Ammeraal Beltech

CONFIDENTIAL

Fruit & Vegetable
Fresh-Cut
100-200

Ammeraal Beltech
Fresh-Cut Processing Sales Guide

Innovation and Service in Belting

This document has been created with the information and the level of knowledge that we have today. With every new business experience and interaction involving new conveyor applications, the information in this document could be augmented or changed.
Please help us keep the Guide as useful and up-to-date as possible by providing us any information you think is relevant; we wish to have the benefit of the knowledge and experience of the full Ammeraal Beltech Global Food team.

Contents

01. General part - introduction

Fruit & Vegetable - definition

Fruits & Vegetables are classified according to how they are processed:

1st range: Fresh produce with no immediate treatment or storage.

2nd range: Canned products and preserves that have gone through sterillization, freeze-drying, or pasteurization.

3rd range: Frozen and deep-frozen ready to cook.

4th range: Product ready to eat as fresh fruits and vegetables, washed, dried, cut, packed in trays or in plastic bags in a modified or controlled atmosphere.

5th range: Cleaned, pre-cooked, vacuum-packed products. NOT frozen.

Sales call preparation

- Investigate products and brands made by customer (from the internet, magazines, etc.)
- Collect information about your customer's business and production processes
- Get to know the basic fruit and vegetable range, key processes and applications
- Learn the basics about hygiene principles and Food Grade belt standards
- Make your appointment with a technical person – engineering, maintenance, quality or production manager
- Check My Ammega for up-to-date information, particularly if you will visit a Strategic Account
- Check product availability and pricing
- Consider the unique benefits Ammeraal Beltech can offer
- Find the Ammeraal Beltech or distributor Service Center closest to the customer site and calculate an average driving time for services on site
- Investigate splicing tool types and widths available from your Service Centre
- Look for the near presence of competitors and local distributors

Ammeraal Beltech industry classification

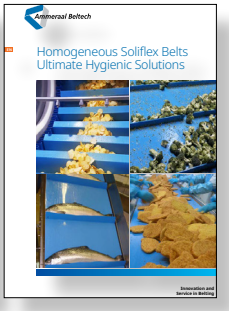
In this sales guide we focus on the Fruit & Vegetable sub-segment, industry code 100.200

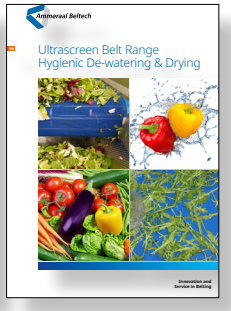
Preparation before the meeting

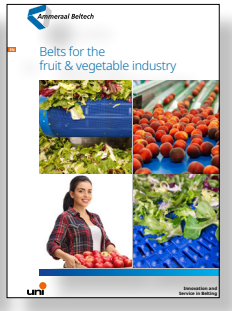
- Be prepared to visit production. Bring safety shoes and measuring tape. Wear clean clothes and be ready to remove rings, bracelets, watch and tie as you will visit a food environment where these items are normally prohibited. Limit your items to detectable pens, computer and notebook
- A laser-infrared thermometer can be useful in order to check belt and product temperatures
- If the customer allows it, bring a camera and take HD pictures of the equipment and belt (as many you can for your references)
- Bring your local food sample kit. Be familiar with its contents, from belt types to brochures and flyers
- If the kit is incomplete or broken, please ask for a new one
- During your visit, try not to spend time only in the office. An inspection on the processing line is essential for your business
- Bring your business card and the contact details of your Service Center
- Leave some content for your next visits as it's unlikely that you'll win a new account with only one visit!
- During the inspection of the processing line, focus on the dirty areas on the belts and introduce our Ammeraal Beltech Food Safety solutions
- Try to offer light blue color belts where possible and avoid fabric, felt and and cotton belts. Look for opportunities to offer Food Safety solutions

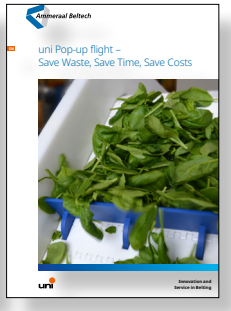
Documentation and samples

- Industry brochure for Fruit & Vegetable
- Corporate brochure of Ammeraal Beltech/AMMEGA
- Soliflex brochure
- AMMdrive brochure
- Dectyl range flyer
- Safe & Clean brochure
- Ultrascreen PRO flyer
- uni Pop-up flight flyer
- uni UltraClean two-part sprocket brochure
- Address and phone number of your distributor or closest Service Centers









Sales questions

All the following questions could be asked depending on your customer.
These questions are not in any specific order.

Customer overview

- Are your products only for your local market or do you also export?
  International fruit and vegetable businesses should pay extra attention to quality and food safety.
- To which Food Grade standards do you comply?
  If customer could not reply properly, you need to emphasize Ammeraal Beltech's expertise.
- How do you store the Food Grade certificates?
  If they have different files, we can say that it's possible to store all of the Ammeraal Beltech datasheets and certificates in one file to be downloaded from My Ammega.
- Do you have a Quality Manager?
  When speaking with a Quality Manager, you can explain how the Ammeraal Beltech belts improve quality and reduce waste.
- Are you a part of an international food company?
  Perhaps your specific account is a part of an international group that we already supply and we thus have good references.
- How many factories do you have locally (and possibly abroad)?
  This is to complete your customer view and consider the need for additional visits.
- Under what brands do you produce fruits and vegetables?
  Customer brands are essential for a correct and fluent communication within different plants.
- Do you focus on volume or quality?
  The question is asked to recognize if the factory is price or quality oriented.
- How many belt suppliers do you have currently?
  To know who athe competitors are and to then introduce us as One-Stop Belt Shop.
- How high is the risk of product contamination?
  Useful to know if the customer is familiar with Food Safety.
- What types of fruits and vegetables are you processing in your plant?
  Essential to know the customer business and rwhat other belts they may need.

Situation

- Are you working 24/7 in shifts?
  Customers working in one single daily shift are not particularly sensitive to downtime.
- Are you doing a risk assessment (HACCP ISO 22.000) in terms of pollution from plastic parts?
  Learning about the level of sensitivity towards the risk of pollution from broken plastic belt parts. Important information to present our belts: Dectyl, Ultrascreen XMD, Soliflex XMD, uni modular detectable and detectable accessories.
- White or blue belts? Could you see a benefit in switching to blue belts?
  Customers not familiar with blue belts need introduction and explanation.
- How many processing lines are running in your plant? What widths?
  Fundamental questions to estimate customer potential and their need of splice service.
- Are your processing only fresh-cut or also canning and frozen fruits and vegetables?
  Basic question to know if they need belts for blanching and freezing process.
- Are you conveying sticky products?
  Problem that could be solved with our wide range of non-stick products such as uni MPB open 20% nub top, Soliflex PRO A18 profiles, Ultrascreen PRO, Synthetic coated A18 or A21.
- Are you using some optical sorting in your process?
  Basic question to know if they need special belts for scanning and vision.
- Who are the OEMs of your processing lines?
  Strategic question to know if you could play reference via OEM.
- Do your own maintenance staff handle the belt splice?
  Critical question to know if the customer is familiar or not with splicing tools.
- Do you have a file with all your belts listed?
  A belt list is a highly valuable tool, a copy could be a big help. A belt file is particularly useful to recognize the level of their maintenance and the relationship with competitors.
- Do you have stock of belts for every conveyor?
  Getting knowledge about the stock level as well as their evaluation of downtime.
- What is the amount of your belt stock?
  Important data for next stock reduction discussions.
- What is the maximum belt width and related type?
  This is to know if you can cover all needs with present Ammeraal Beltech product portfolio.
- Do you have fabric, cotton or felt belts?
  With the mentioned belt types, they will have cleaning and hygienic issues and those might be solved with coated belt types.

- What is the average lifetime of your curve conveyors?
  Frequently round curve belts have short lifetime (<12 months) and are very expensive. Lifetime could be extended using our EF Synthetic range.

Problem

- Why do you usually replace a belt?
  To know the main problem(s), e.g. splice issues, mistracking, hygiene.
- Do you have shrinkage problems on your belts?
  This is a common problem and can often be solved with our classic range of belt dipcoated (00+) and/or with our non-fray belt types.
- Do you have belts losing tension? How do you control the belt tension?
  Both questions are useful to recognise if your customer needs basic training on belt dynamics.
- How often do you notice mistracking problems? Who takes care of such mistracking in your factory? The maintenance staff or the machine operator?
  To clarify the level of issues about mistracking and the need for instructions.
- How do you clean your belt? Who does it – your own personnel or a third-party service company?
  To learn who you can provide with our official cleaning instructions.
- Do you have your own cleaning instructions or do you stick to the detergent supplier cleaning instructions?
  Bring into focus the need for professional cleaning instructions from belt and detergent suppliers, e.g. Ecolab, Johnson, Diversey, etc.
- Do you have belts with mechanical fasteners and/or belts with sewn joints?
  Belts with mentioned accessories are always an issue in terms of short life and cleaning.
- How many working hours do you need to replace a mesh belt?
  Question stresses the need for positive drive Ultrascreen PRO.

Implication

- Do you have a common belt supplier for all your factories or do you have different local plant suppliers?
  Finding a way to introduce the One-Stop Belt Shop concept.
- How long does it take for an external fitter to do a splice?
  To explain later the benefits of the Maestro splicing tool in terms of time and user friendliness.
- How many persons are working with maintenance in your plant?
  To recognize the impact of the belts in customer maintenance department.
- What are your maintenance costs by hours in regular and overtime hours?
  Essential data for your next cost saving calculations.
- How many splices on site do you need per month?
  Clarifies the need for service on site.
- Which is the minimum temperature of water during washing and rinsing process? Are you adding any chemicals to the water?
  To know if we can manage with our mesh belts Ultrascreen.
- How frequently do you adjust the position of your scrapers?
  A trick question to clarify that a scraper should not be placed against any drum.
- How often do you have failure on belt splices, fasteners, V ropes?
  If you find frequent splice issues regarding belts with V ropes, you might consider offering a different splice, such as the Finger Over Finger.
  For mesh belts, the cracking of V ropes or fasteners is connected with mistracking issue.
- Are you familiar with the antimicrobial belt system?
  A question to explain the benefits of the Ammeraal Beltech technology.
- Where on the processing line do you have metal detectors? For example, before packaging?
  To know where you need to install belts without AS properties.
  Do you map/survey all your processing lines or should we organize this?

