
SKF

The Beverage Industry - internal training

Internal only

Content

1. **The beverage Industry**
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   - Industry regulations and guidelines
   - Competitive landscape
   - Key players
   - SKF Market potential
2. **Beverage process**
   - Assets, Functions, Issues and Capabilities
3. **Hygiene and Automation**
4. **Process approach**
5. **Segment and Contacts**

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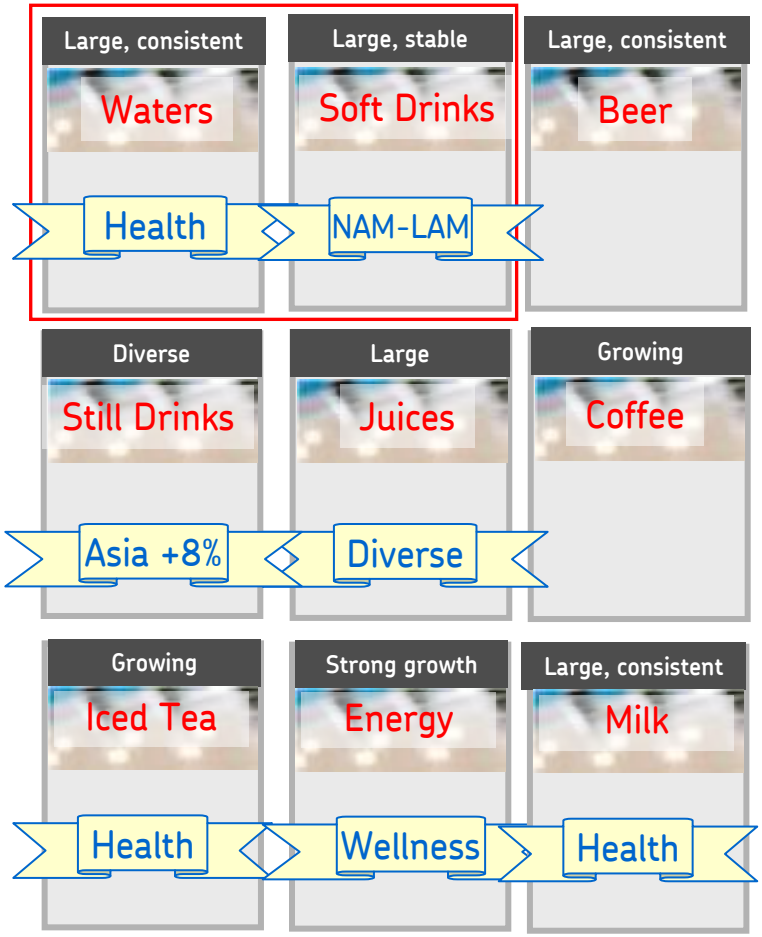
The Beverage Industry

Large, stable with consistent process

- Non-cyclical, one of largest manufacturing sectors, high portion people employed and consistent process. 15% of F&B Industry turnover in Europe *
- Non Alcoholic Beverages: Largest category in Food Industry, stable with CAGR 6% ** and specific products growing +10-50%
- Alcoholic Beverages: 2nd Largest category in Food Industry, stable with CAGR 4% **
- AM: Top 100; multi-producers, 23% in beverage
- OEM: Few large F&B OEMs. Smaller companies served by D/Ds



CAGR – Compound Annual Growth Rate
* Source CIAA F&B Report 2007
** Source AC Nielsen – Executive News report Dec. 2006

Beverage industry trends and drivers

Pressure for efficiency	Price pressure, globalization, innovation cost
Hygiene regulation	Global ISO22000 and HACCP drive need for hygienic design
Increased outsourcing and automation	Maintenance, engineering, sanitation
Energy, lubrication management and safety;	Focused areas for producers
Engineering skills eroding	Difficulty to maintain engineering skills

