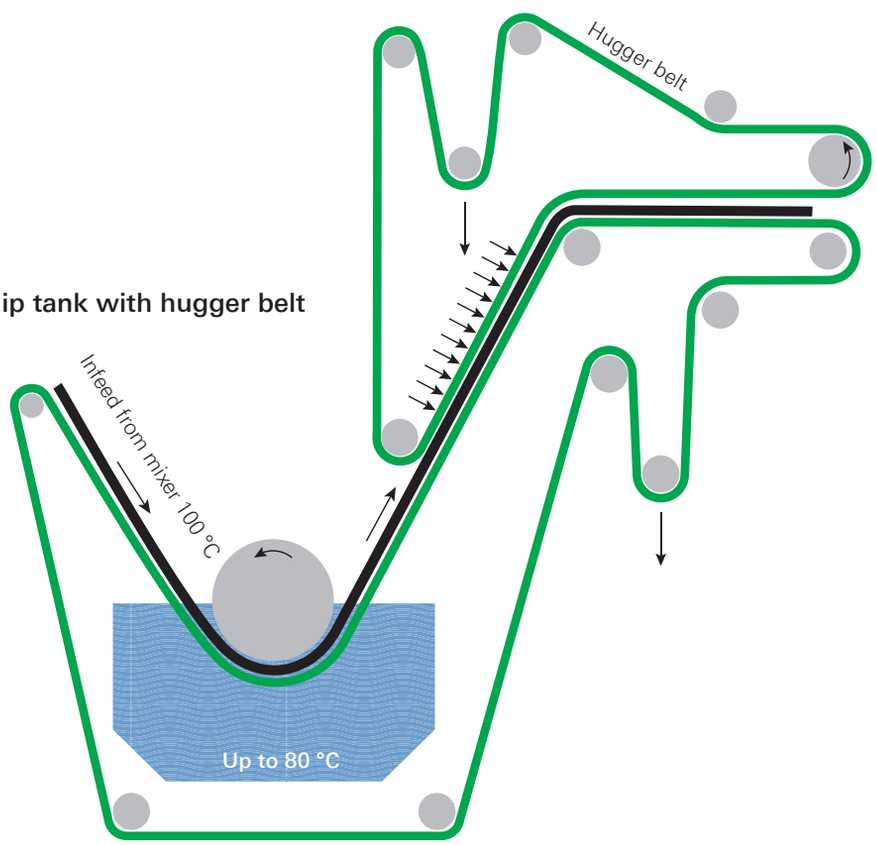
Good chemical resistance

The two major dip tank configurations

Basic dip tank design



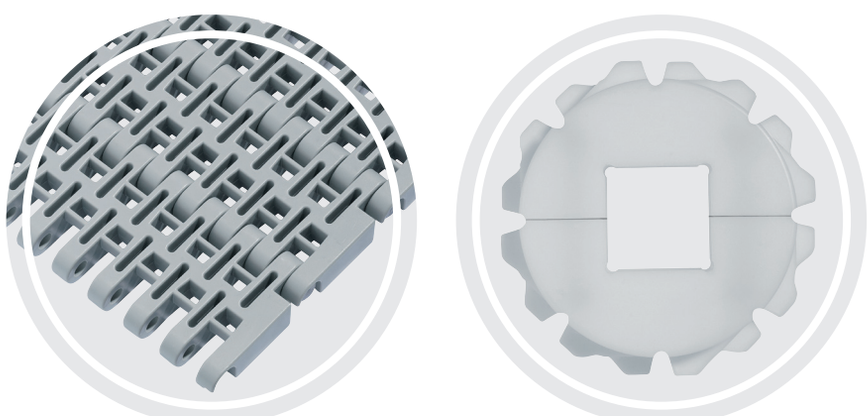
Principle of the dip tank with hugger belt