Need pay-off

- Amount to be saved if using positive drive belts.
  An opportunity to explain the advantages of using Ultrascreen PRO and AMMdrive (no slippage, self-tracking, avoiding stressed fasteners and cracking on V-rope and edges, plug & play, maintenance-free)
- How many splice tools would you need in order to be completely independent from fitters coming from third parties?
  Useful information to determine if the belting business could be taken from competitors by supplying Maestro splicing tools.
- Would you benefit from having one main belt supplier for your order processing?
  To convince your customer to give all business to Ammeraal Beltech with our One-Stop Belt Shop concept.
- Would you like the original belt as the first installation?
  To know if your customer has restrictions on some equipment where no risk is taken by using not original components.
- Are your maintenance staff up to date with technical belt trainings?
  To clarify if you could bring the customer relationship to a higher level, offering more belt knowledge.

Behind the sales questions

- Customers that export are much more sensitive to Food Safety than customers selling only to domestic companies.
- Customers are often unfamiliar with specific Food Grade standards – they will benefit from your explanation.
- If you have the possibility to deal with the Quality Manager, you can draw the attention to the high demand on Food Safety where we are stronger than competition.
- Customers with plants in different countries could benefit from Ammeraal Beltech sales network.
- Instead of a mix of different suppliers, the customer needs one single supplier such as Ammeraal Beltech with the One-Stop Belt Shop concept.
- All questions related to product contamination can be answered with our multiple solutions for Food Safety.

Additional sales questions on process steps

- Bi-directional conveyors for product dosing or with by-pass features are difficult to track. Normally in Fruit & Vegetable processing positive drive belts are used for this purpose. Ultrascreen PRO, modular or AMMdrive are a good options.
- Slide bed or roller support information will help to recognize which belt type you eventually could supply.
- If there is a metal detector, particularly in dry application, you should not supply belt with AS properties, because they will give false signals.
- Information about current belt type running is always very helpful.
  A full belt nomenclature from the competition could provide you with many technical details from their datasheets, including price settings, limitations in flexibility, Food Grade certificates, etc.
- If fixed tracking guides are present, non-fray belts should be recommended.
- Processing of different products on one single belt could be risky as regards stickiness and release properties. You may experience different belt performance.
- Information about OEM brand could help you recognize if already supplied as first installation from Ammeraal Beltech or for next references.

General belting tips for Fruit & Vegetable processing lines

- Non-stick surfaces for wet product. There are different types of profiles (A18, A2, etc.) and covers for different applications
- Hygienic design: easy cleanability (less water, detergents and labour intensity).
- Excellent drainage properties
- Good resistance to cleaning agents – deep sanitation
- The Dectyl and the XMD belt ranges are a great step forward in Food Safety, protecting consumers from the risk of pollution from broken plastic belt parts.
- High impact resistance
- Positive drive belts with smooth covers, no slippage
- Reduced belt elongation and strength even in high temperature (blanching)
- Foresee accessories for positioning and sorting fruits : finger cleats , brush or pillow belts
- Belt tension: as low as possible
- Plug & Play: no run-in time

Belt requirements

The Fruit & Vegetable industry needs high quality products and fabrications:

- Blue or white belt colors: choose a belt color with the highest contrast to the color of final food product which does not exist in nature. Light blue color RAL 5015 does not exist in food, while the dark blue color could be confused with foodstuffs like wood, seeds, etc.
  The white or light blue belt color could drastically improve your optical detection of broken belt fragments and other foreign bodies that cause contamination of your foodstuffs
- Food Grade at EC 1935/2004, EU 10/2011 and FDA
- X-ray and metal detectable conveyor belt range
- Easy-to-clean covers
- Positive drive belts: no mistracking
- Resistance to extreme temperatures (blanching and freezing)
- Oil and fat resistant if foreseen in some applications
- Non-shrink and non-wicking synthetic belts with impregnated bottom fabric (00+)
- Profiled cover: negative pyramid, fine diamond, fine square pyramid, negative rhomboid, etc.
- Perfect flatness
- High lateral stability or flexibility
- Perfect splice with constant friction
- Non-fray fabrics
- Belt color stability
- Range of materials: PVC, TPU, PP, PE, POM, PA, PK, etc.
- Belt slabs without any defect
- Different type of splice,\ e.g. finger over finger (FOF) and inclined finger
- Wide range of accessories such as ropes, sidewalls, carriers, sealed edges, etc.

Value proposition

With industry specific product innovation and a dedicated service concept, Ammeraal Beltech improves:

- Food Safety
- Product quality
- Production efficiency

Benefits	Ammeraal Beltech solution
Food Safety	Wide range of innovative and unique AB hygiene solutions. MD and XMD belt range are a step forward to protect consumers from broken plastic belt parts.
Top quality of final products	Easy-to-clean, non-stick belt; endless woven rotary moulder belts
Reduced downtime	High-speed Maestro splicing tools, fast service and quick deliveries
Increased production output	Extended belt life with reliable AB solutions
Reduced supplier base	One-Stop Belt Shop
Stock (capital employed)	Compact belt range and belt surveys
Positive drive	Soliflex PRO lug technology for avoiding slippage and extending belt lifetime

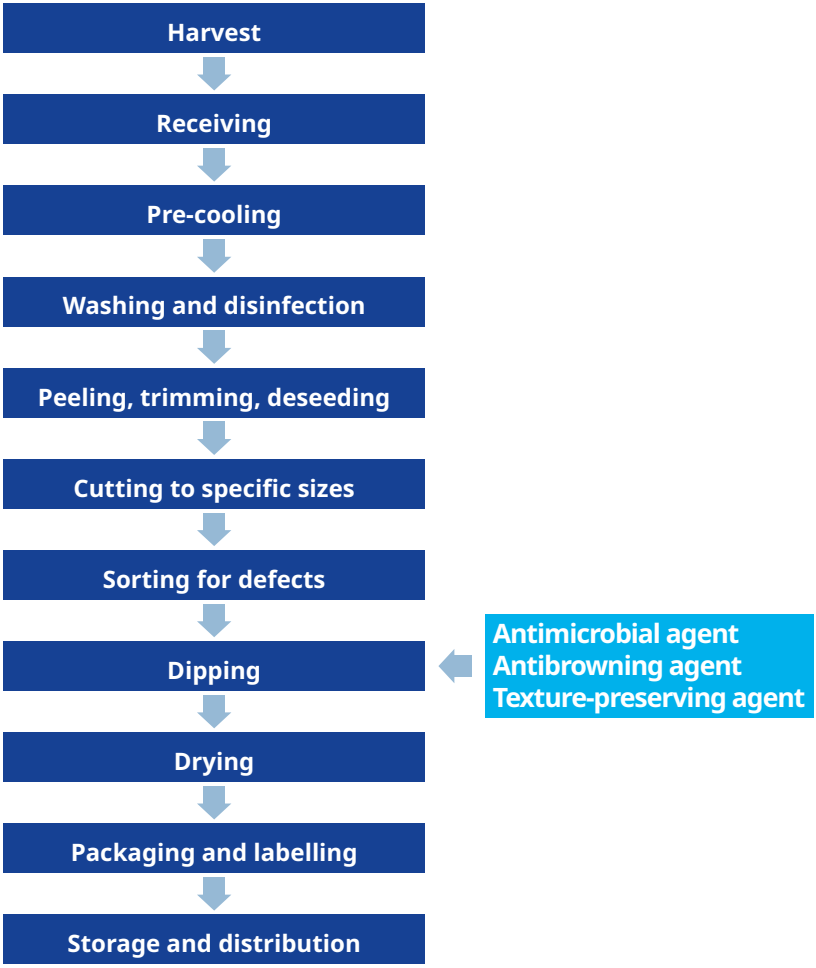
What to whom:

P	Product management
M	Maintenance management
Q	Quality management
O	Machine operator