Sustainable production

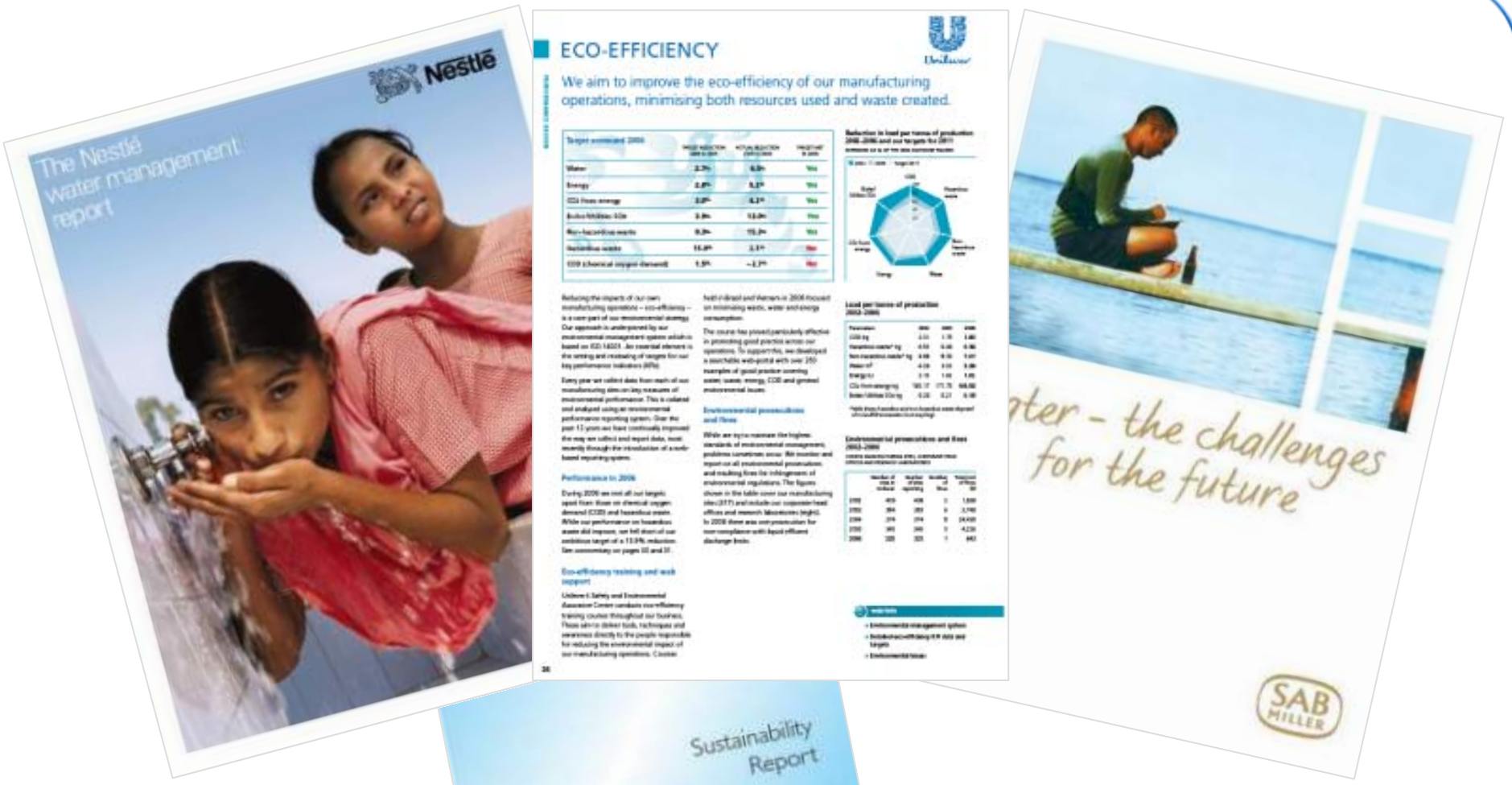
- Improved line efficiency, flexibility & Product line performance
- Improve foreign body prevention & Good manufacturing practices (GMP)
- Improve people safety

Sustainability

- Reduce waste
- Water Savings
- Energy Savings

SKF's Toolbox

A major concern in beverage industry



Industry regulations and guidelines

- **NSF* International,** develops standards and provides product certification. Many products in the F&B Industry require NSF approval
- **The Beverage Industry** has unique requirements

Multiple cleanings, frequent *high-pressure wash downs* with caustic anti-bacterial *cleaning agents*, very high or low temperatures, expose products to harsh environments and can impact the bottom line

Products should not contaminate the processed product with any material that could be affect the consumer's health if ingested

*NSF: National Sanitation Foundation

NSF – White Book

NSF Live safer.™ Close window to exit NSF Listings.