Habasit belts designed for dip tanks

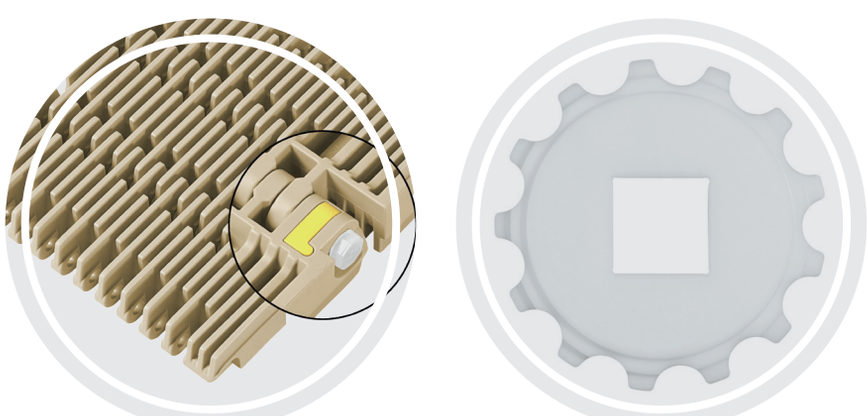
M5032 Flush Grid Heavy Duty

- Strong design
- 34% open area
  60% open contact area
- Excellent for flushing and draining
- Closed hinges
- Approved for abrasive environments
- Different materials available
- Rod diameter 7 mm / *0.27"*
- Sprocket design reduces punctual forces



M5131 Raised Rib 2"

- Imperial belt width
- 36% open area
  67% open contact area
- Easy to clean
- Straight ribs 2.8 mm / *0.11"* thick
- Rod diameter 7 mm / *0.27"*
- Smart fit rod retention
- Strong edges
- Lug teeth sprockets
- Different materials available



Performance benefits of HabasitLINK®

To benefit from the superior performance of a modern plastic modular belt in a dip tank, especially as a retrofit, several engineering and design aspects must be considered from the start:

Form-locked sprocket drive

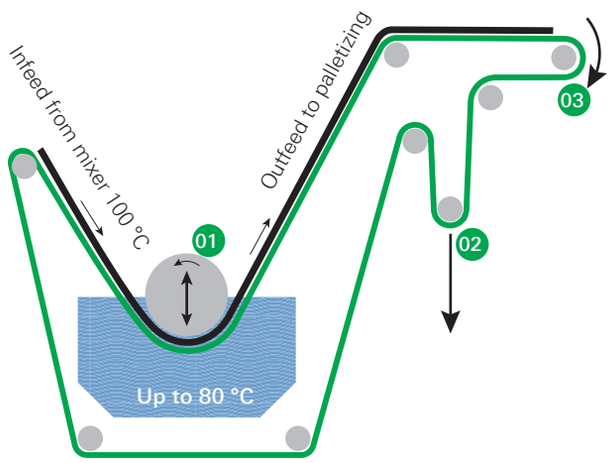
Plastic modular belts are not tensioned by static devices. The system is driven by sprockets, with the conveyer design in the dip tank configured for correct sprocket engagement.

Gravity roller

A gravity roller system can be used to guarantee safe sprocket engagement. The correct calculation of the required gravity pull force ensures good sprocket engagement without creating high tension. The forces on the sprockets and the belt can be adjusted.

Balancing the belt forces

If the dunk drum is used as gravity force, the travel way must be limited. An additional gravity roller outside the tank should be foreseen to balance belt forces.



01 The dunk roller must not drop the belt to the ground. Its lowest position needs to be defined

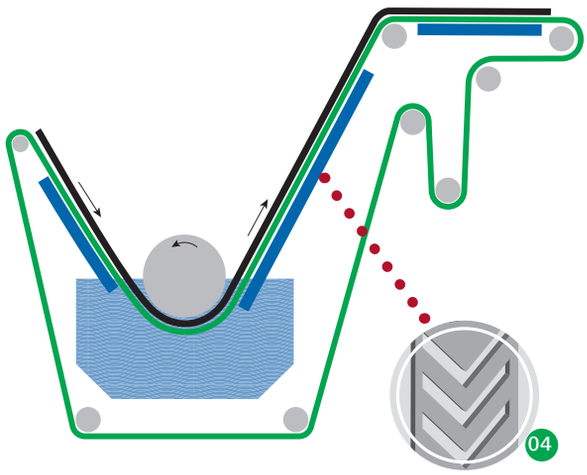
02 The weight of the gravity roller pulls the belt to a calculated pre-tension and compensates for belt elongation due to thermal expansion, wear, or changes in the load

03 The belt on the drive position is always under tension, so sprocket engagement is secured

The abrasive environment in the dip tank needs the best possible materials for the belt modules, connection rods and sprockets. Each case is different and requires a tailored solution. Careful selection of each component in the belting system optimizes the total cost of ownership.