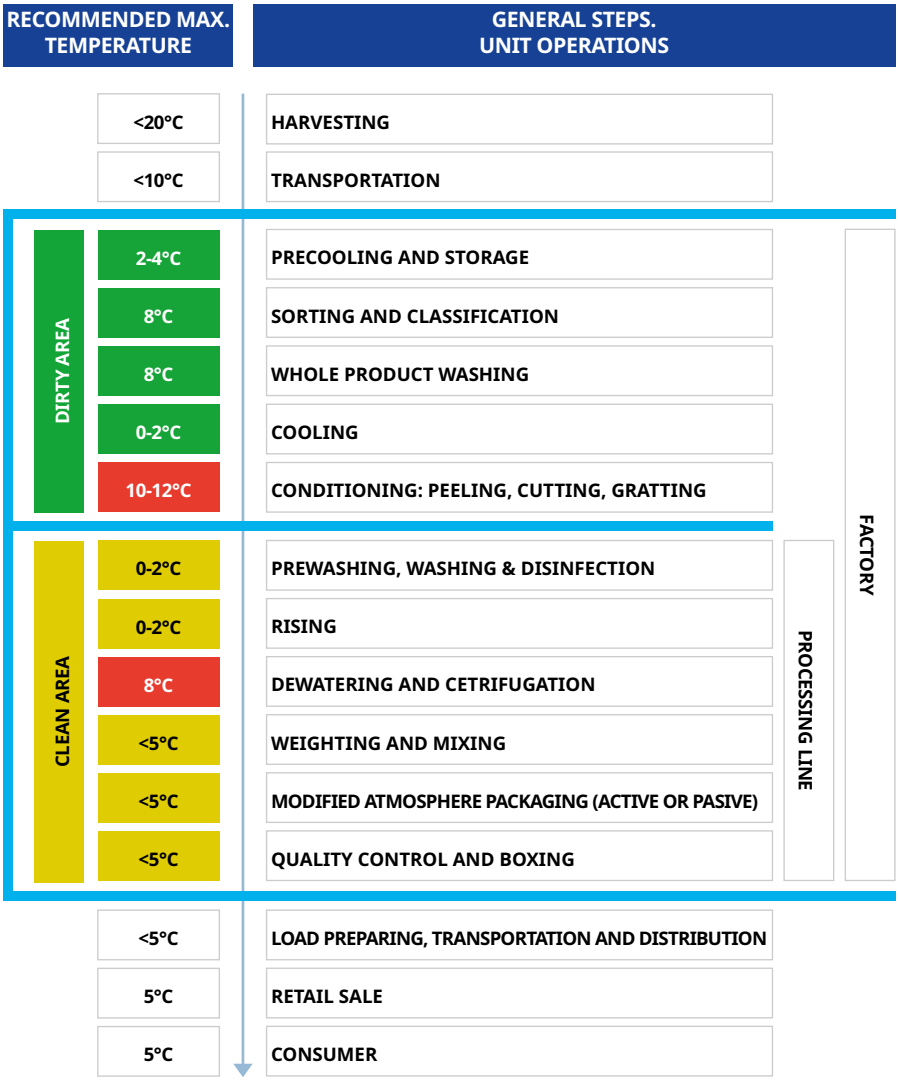
Ammeraal Beltech solution	P	M	Q	O
SAFE & CLEAN concept on the Soliflex homogeneous belt – the ultimate hygienic belt	X	X	X	
Wide range of light blue belts and accessories for easy cleaning and instant contamination recognition	X	X	X	X
Non-stick belts such as Ultraclean, Poliflex and Ropanyl	X	X	X	X
Know-how and instructions provided for belt cleaning	X	X	X	X
Antimicrobial (AM) belts	X	X	X	
Extended range of belts certified with Food Grade standards at EC and FDA levels	X		X	
Printed logos on Food Grade belts	X	X	X	
Full belt traceability in accordance with EC Regulation 2023/2006 (GMP)	X	X	X	
Synthetic belts with Amseal sealed edges for thorough and fast cleaning	X	X	X	X
Footless carriers with hygienic design	X	X	X	X
Ropanyl and Nonex crack-free belt series	X	X	X	X
X-ray & metal detectable conveyor belt range to be added	X		X	

Main processing stages of fresh-cut fruits, vegetables and root crops

Fresh-cut processing involves peeling, trimming and deseeding fresh produce and cutting it to a specific size. Fresh-cut products must not only look fresh, but also have the sensory properties associated with freshly prepared produce, like aroma, taste, texture and visual appeal. Thus only fresh produce of good quality must be used as the starting material in fresh-cut processing. Fresh-cut products must also be safe, wholesome and nutritious.



Unit operations and recommended temperature for each step (temperature could be higher because of different regulations in different countries)



FRESH-CUT VEGETABLE

Fully grown salad: it's trimmed and sliced with a rough cut or a shredded cut. These salads are often cut into squares or long strips. It's important to know that there are always a lot of inevitable small rejects with multiple mechanical cuts. These small scraps of 3-4 mm, which are also generated during falls and drying, are very sticky and not easy to remove, so they are considered a contaminant.

Baby leaves: they are harvested mechanically in greenhouses.
These salads have leaves with thin stems that slip everywhere, so it would be better to to prevent the use of open belts or limit it, so that baby leafs won't get stuck and damaged. If the spoiled product comes off and returns with the mass of good-quality leaves, it will certainly trigger putrescence of the whole product batch.The phenomenon can be limited post drying with appropriate air blades.
Arugula and baby spinach have long, rigid, thin stems that slip everywhere. They are the worst case to prevent.

Root crops like carrots, radish, or other crudities like fenoil, cabbage, olives, etc.In this process, there is not only contamination from foreign bodies, but also from rotting parts (putrid, rotten, spoiled). Consider each cut part a potential trigger of putrescence. In addition, if a leaf remains attached to the tape for hours, turn after turn it is being crushed by the new flows transported. The cutting scraps are lost in water but are also present during the drying and at each processing step. In general, keep attention to the choice of modular belts after drying and foresee the use of air blade where possible.

FRESH-CUT FRUITS

Fruits come in a variety of shapes and sizes with a range of specific flavors and textures. Fresh-cut fruits are mainly the tropical ones like mangoes, papayas, kiwi, pineapples, bananas, melons, etc. Apples, pears, peaches, and citrus are a different fruit range in fresh-cut business. Many popular fruits require peeling and preparation before eating. They are attractive to the busy consumer if presented in a convenient package in a ready-to-eat format.
Pineapples need a process stage in a dip tank after the slicing, all the other fruits need this process stage to avoid the oxidation and preserve their color and taste.

Non-stop production

This sector operates throughout the full year, as the use of greenhouses releases crops and harvests from seasonality. Despite this, the producers of 4th range must plan ahead and stricly respect the daily production schedules because they have to ship the right quantity of the product mix required by the retail and food services market.
This is an important detail because the rapid belt repair or assembly service are an important selling topic: end users can't stop a line for days!

Maintaining the quality of fresh-cut fruits and vegetables between harvest and processing

Harvesting to assure quality and safety

Quality is influenced by maturity at harvest, the methods of harvesting, storage times, temperatures, and the extent of handling. Produce should ideally be harvested during the cooler part of the day, on the day of processing, in order to minimize storage and handling and thus increase fresh-cut shelf-life. Field staff should be trained in proper harvesting methods as well as the use the appropriate harvesting equipment and protective containers so as to prevent damage to the produce. Fruit should be mature, with flavour developing for best taste. Produce with insect damage, sun scorch or any other physical damage would not produce good quality fresh-cut products with the desired shelf-life. Reducing defects also reduces the microbial load associated with the produce.

Post-harvest handling to assure quality and safety of fresh produce

Harvested produce should be placed in a shaded area so as to avoid sun damage while awaiting transportation to the processing plant. Produce must be properly handled to avoid bruising and contamination.

Pre-cooling

Pre-cooling is the rapid removal of field heat from fresh produce. It is among the most efficient quality enhancements available to commercial producers and ranks as one of the most essential value-added activities in the horticultural chain. Proper pre-cooling can:

- Prevent quality loss due to softening by suppressing enzymatic degradation and respiratory activity
- Prevent wilting by slowing or inhibiting water loss
- Slow the rate of produce decay by slowing or inhibiting microbial growth (fungi and bacteria)
- Reduce the rate of ethylene production
- Minimize the impact of ethylene on ethylene-sensitive produce

Washing and disinfection

Any dirt on the surface of produce must be thoroughly removed by washing in water. The produce must be subsequently washed in potable water containing a sanitizer in order to reduce the risk of the transfer of microbial contamination during processing.

A sanitizing agent or sanitizer is an antimicrobial agent applied to destroy or reduce the number of microorganisms of public health concern, without affecting produce quality and consumer safety. Sanitizers minimize the transmission of pathogens from water to produce, reduce the microbial load on the surface of the produce and prevent microbial build-up in the processing water.
Sanitizers applied to fresh fruit and vegetables must be safe to use and must be used in accordance with given instructions. The sanitizer concentration in the processing water should be routinely monitored and adjusted to prescribed levels. Should it not be possible to monitor the sanitizer concentration, recommendations for the reuse of sanitized water should be followed. In order to minimize the build-up of organic materials, the water must be filtered, or otherwise changed. Technical assistance on the use of sanitizers should be sought when necessary.

Sanitizer treatment: Post-harvest handling and sanitation treatments have considerable impact on the microbiological quality of fresh-cut produce. Washing whole fruits and vegetables in clean water only achieves an insignificant reduction in microbial populations. The use of sanitizers such as chlorine, peroxyacetic acid, hydrogen peroxide, acidified sodium chloride or ozone can provide an additional 1-2 log reduction in the initial population of microorganisms on the surface of fresh produce. Chlorine is currently the most used sanitizer in washing, successfully used at concentrations ranging from 50 to 100 parts per million (ppm) to wash fruit and vegetables in fresh-cut studies.
Improper use of chlorine can, however, lead to the retention of a faint chlorine odour on the fresh-cut fruit and vegetable. Despite its common use as a disinfectant for decontamination of fresh produce, chemical hazards associated with chlorine or chlorine residues are of concern. The use of chlorine in the processing of minimally processed products has been banned in some European countries.

UNI EN ISO 22000 (previously HACCP) for effective running of a fresh-cut plant

From 1988 to the present day, HACCP principles have been promoted and incorporated into food safety laws in many countries around the world. The approach was originally derived from engineering systems – failure mode and effect analysis. It was further developed by Pillsbury/NASA for the American Space Programme. ISO 22000 reduced the risk of astronauts suffering from the effects of consuming contaminated food whilst in space. It is a food safety methodology that relies on the identification of Critical Control Points (CCPs) in food production and preparation processes. Closely monitored CCPs will ensure that food is safe for human consumption. ISO 22000 is used to avoid the antiquated approach of testing the finished product without knowing the risks involved in preparation. The ISO 22000 system consists of seven principles:

- **Principle 1:** Conduct a hazard analysis. Three main categories of are hazards: biological, chemical and physical, may affect products. Management should determine the food safety hazards and identify the preventive measures that can be applied by the plant to control these hazards.

- **Principle 2:** Identify CCPs and the steps or procedures in a food processes at which control can be applied. The result is a prevention of a food safety hazard or its reduction to an acceptable level.

- **Principle 3:** Establish critical limits for each CCP. A critical limit is the maximum or minimum value to which a physical, biological or chemical hazard must be controlled at a critical control point to prevent, eliminate or reduce the hazard to an acceptable level.

- **Principle 4:** Establish CCP monitoring requirements. Monitoring activities are necessary to ensure that the process is under control at each critical control point.

- **Principle 5:** Establish corrective actions. These are actions to be taken when monitoring indicates a deviation from an established critical limit. The final rule requires a plant's HACCP plan to identify the corrective actions to be taken if a critical limit is not met. Corrective actions are intended to ensure that no product injurious to health or otherwise adulterated as a result of the deviation, enters commerce.

- **Principle 6:** Establish record-keeping procedures – a written ISO 22000 plan and records documenting the monitoring of critical control points, critical limits, verification activities and the handling of processing deviations.

- **Principle 7:** Establish procedures for ensuring that the ISO 22000 system is working as intended. Validation ensures that the plans do what they were designed to do; that is, they are successful in ensuring the production of safe products. Plants will be required to validate their own ISO 22000 plans. Verification ensures that the ISO 22000 plan is adequate and is working as intended. Verification procedures may include such activities as a review of ISO 22000 plans, CCP records, critical limits and microbial sampling and analysis.

When developing an ISO 22000 plan, the whole process must be evaluated for possible risks. An ISO 22000 flow chart would show the CCPs and a decision-making tree would be used to determine which hazard may actually be controlled and measured.

Equipment requirements for fresh-cut processing

Fresh-cut processing can be performed at different scales of operation. Regardless of the scale of operation, individuals engaged in fresh-cut processing should be properly attired with protective clothing, including gloves, aprons and hair nets. They should be well-trained in the preparation of products to minimize damage, excessive handling and contamination. Equipment must be cleanable, properly maintained and sanitized prior to use. Surfaces that come in contact with the food must be non-toxic, non-reactive with the produce, non-contaminating to the produce, non-corrosive and cleanable. Stainless steel of the 300 series is preferred for food contact surfaces.

Equipment for fresh-cut processing should be designed so that it is easy to clean and maintain, thus minimizing the potential for microbial contamination of the fresh-cut product.
It's recommended to use smooth, non-absorbent, sealed and easily cleanable food contact surfaces that are sloped to drain freely and made of durable, non-corrosive, non-toxic materials for fresh-cut processing. Food contact surfaces include items such as knives, conveyors, belts, chutes, product totes, gloves, tools with shovels and racks, cutting boards, tables, driers and spinner baskets as well as packing scales.
All food contact surfaces should be smoothly bonded (i.e. free of pits, folds, cracks, crevices, open seams, cotter pins, exposed threads and hinges) to avoid harbouring pathogens.

1.0 Fresh-cut vegetable processing

Introduction
Many fresh-cut processing plants for leafy vegetables use automated equipment for all stages of fresh-cut processing. These include the following main items of equipment:

A. Weighing belts at reception bunker / infeed systems to guarantee the right product mix and flow
B. Slicer for fully grown salads
C. Washing tanks
D. Dewatering equipment decreasing residual moisture to 10%
E. Weighing belts to feed the drying equipment in the correct way
F. Drying equipment decreasing residual moisture to between 1 and 5%
G. Optical sorting equipment
H. Outfeed drying/sorting equipment
I. Packaging equipment

Note
The drying (F) equipment can be different in function of the type of vegetables, quality parameters and the percentage of residual moisture recommended to guarantee the correct shelf life:

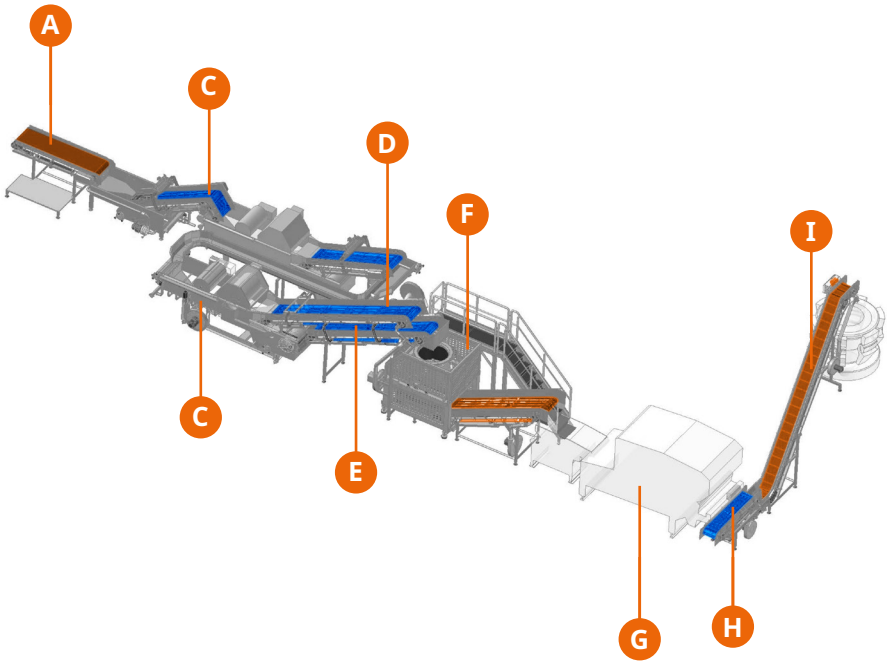
1. Vertical spin dryer (1-5% residual moisture baby leaves & fully grown salads)

2. Horizontal spin dryer (1-2% residual moisture baby leaves)

3. Drying tunnel (1-2% residual moisture baby leaves)

1.1 Plant layout for fresh-cut vegetables by type of product

Line for baby leaves with spin dryer (arugula, lamb lettuce, spinach, etc.)



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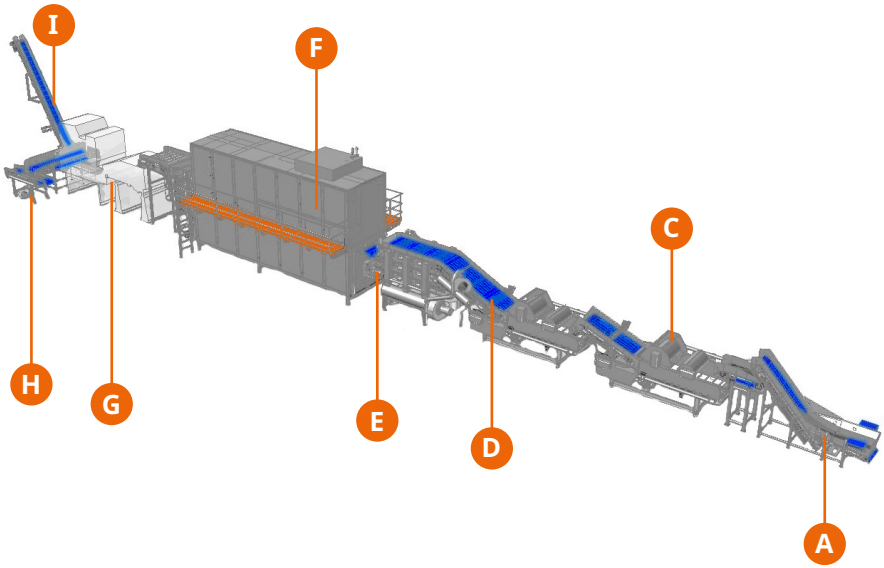
Line for baby leaves with drying tunnel (arugula, lamb lettuce, spinach, etc.)



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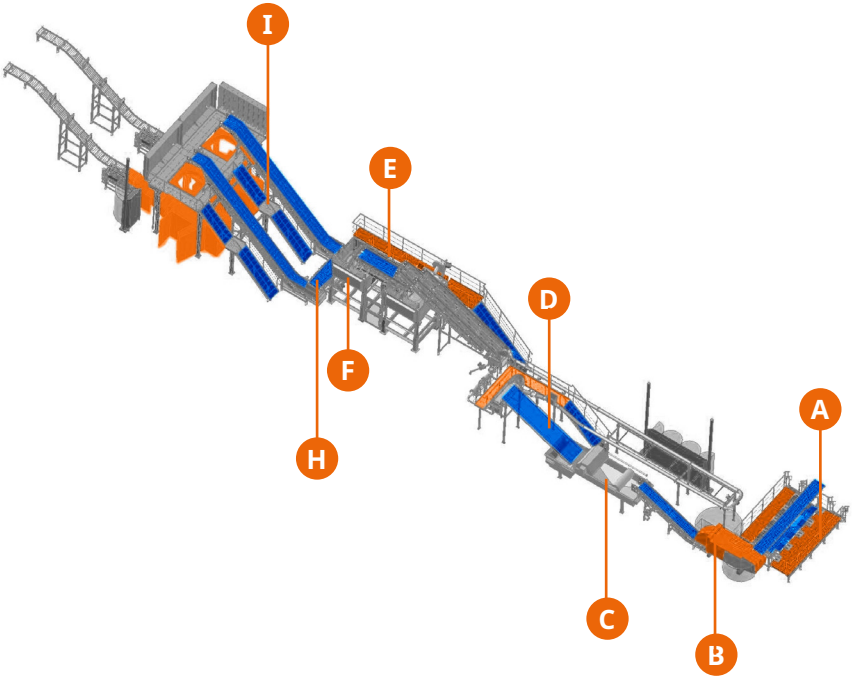
Line for fully grown salads (lettuce, iceberg, chioggia, etc.), crudity (carrots, cabbage, fennel, etc.), mix of them



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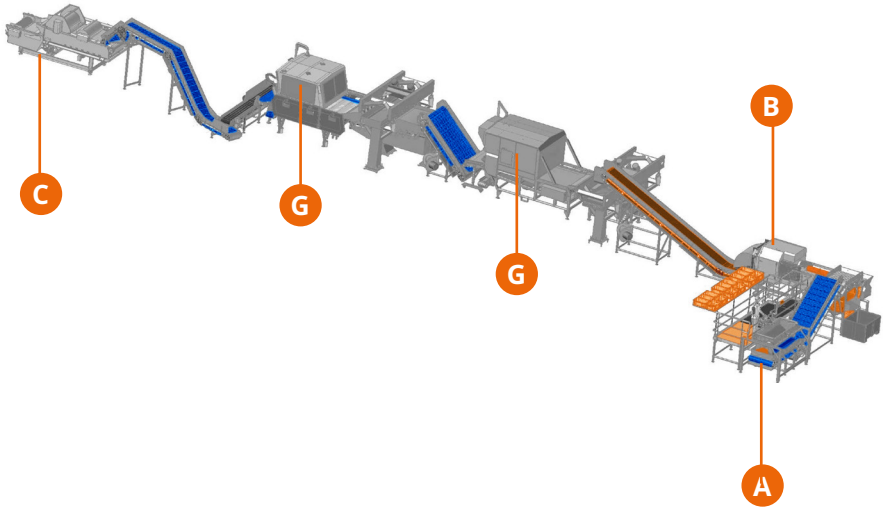
The main difference in the process for these raw materials is the presence of a trimming table (prepline) and a slicer in the case of fully grown salad vs baby leaves. In this last case we have a reception bunker.