Drainage-friendly design

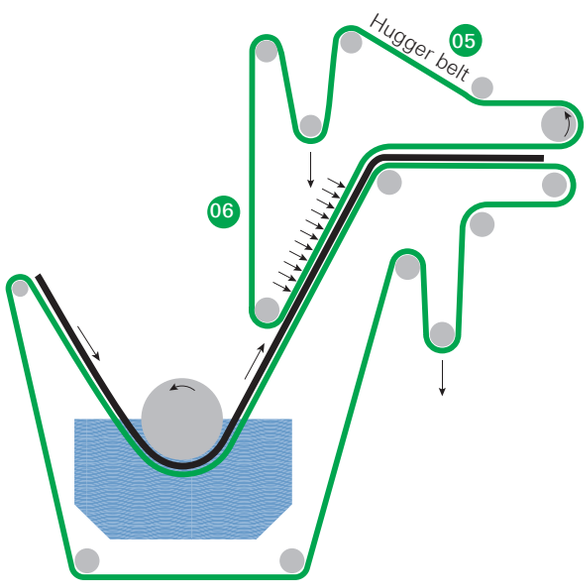
The slider bed at the dip tank outfeed should be a stainless steel plate with an open area for water and talcum powder drainage. Punched holes or a chevron pattern over the full width provide good drainage and low wear. Stainless steel wear stripes in a chevron pattern are also possible.



04 The open area on a stainless steel slider bed provides excellent drainage of dip tank water

Safe inclines

Back-slipping of the rubber belt on steep-increase dip tank layouts is one of the most critical challenges in the dip tank application. To avoid a back-slip situation, a hugger belt installed on top of the main dip tank belt can help to keep the rubber layer between the two belts and carry it safely out of the tank. A well-designed hugger belt with a good area of contact and allocated belt weight removes internal tensile forces in the soft rubber band and helps to overcome steep and long incline sections.