In some cases, for the **lines with high high capacity for fully grown grown salads** there are no trimming tables but a direct cut line feeded like baby leaves line by a reception bunker for whole heads of salads. The quality is supported by 2 optical sorters in line before the washing. The rest of the line remains the same as before.



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Industry characteristics

- High quantity of modular and mesh belts
- From 2 to 15 processing lines per plant
- Average capacity of 300-800 kg/h for baby leaves and 1000-2500 kg/h for fully grown salad
- ISO 22000 (previously HACCP) quality control
- IFS Certification (*)
- BRC Certification
- 50-250 employees per plant

Processing line widths:

- Min width 600 mm
- Max width 1500 mm

Common processing line widths:

- 600, 800 or 1000 mm
- 2 or 3 working shifts a day, 6 days per week

(*) IFS Food Standard reviews the products and production processes to evaluate a food producer's ability to produce safe, authentic, and quality products according to legal requirements and customer specifications

Manufacturers of equipment for fresh-cut vegetables

Processing lines	Slicers	Optical sorters	Packaging
Turatti Natural Innovation HQ: Italy	Turatti Natural Innovation	TOMRA HQ: Belgium	ISHIDA HQ: UK
TECNOCEAM HQ: Italy	TECNOCEAM	KEY Technology HQ: USA	Yamato HQ: Germany
Naddeo HQ: Italy	Naddeo	RayTec Vision HQ: Italy	MULTIPOND HQ: France
sormac vegetable processing equipment HQ: Netherlands	URSCHEL HQ: USA		IMA ILAPAK HQ: Italy
JBT FTNON HQ: Netherlands	JBT FTNON		GEA HQ: Netherlands
KRONEN THE CROWN FOR FRESHNESS HQ: Germany	KRONEN THE CROWN FOR FRESHNESS HQ: Germany		KLC HQ: Italy
SGORBATI GROUP HQ: Italy	FAM stumabo HQ: Belgium		COMEK AUTOMATIC PACKAGING SOLUTIONS HQ: Italy
FINIS allert HQ: Netherlands	FINIS allert HQ: Netherlands		G. MONDINI HQ: Italy
			ULMA HQ: Spain
			TAVIL HQ: Spain
			REEPACK COMMITTED TO PACK HQ: Italy
			TIBER PACK HQ: Italy
			SCHUBERT HQ: Germany

A. Process step
Infeed systems

Production process

The infeed line for baby leaves and fully grown salads comes with a bin tipper or plastic crates. The raw material is unloaded on the weighing hopper, which is a sort of weighing station to ensure the right mix of different products and the production continuity.
In some cases, only a bunker belt can be set for ensuring a continuous flow through.
Different belt speed can be implemented to feed a line constantly and give the opportunity for the operator to detect some foreign bodies or damaged leaves.

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When it comes to manual trimming, the line can feature a trimming table for fully grown salads. It is an ergonomic and functional solution for trimming operations on the products, usually equipped with inlet belt for the product to be trimmed and another one for the output of selected product.

Belt details

- Low speed
- Non-stick surface
- 600-1500mm in width
- Positive drive homogenous belts are also used

Typical belt problems and their consequences

- Sanitation difficulties

Additional sales questions

- Is it a conveyor layout with roller support or sliding belt?
- How many different types of raw materials does the belt process? What are the dimensions of leaves and how sticky are they?
- What type of belt is currently installed? Competitor brand, belt description, and typology can help you choose a suitable belt.

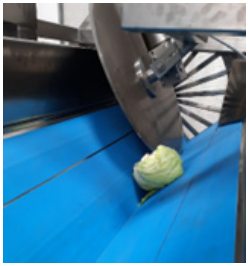
Features	Heavy-duty fabric belts (2-3 plies), positive drive homogeneous belts, mesh belts or modular belts
Food safety	Non-stick material and belt finishing (low contact area is the key)
Extended lifetime	• Consistent belt strength and stiffness independent from temperature and cleaning conditions – modular belts with resistance to the oxidation • Positive drive belts provide less tension and are maintenance-free – Ultrascreen mesh belts, Soliflex homogenous belts, AMMdrive positive drive conveyor processing belts
Fast instalaltion on site	Positive drive, plug & play – no run-in time
Maintenance-free belt	Soliflex PRO, AMMdrive and Ultrascreen PRO with self-tracking system and self-cleaning sprockets

Belt type	Selection
AMMdrive TPU light blue	Positive drive solution
Soliflex range: XMD and PRO TPU	Homogeneous positive drive solution
Ultrascreen range: XMD and PRO	Recommended solution for weighing hopper
uni MPB 2″	Modular belt solution PP/PE/ POM DI blue
uni SNB 1″	Modular belt solution PP/PE/ POM DI blue
uni S-MPB 1″	Modular belt solution PP/PE/ POM DI blue
uni CNB 1″	Modular belt solution PP/PE/ POM DI blue
514694 Flexam EM 8/2 00 + 04 light blue M2 FG	Classic solution for trimming table
573810 Nonex EM 15/3 A18 + 07 light blue FG AM	Classic solution for trimming table

B. Process step
Slicer

Production process

The cutter slices a wide variety of food products at high production capacities. Wide variety of interchangeable cutting wheels is available to create a full range of slices, shreds, and julienne cuts. VFD (variable frequency drive) offers precise speed control and maximum energy savings.



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Belt details

- Non-stick surface
- Longitudinal guide ropes

Typical belt problems and their consequences

- Sanitation difficulties
- Belt shrinkage

Additional sales questions

- How many different types of raw materials does the belt process? What are the dimensions of leaves and how sticky are they?
- What is the maximum belt speed?
- What type of belt is currently installed? Competitor brand, belt description, and typology can help you choose a suitable belt.

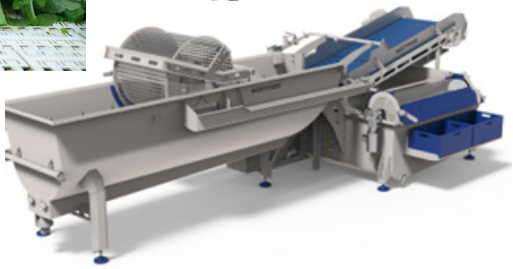
Food safety	Non-stick belt Stick to one spelling rule throughout the whole document. I suggest antimicrobial properties
Extended life-time	Crack-free belt covers
Fast instalaltion on site	No run-in time

Belt type	Selection
578932 Ropanyl DM 8/2 A2 + 06 light blue AS FG	Infeed slicing: recommended solution for big slicers with high speed (Urschel)
573920-573790 Ropanyl EM 8/2 00 + 02 light blue AS FG	Infeed slicing: recommended solution for compact slicer
Soliflex range: XMD and PRO TPU	Outfeed slicing: homogeneous positive drive solution
Ultrascreen range: XMD and PRO	Outfeed slicing: recommended solution for weighing hopper

C. Process step
Washing

Production process

The washing machine the washing machine adapts to to different production volumes, and utilizes advantage of the gentle action of air bubbles to ensure an excellent result while preserving the integrity of the product. It's particularly suitable for baby leaves, fruit, vegetables, vegetables, etc. It can can be optionally equipped with a filter for insects and for small floating impurities. Chlorine (50-100 ppm) or other chemicals are used during washing to avoid any kind of cross-contamination between the water and the vegetables. There are two or three steps of washing. During washing, the temperature of water is 10-15°C, during the rinsing – 3-5°C.



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Belt details

- Low speed
- Different types of mesh available
- Water permeability
- Air permeability
- Friction driven

Typical belt problems and their consequences

- High tension
- Mistracking problems
- Slippage
- Cracking on fastener, edges, and ropes
- Maintenance-intensive
- Product contamination

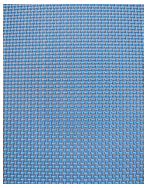
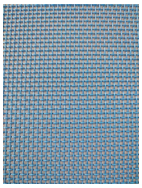
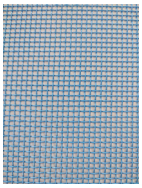
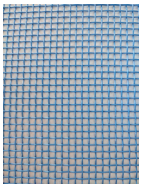
Additional sales questions

- What type of belt is currently installed?
  Competitor brand, belt description, and typology can help you choose a suitable belt.

Benefits	Ultrascreen PRO: • The ultimate tracking performance, no mistracking • Less tension applied to materials during assembly • Reduced energy required to run your conveyor • Plug & play (no run-in time) • Lower maintenance costs • Lesser belt elongation
Food safety	Ultrascreen XMD edges available: the edges are X-ray and metal-detectable Ultrascreen PRO: easy to sanitize and with excellent hygienic qualities, supports ISO 22000 requirements (previously HACCP). PRO version reduces the product contamination
Extended lifetime	Positive drive belts provide less tension and are maintenance-free
Fast instalation on site	Positive drive, plug & play – no run-in time
Maintenance-free belt	Ultrascreen PRO with self-tracking system and self-cleaning sprockets. Maintenance-free

Belt type	Selection
Ultrascreen range: XMD and Pro	Recommended solution

Available mesh inside Ultrascreen range:

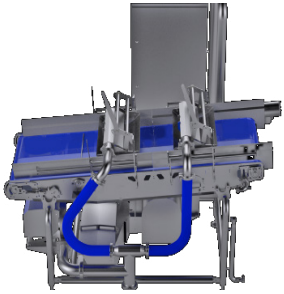
Product	Ultrascreen 1000 µm	Ultrascreen 2000 µm	Ultrascreen 3000 µm	Ultrascreen 4000 µm
				

Description				
Available mesh	Polyester	Polyester	Polyester	Polyester
Air permeability L/dm²/s @100Pa	3640	5080	6000	6540
Water permeability L/(m²/s) @200mbar	2020	3350	5000	6450
Open area	30%	45%	55%	64%
Available belt width Ultrascreen	2000 mm	2000 mm	2000 mm	2000 mm
Available belt width Ultrascreen PRO	1450 mm	1450 mm	1450 mm	NA
Available belt width Ultrascreen XMD	1450 mm	1450 mm	1450 mm	NA

D. Process step
Dewatering

The dewatering equipment is particularly suitable for the first step of drying of the product. These systems continuously remove water from the surface of fresh fruit and vegetables, limiting the mechanical stresses applied to the product. They are often used upstream of the drying tunnels and spin dryers, or other solutions based on the customer's needs.
Water is drained with beaters, extracted under vacuum and the product is removed from the belt with air blades.
They are designed and manufactured in compliance with sanitation principles that ensure effective and efficient cleaning.

The main features are:
- Maximum flexibility for a wide variety of products and applications
- Ability to dry very fragile and delicate products
- Continuity of processing



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Belt details
- Low speed
- Different types of mesh available. Standard version is 2000 microns with a residual moinsture of 10%
- Water and air permeability
- Friction driven

Typical belt problems and their consequences

- High tension
- Mistracking problems
- Slippage
- Cracking on fastener, edges, and ropes
- Maintenance-intensive
- Product contamination

Benefits	Ultrascreen PRO: • The ultimate tracking performance, no mistracking • Less tension applied to materials during assembly • Reduced energy required to run your conveyor • Plug & play (no run-in time) • Lower maintenance costs • Lesser belt elongation
Food safety	Ultrascreen XMD: the edges are X-ray and metal-detectable Ultrascreen PRO: easy to sanitize and with excellent hygienic qualities, supports ISO 22000 requirements (previously HACCP). PRO version reduces the product contamination
Extended lifetime	Positive drive belts: less tension
Fast instalation on site	Positive drive, plug & play – no run-in time
Maintenance-free belt	Ultrascreen PRO with self-tracking system and self-cleaning sprockets. Maintenance-free

Belt type	Selection
Ultrascreen range: XMD and PRO	Recommended solution

E. Process step
Continuous weighing belts

The weighing conveyor is provided with 4 load cells cells. It's suitable for batch weighing and continuous weighing. The weighing conveyor may be used for inline weighing or for infeeding the drying equipment.

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Belt details

- Low speed
- Different types of mesh available. Standard versions are 1000 or 2000 microns
- Water permeability for infeed drying equipment
- Air permeability
- Friction driven

Typical belt problems and their consequences

- High tension
- Mistracking problems
- Slippage
- Cracking on fastener, edges, and ropes
- Maintenance-intensive
- Product contamination

Additional sales questions

- What type of belt is currently installed?
  Competitor brand, belt description, and typology can help you choose a suitable belt.

Benefits	Ultrascreen PRO: ● The ultimate tracking performance, no mistracking ● Less tension applied to materials during assembly ● Reduced energy required to run your conveyor ● Plug & play (no run-in time) ● Lower maintenance costs ● Lesser belt elongation
Food safety	Ultrascreen XMD edges available: the edges are X-ray and metal-detectable Ultrascreen PRO: easy to sanitize and with excellent hygienic qualities, supports ISO 22000 requirements (previously HACCP). PRO version reduces the product contamination
Extended lifetime	Positive drive belts provide less tension
Fast instalation on site	Positive drive, plug & play – no run-in time
Maintenance-free belt	Ultrascreen PRO with self-tracking system and self-cleaning sprockets. Maintenance-free

Belt type	Selection
Ultrascreen range: XMD and PRO	Recommended solution

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F. Process step
Drying

The spin dryer can be used to dry all the leafy or diced vegetables by centrifugal action with a fixed cycle. Moreover, it's particularly suitable for fresh-cut products. The rotating drum is loaded with produce coming from a weighing conveyor belt, and at the end of the spin cycle, it transfers the product onto a discharging belt. The speed of loading and centrifugation are adjustable by the control unit. The standard processing cycle lasts 1 minute. Its main innovation is the implementation of a new braking system, which allows a considerable energy recovery.

There are 2 types of spin dryers:
- Vertical infeed, which is a standard inside processing equipment
- Horizontal infeed – the drumdrum has a completely smooth inner surface without a central axle or other parts which could damage the product. It's used for fragile baby leaves because a low level of pressure (kg/cm^2) is applied on the leaves

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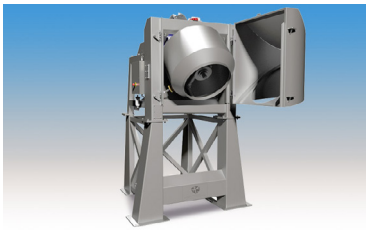
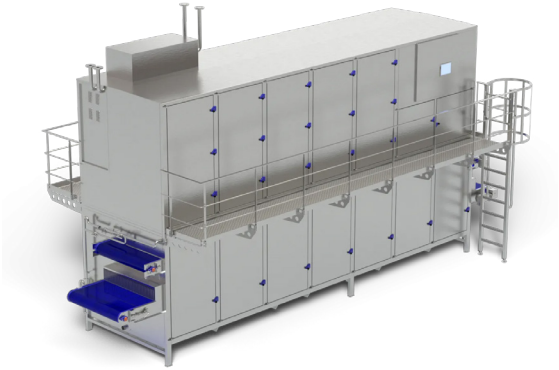


Air drying tunnel was developed specifically for drying delicate leafy vegetables and for creating a low-attached moisture percentage with leafy vegetables. It ensures continuous flow of product. The machine is able to quickly dry delicate leafy vegetables (i.e. baby leaf salad, basil) by means of dehumidified air, preserving product freshness and prolonging its shelf-life at the same time.



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Belt details

- Low speed
- Different types of mesh available. Standard versions are 1000 or 2000 microns
- Water permeability for infeed drying equipment
- Air permeability
- Friction driven

Typical belt problems and their consequences

- High tension
- Mistracking problems
- Slippage
- Cracking on fastener, edges, and ropes
- Maintenance-intensive
- Product contamination

Additional sales questions

- What type of belt is currently installed?
  Competitor brand, belt description, and typology can help you choose a suitable belt.

Benefits	Ultrascreen PRO: • The ultimate tracking performance, no mistracking • Less tension applied to materials during assembly • Reduced energy required to run your conveyor • Plug & play (no run-in time) • Lower maintenance costs • Lesser belt elongation
Food safety	Ultrascreen XMD edges available: the edges are X-ray and metal-detectable Ultrascreen PRO: easy to sanitize and with excellent hygienic qualities, supports ISO 22000 requirements (previously HACCP). PRO version reduces the product contamination
Extended lifetime	Positive drive belts provide less tension
Fast instalation on site	Positive drive, plug & play – no run-in time
Maintenance-free belt	Ultrascreen PRO with self-tracking system and self-cleaning sprockets. Maintenance-free

Belt type	Selection
Ultrascreen range: XMD and PRO	Recommended solution

G. Process step
Optical sorter

The optical sorter is equipped with high-resolution cameras that examine the product on a conveyor belt and are able to to discard products with color defects, rotten products, and foreign bodies, even the ones in the same color as the good product. The product is fed onto the inspection tape, which stabilizes the product so that it does not roll. The optical sorter is equipped with air waste system through ejection valves with electric control.

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Belt details

- High speed (260 m/min)
- Non-stick surface
- Transparent to the vision system
- Typical belt dimensions: 5-6 m long and 600, 1200 or 1800 mm wide
- Conveyor layout with knife edge 38 mm-160°

Typical belt problems and their consequences

- Belt shrinkage
- Cleaning difficulties
- Short lifetime
- Mistracking problems
- Software tuning by belt reflection

Additional sales questions

- What type of belt is currently installed?
  Competitor brand, belt description, and typology can help you choose a suitable belt.
- Manufacturing OEM?
- Is Ammseal needed?
- Is there an automatic tracking device present?

Food safety	Non-stick belt Scraper-friendly covers Amseal sealed edges
Extended lifetime	Amseal extra resistant sealed edges Double cover belts Non-shrinkage belts
Fast instalation on site	Maestro splicing tool
Maintenance-free belt	High lateral stability fabrics EM6/2

Belt type	Selection
577822	Ropanyl EM 6/2 00+A2 white FG NL
577832	Ropanyl EM 8/2 00+A2 light blue FG NL
576749	Ropanyl ESM 5/2 00+015 light blue M1 AS FG AM NF
578749	Ropanyl ESM 5/2 00+015 white M1 FG
577950	Ropanyl EM 6/2 00+02 white AS FG
577951	Ropanyl EM 6/2 00+02 white M2 AS FG

H. Process step
Outfeed drying/sorting

In the outfeed of drying or optical sorter (if it's present) there are bypass belts with bi-directional distribution systems to accumulate the product and in the end feed the packing. In some cases, they are used to prepare the product for mixing. Sometimes, weighing hopper are used to add particular ingredients into the salad mix.

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Belt details

- Low speed
- Homogeneous belt
- Different types of mesh available. Standard versions are 1000 or 2000 microns
- Friction driven

Typical belt problems and their consequences

- Sticking
- High tension
- Mistracking problems
- Slippage
- Cracking on fastener, edges, and ropes
- Maintenance-intensive
- Product contamination

Additional sales questions

- What type of belt is currently installed?
  Competitor brand, belt description, and typology can help you choose a suitable belt.