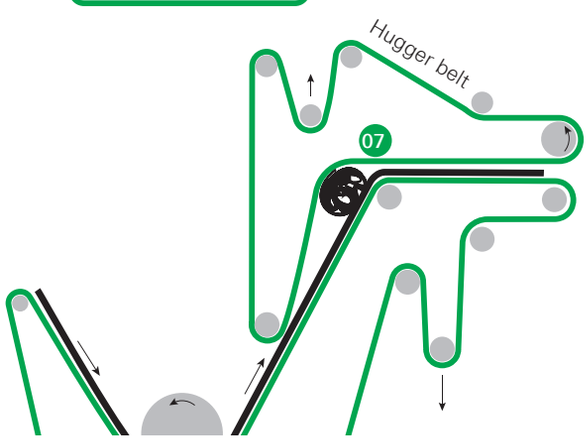


05 Hugger belts ensure safe rubber transfer on steep inclines and keep the rubber in place

06 The weight of the hugger belt defines the hugging forces on the rubber band

Control and flexibility

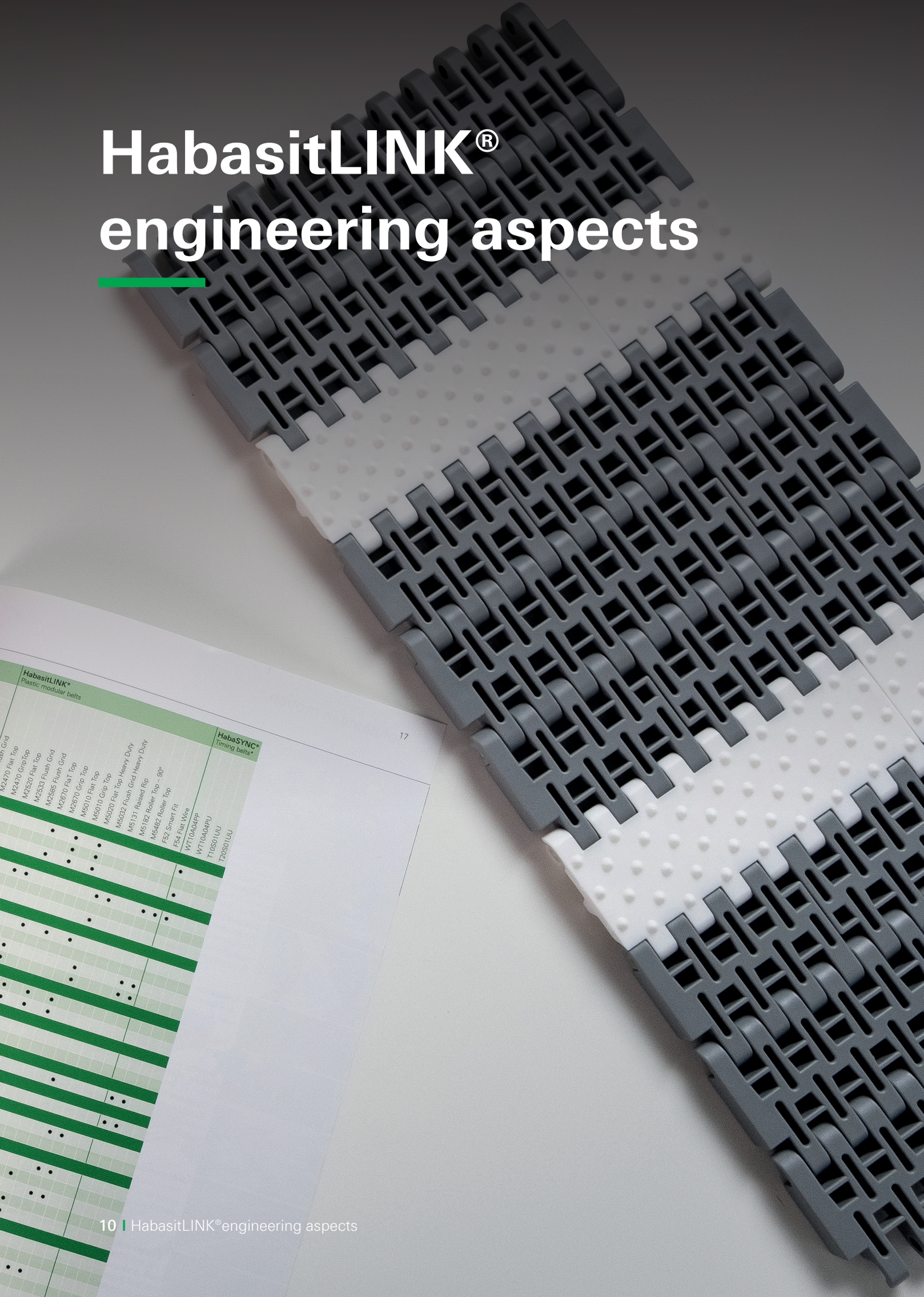
A gravity tensioning unit is mandatory for the hugger belt to compensate for natural belt elongation. In cases where there are potential rubber ball-ups, it makes the belt flexible when length adaptation without stressing the rubber layer is required.



07 Rubber balling-up is compensated for by the belt and can be detected if the gravity tensioning roller is pushed up

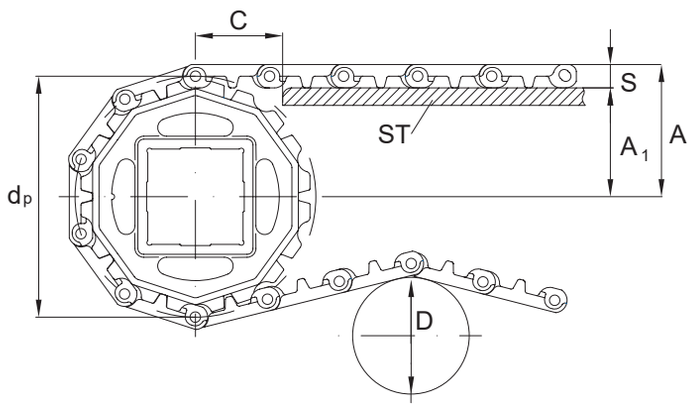
Wear limits the belt lifetime. Thorough knowledge of wear-causing factors is essential for improving processes. Wear is a function of load, speed, temperature, environmental conditions, choice of materials and design. The first four factors are determined by the process, but the correct choice of materials, along with a well-engineered sprocket and belt and conveyor layout, can make all the difference.
This is where Habasit can help.

HabasitLINK® engineering aspects



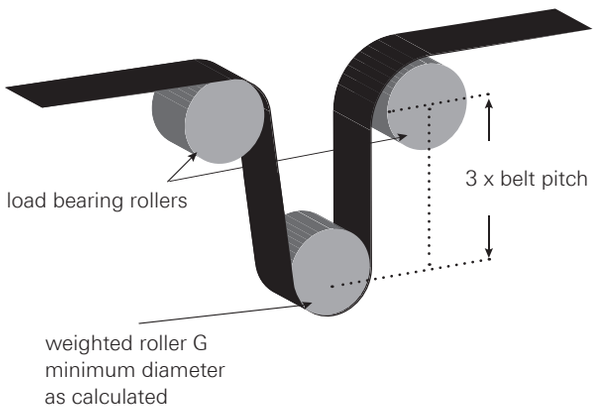
Drive situation

- Distance A_1 is important to ensure a smooth belt run
- First roller at a short distance
- Wrapping angle approx. 200°
- Distance C should be as short as possible
- Distances A_1 and C must be adjusted; d_p, S, A and D result from the choice of belt type and sprockets
- Slider table ST provides stable belt support