Benefits	Positive drive Soliflex PRO and Ultrascreen PRO: • The ultimate tracking performance, no mistracking • Less tension applied to materials during assembly • Reduced energy required to run your conveyor • Plug & play (no run-in time) • Lower maintenance costs • Lesser belt elongation
Food safety	Non-stick belt A18 for Soliflex PRO XMD version available Easy to sanitize and with excellent hygienic qualities, supports ISO 22000 requirements (previously HACCP)
Extended lifetime	Positive drive belts provide less tension No slippage
Fast instalation on site	Positive drive, plug & play – no run-in time
Maintenance-free belt	Ultrascreen PRO with self-tracking system and self-cleaning sprockets. Maintenance-free

Belt type	Selection
Ultrascreen range: XMD and PRO	Recommended mesh belt
AMMdrive TPU light blue	Positive drive solution
Soliflex range: XMD and PRO TPU	Homogeneous positive drive solution
uni MPB 2”	Modular belt solution PP/PE/ POM DI blue
uni SNB 1”	Modular belt solution PP/PE/ POM DI blue
uni S-MPB 1”	Modular belt solution PP/PE/ POM DI blue
uni CNB 1”	Modular belt solution PP/PE/ POM DI blue

I. Process step
Packaging

The packaging is handled by elevator belts and scales, and then the product is conveyed to the vertical packaging machine (for bagger) or to the horyzontal one (for flowpacks and sealers). The baggers need pull down belts, the horizontal machines need belts for feeding, buffering and flow-wrapping or sealing in a sequence.

Belt details

- Vertical machines need inclined elevator belts with carriers and sidewalls. Swan neck conveyor layout is common. Typical solutions are modular belts, mesh belts and homogeneous positive drive belts
- Belt is running at low speed with many starts and stops
- Typical belt dimensions: 5-10 m long and 600-800 mm wide
- Horizontal machines need many narrow synthetic belts that are always running on double tight knife edges. Omega drives and high speeds are common
- Typical belt dimensions: 1-4 m long and 200-500 mm wide
- Knife edge with wrapping angle of 180°

Typical belt problems and their consequences

- Vertical machines have issues with broken carriers and sidewalls
- Horizontal belts have problems with mistracking, contamination contamination from frays, bad wrapping on knife edges due to belt rigidity, cracking on top cover and, particularly, issues with findingQZ> the right grip

Food safety	Synthetic belts for horizontal machines: • Non-fray properties • Crack-free cover • Antimicrobical properties on light blue belts • Amseal for sealed edges • Scraper-friendly covers Elevator belts: • Non-stick belt A18 for Soliflex PRO • XMD version available for Ultrascreen and Soliflex • MD version available for modular belts • Easy to sanitize and with excellent hygienic qualities, supports ISO 22000 requirements (previously HACCP).
Extended lifetime	Self-tracking for homogeneous and modular belts Heavy-duty flexible fabric belts Crack-free cover Self-tracking homogeneous and fabric belts Non-shrinkage belts Constant top cover friction
Fast instalation on site	Positive drive, plug & play – no run-in time

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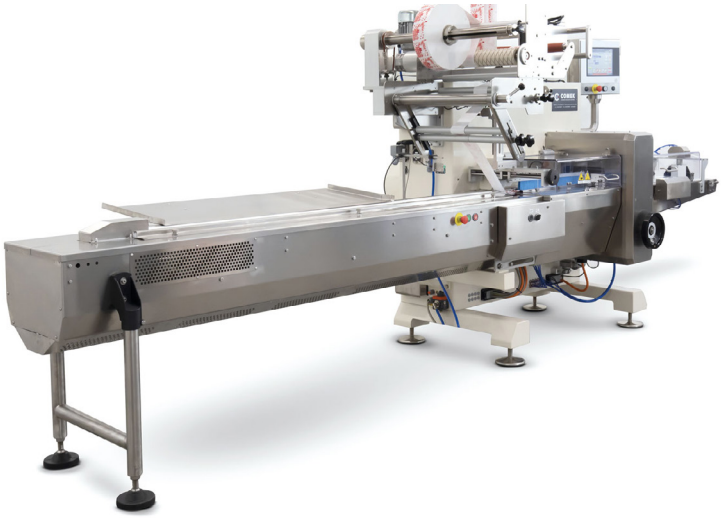


Vertical/horizontal infeed packaging machine solutions:

Belt type	Selection
AMMdrive TPU light blue	Positive drive solution for swan neck conveyors
Soliflex range: XMD and PRO TPU	Homogeneous positive drive solution for swan neck conveyors
Ultrascreen range: XMD and PRO	Recommended mesh belts for swan neck conveyors
Engineering timing belts	Top cover is chosen based on packing materials and working conditions
uni MPB 2″	Modular belt solution PP/PE/ POM DI blue
uni SNB 1″	Modular belt solution PP/PE/ POM DI blue
uni CNB 1″	Modular belt solution PP/PE/ POM DI blue
uni S-MPB 1″	Modular belt solution PP/PE/ POM DI blue
uni CNB 1″	Modular belt solution PP/PE/ POM DI blue
uni FLEX ASB 1″	Modular belt solution PP/PE/ POM DI blue
uni FLEX SNB 1″	Modular belt solution PP/PE/ POM DI blue
All the listed belts are elevators with carriers and sidewalls, if needed. For vertical packaging machines, we offer a range of pull down belts. Get further details, including the machine type, belt type and size to identify the right belt.	

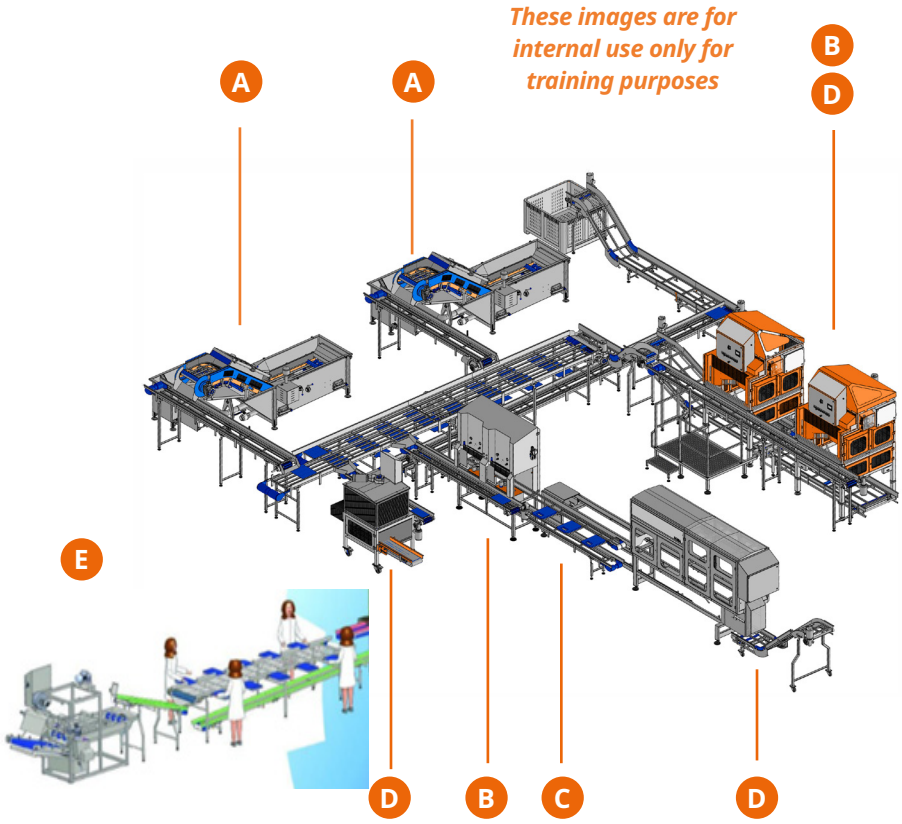
Horizontal packaging machine solutions:

Belt type	Selection
579800 Ropanyl EM 3/1 00+02 white AS FG	Classic grippy solution
579780 Ropanyl EM 3/1 00+02 light blue AS FG AM	Classic grippy light blue solution
579789 Ropanyl EM 3/1 00+02 light blue M1 AS FG AM	Classic non-stick light blue solution
579809 Ropanyl EM 3/1 00+02 white M1 AS FG	Low friction solution
579890 Ropanyl EM05 6/1 00+02 white AS FG	Grippy easy tracking fabric solution
577950 Ropanyl EM 6/2 00+02 white AS FG	Classic heavy-duty grippy solution
577951 Ropanyl EM 6/2 00+02 white M2 AS FG	Classic non-stick heavy-duty solution
578749 Ropanyl ESM 5/2 00+015 white M1 FG	Low friction solution
576750 Ropanyl ESM 5/2 00+015 light blue AS FG NF	Hygienic grippy solution
576749 Ropanyl ESM 5/2 00+015 light blue M1 AS FG NF	Non-stick hygienic solution
uni M-QNB 0,5”	Modular belt solution PP/PE/ POM DI blue
A “recommended solution” do not exist as equipment always needs a mix of grip and non-stick belts.	