Gravity take-up

- The design of a gravity take-up depends on the required gravity force (G) to pull the belt into the correct sprocket position
- The diameter of the pulleys is defined by the belt type selected
- The radius of the G pulley defines the distance between the load-bearing rollers and the space required to install it



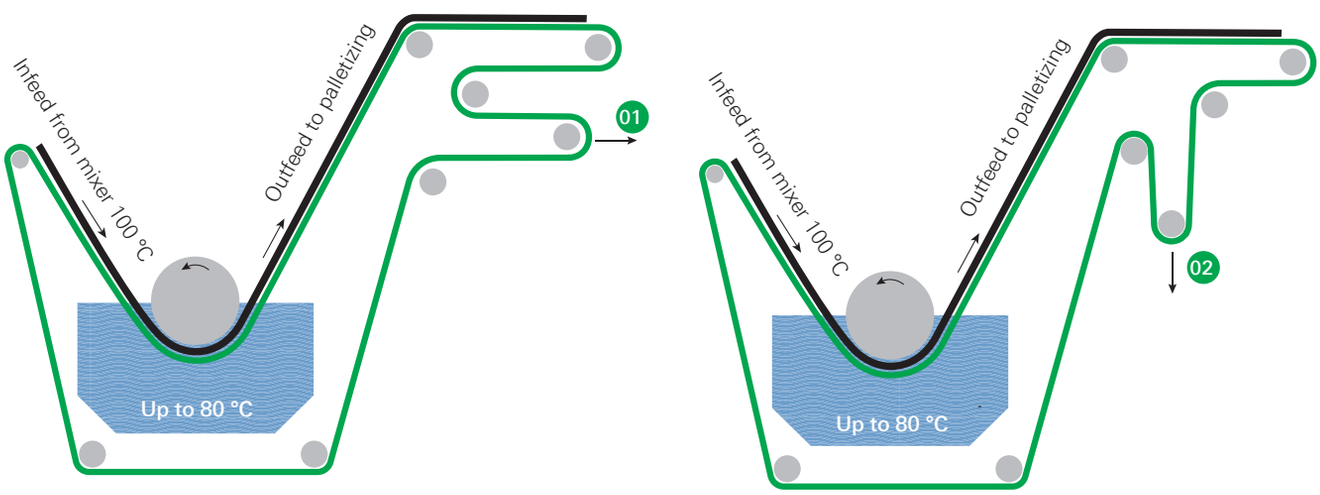
Chevron slider bed

- The chevron design of the slider bed ensures optimal drainage of dip tank liquid
- The chevron shape goes over the full belt width, so the belt has uniform wear and a long lifetime
- The slider plate is 100% stainless steel

Dip tank retrofit

Preparing for the future

Challenge
Can I convert my dip tank now equipped with a fabric or rubber belt into a modern plastic modular belt design, with high wear resistance, easy maintenance, and a long belt lifetime?



Habasit's solution
In most cases, a re-design of the dip tank is both possible and valuable. Your local Habasit representative will help you evaluate if new parts are needed, such as a new drive shaft for sprockets, or if you require re-engineering of the belt tensioning unit into a gravity-controlled take-up system, use of a slider bed, hugger belt re-positioning, etc.

If additional engineering or fabrication parts or assembling forces are required, Habasit will help you to find a reliable partner in your region..

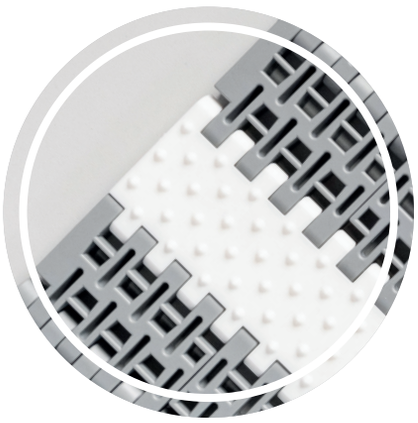
Your first step is easy:
Call your Habasit contact and ask for an appointment.

01 Tension unit
Example of a fabric belt

02 Gravity roller
Typical gravity tensioning roller on a plastic modular belt

Effective and easy

Challenge
Can I reduce downtime from rubber jams caused by back-slipping rubber in a dip tank by replacing a poorly engineered plastic modular belt?



Habasit's solution
The Habasit Series M5032 Flush Grid Heavy Duty belt lets you mix a flush grid open belt surface with a Series M5013 Cone Top spiked surface. The number and pattern of spike modules can be freely chosen, so every installed incline angle or hugger belt situation can be individually assessed by our experts and given a tailored solution.

Your first step is easy:
Call your Habasit contact and request a consultation.

From slave to master

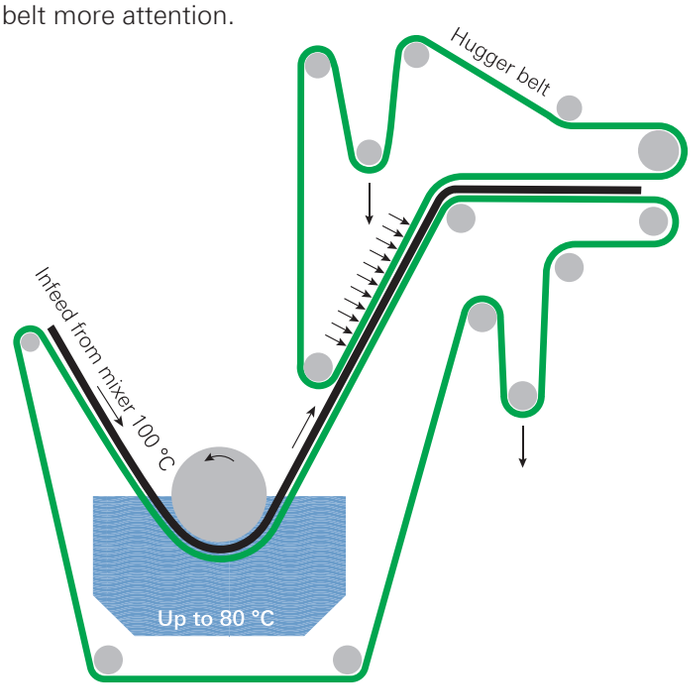
Challenge
Can I turn my hugger belt into a more efficient and intelligent component instead of a slave-driven sleeve to keep the rubber layer in place on an incline?

Habasit's solution
The size, width and design of a hugger belt, and its importance for maintaining a perfectly running system, is often underestimated. The hugger belt is often smaller than the main belt and even smaller than the rubber layer. We suggest giving the hugger belt more attention.

A motor-driven shaft and a gravity roller or pneumatic tensioning device permit belt elongation and still keep a defined pressure on the rubber band.

In the case of potential rubber ball-ups, the lifted position of the gravity roller can be used as an incident indicator and provide an early signal to operators. Alternatively, a pneumatic device can be used to control the hugger belt pre-tension to give the system a chance to self-regulate and reduce the likelihood of rubber balling.

Your first step is easy:
Call your Habasit contact and evaluate your options.



Our services

Our commitment to our customers' success is what drives our continuous innovation and product and service improvements. We combine our engineering expertise with total dedication to reliability, to create lasting value for our customers.

Global leadership, local service
Habasit is your local partner with global reach. With 30 affiliated companies, each with its own inventory, fabrication, assembly, and service facilities, plus our worldwide network of partners, we react quickly and expertly to meet your most complex installation challenges.

Comprehensive technical support
From belt selection to design assistance. Extensive knowledge of our customers' processes lets us guide you from application analysis to selecting the optimal solution. We offer online calculation and belt selection tools, as well as on-site engineering assistance and equipment design, to make sure you get the best solution.

Process optimization and everyday efficiency
Innovation comes from understanding our customers' daily challenges. Habasit is more than a belting company. Our experts can provide belt condition monitoring, regular inspections, analysis and surveys at your sites, to keep your lines running smoothly and fully optimize your equipment and production processes.

Sharing knowledge and making business easy
Habasit offers training programs and support tools to ensure optimal use of our products, with training on fabrication, installation, assembly, maintenance and belt repair either at a Habasit site or your own location. Orders, shipping and tracking can be managed via our Customer Care team, or directly online.

Committed to innovation beyond the obvious
Because our customers' challenges and needs are always changing, we are constantly investing in the research and development of new products and solutions not only for today, but also for tomorrow.

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