2.0 Fresh-cut
Fruit processing

Many fresh-cut processing plants for fruits use automated equipment for all stages of fresh-cut processing. These include the following main items of equipment:

A. Pre-washing tank
B. Peeling and coring equipment
C. Trimming and sorting equipment
D. Cutting/Slicing equipment
E. Dip tank for fruit treatment
F. Packaging equipment (as for fresh-cut vegetables)



Industry characteristics

- High quantity of modular and homogeneous belts
- From 2 to 10 small and flexible processing lines per plant, depending on the fruit mix
- Average capacity of 300-1.000 kg/h depending on the fruit mix
- ISO 22000 (previously HACCP) quality control
- IFS Certification (*)
- BRC Certification
- 50-250 employees per plant
- Labor-intensive

Common processing line widths:

- 800-1000 mm
- 1 or 2 working shifts a day, 6 days per week

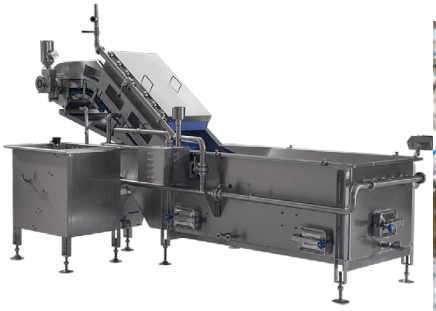
(*) IFS Food Standard reviews the products and production processes to evaluate a food producer's ability to produce safe, authentic, and quality products according to legal requirements and customer specifications

Manufacturers of equipment for fresh-cut fruit

Processing lines	Slicers	Optical sorters	Packaging
PND FRUIT PROCESSING MACHINERY HQ: Italy	PND FRUIT PROCESSING MACHINERY	TOMRA HQ: Belgium	ISHIDA HQ: UK
KRONEN THE CROWN FOR FRESHNESS HQ: Germany	KRONEN THE CROWN FOR FRESHNESS HQ: Germany	KEY Technology HQ: USA	Yamato HQ: Germany
sormac vegetable processing equipment HQ: Netherlands	sormac vegetable processing equipment HQ: Netherlands	RAYTEC VISION HQ: Italy	MULTIPOND HQ: France
	URSCHEL HQ: USA		IMA ILAPAK HQ: Italy
JBT FTNON HQ: Netherlands	JBT FTNON		GEA HQ: Netherlands
			KLC HQ: Italy
			COMEK AUTOMATIC PACKAGING SOLUTIONS HQ: Italy
			G. MONDINI HQ: Italy
			ULMA HQ: Spain
			TAVIL HQ: Spain
			REEPACK COMMITTED TO PACK HQ: Italy
			TIBER PACK HQ: Italy
			SCHUBERT HQ: Germany

A. Process step
Pre-washing tank

The pre-washing tank is a specific device for washing fresh fruit. In the first part of the tank, a stream of water pushes the fruit onto a modular flighted conveyor belt that allows the produce (including non-floating fruits) to be treated in water. The product is moved by the bubbling motion. The pre-washing tank is equipped with a recirculation pump and a water filtering system. It is also possible to adjust the conveyor belt speed. The design makes the post-process sanitization easy, thanks to the openings on both sides of the tank and the easily removable side rails.



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Belt details

- Low speed
- Positive drive belt

Typical belt problems and their consequences

- Sanitation difficulties

Additional sales questions

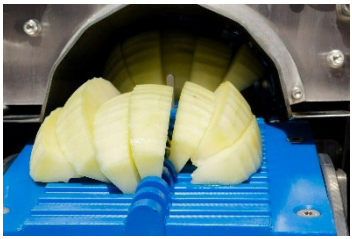
- How many different types of raw materials does the belt process?
  What are the dimensions of fruits and how much do they weight?
- What type of belt is currently installed?
  Competitor brand, belt description, and typology can help you choose a suitable belt.

Belt type	Selection
uni MPB 2" Open Flush grid	Recommended modular solution PP blue

B-C-D. Process step
Peeling and coring, trimming and sorting, cutting/slicing

Peeling machines are normally available in three models: one, two and four peeling stations.
The peeling machine is a manual feed machine that allows external peeling: thanks to it, all the fruits, even if not calibrated and irregular, can be peeled easily and with maximum efficiency.
The fruit is loaded into the appropriate loading space by the operator. It is cored and peeled at an adjustable speed.

After peeling and decoring decoring, an operator sorts and trims the fruits before the cutting/slicing step. The wedging-chunking machine is a semi-automatic machine designed for cutting mangoes, melons and pineapples into wedges and chunks.
The operator loads the peeled and halved fruits on an infeed conveyor belt. The machine has a loading belt with two stations and two cutting units. The first cutting unit is a guillotine and performs the horizontal cut the second cutting unit has circular rotating blades and performs the vertical cut, creating fruit wedges. If both cutting units are activated, the fruit will be cut into chunks. If one wants to cut fruit into wedges, the first station can be deactivated.



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In some cases, it's possible to have a multipurpose machine (for pineapple mainly). The semi-automatic cylinder and coring machine at two heads are suitable for pineapple cylinders. An operator loads the fruit and the machine cuts it in three steps: coring, top and tailing, cylindering.
The cutting operations are optional. The output may come in rings, segments, and chunks.

For apples and unpeeled peaches, a coring and slicing machine is used during the process. This machine is able to core the fruit and cut them into slices/rings. The machine consists of various synchronized mechanisms. The first one is a rotating plate with 8 work stations for the fruit, moving in intervals. This gives the operator time to load the fruit, two at a time. The second mechanism moves up and down by means of a pneumatic piston, which allows the rotation of two coring tubes by an electric motor. The coring tubes are interchangeable, depending on the requirements.

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Belt details

- Low speed
- Positive drive belt

Typical belt problems and their consequences

- Sanitation difficulties
- Sticking
- Product contamination

Additional sales questions

- How many different types of raw materials does the belt process?
  What are the dimensions of fruits and how much do they weight?
- What type of belt is currently installed?
  Competitor brand, belt description, and typology can help you choose a suitable belt.

Belt type	Selection
Soliflex range: XMD and PRO TPU	Recommended homogeneous positive drive belt
uni MPB 2″	Recommended modular solution PP blue
uni UCB 2″	Modular solution PP blue
uni S-MPB 1″ non-stick	Recommended modular solution PP blue
uni CNB 1″	Modular solution PP DI blue

E. Process step
Dip tank for fruit treatment

The treatment tank is used to prevent fruit oxidation. It is ideal for processing apples, pears, pineapples, melons, oranges, and other types of whole and cut fruit. Thanks to the optional conductivity control unit and the dosing system, the tank is an excellent ally in fruit processing. In combination with your preferred fruit shelf-life extension liquid, it can lead to excellent results, including fragrance protection and avoiding the risk of oxidation. The system has been designed as to minimize the amount of water in the tank and therefore the percentage of additive substance, while ensuring the dip time required. Depending on the customer's request and the type of product, the fruit stays immersed in the additive for between 30 seconds to 2 minutes. At the end of the process, the product can be dried with a blower and discharged directly into a container or repositioned on a conveyor belt for further processing. The tank and the conveyor belts have been designed in such a way that cleaning and maintenance can be carried out in a very short time, reducing labor costs.

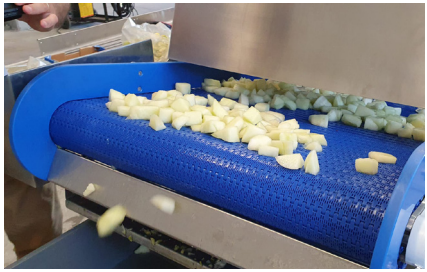
Belt details

- Low speed
- Positive drive belt

Typical belt problems and their consequences

- Sanitation difficulties
- Sticking

Belt type	Selection
uni S-MPB 1" open (flush grid) curved	Recommended modular solution PP blue
uni SNB 1"	Recommended modular solution PP blue



F. Process step
Packaging

A full range of fresh, exotic, and seasonal fruit salads: practical, convenient, and ready to eat wherever you are. Below you can see some example of packing.
For process and belting details, consult the packing step for fresh-cut vegetables, in particular the solutions adopted for horizontal machines, because the fruit are packed mainly in trays or bowls.

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3.0 PPLESC
Determining factors for belt selection

Belt selection
The Ammeraal Beltech belting range is large and it is not always easy to choose the right belt for the application. Sometimes, there are even several possible solutions. With the determining factors for belt selection – PPLESC – and the information from the belt nomenclature you can select the correct belt type. PPLESC is an abbreviation of the first characters of a short 'checklist'. It is a short simple funny word, easy to remember. This method proved a good system for belt selection and makes extended belt questionnaires redundant.

Determining factors for belt selection – PPLESC
In order to approach belt selection in a structured way, Ammeraal Beltech developed a very short PPLESC checklist. This term is well-known within the company and was created to support you in the first steps of selecting a belt or solving a technical problem. A selected belt must always match the conveyor and other application criteria. Always follow this sequence for your belt selection PPLESC stands for:

A. Product
B. Production process
C. Layout of the conveyor
D. Environment
E. Standards
F. Commercial factors

Product	Production process	Layout of the conveyor
Information about the product to be transported or to be processed	Is the product (and therefore the belt) subject to some kind of process?	Design of the belt conveyor
• Type of product • Specific application conditions of this product: wet, moist, chemical solvents or vapours present, hot, cold, corrosive, sharp edges, weight per unit, etc.	• Heating, cooling, washing, drying, squeezing, absorbing, accumulating, etc. • Have there been any recent changes in the process?	• Belt support: slider bed or roller (diameter), flat or trough • Knife edges: diameter, arc of contact • Diameter of end pulleys/rollers in flexing and back flexing • Type of conveyor: straight, belt bend (radius, slider or roller), inclined (angle) • Belt speed
Keywords: weight, food or non-food, grip, chemistry, temperature, standards	**Keywords:** grip, mechanical, thermal, chemical	**Keywords:** belt support, pulley/roller diameter, speed, tensioning, scraper

Environment	Standards	Commercial factors
What are the circumstances and conditions under which the belt will operate?	Are there any national or international standards to meet?	What solution can we propose for a certain problem or what general value proposition can we offer?
• Indoor, outdoor, sheltered • Wet or dry • Dusty, clean • Ambient temperature – hot or cold	• FDA – Food and Drug Administration • EU – European food standards • ATEX • FR – Flame retardant • Low noise (below 70 dBA) • Specific customer standards	• What is the action requested by the customer? • What is the advantage for the customer: price, delivery time, quality, belt life? • Where to supply and invoice? • Service • Competition • Any other actions
Keywords: indoor/outdoor, wet or dry, temperature, chemicals	**Keywords:** foodgrade (FG), flame retardant (FR), antistatic (AS), noise-reducing	**Keywords:** competitive, deliverable, service, "good is good enough"

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