White Book™ - Nonfood Compounds Listings Directory

These Listings were Last Updated on **Tuesday, March 04, 2008** at 8:00 PM Eastern Standard Time.
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NSF-Registered
Proprietary Substances and Nonfood Compounds

SKF MAINTENANCE PRODUCTS

Cert-Link® (Click here to visit this Company's Website)

LDTS 1	139739	H1
LGFA 0	139518	H1
LGFA 00	139517	H1
LGFA 1	139519	H1
LGFA 2	139516	H1
LGFB 2	137587	H1
LGFL 1	137588	H1
LGFP 2	128004	H1
LHFP 150	136858	H1

SKF®

Strong Market Growth

- Beverage Consumption to grow by 18% in the next 6 years*
- Bottled Water Consumption to grow by 40% in the next 6 years*
- Pet Packaging will double by 2015. (23% to 41% of all packages)**
- Glass will decrease by 2015. (33 to 21% of all packages)**

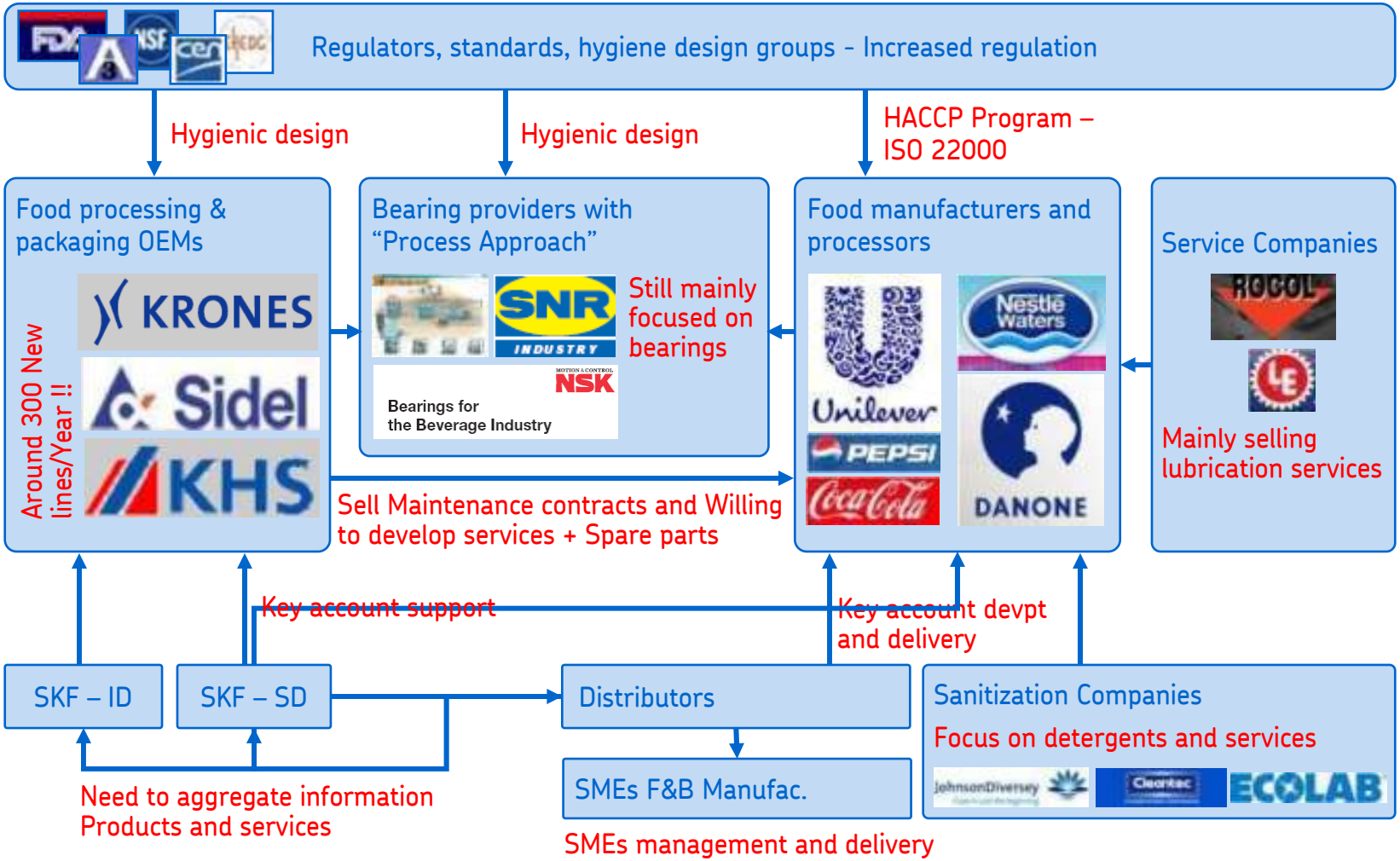
* Source: Canadean – Global Beverage Consumption - April 2007
** Source: PCI, Canadean, Mercer, GDA, Tetra, Krones

Main categories and related packaging

Category/Packaging type	Glass	PET*	Can	Carton
Water	X	X	X	
Carbonated Soft drinks	X	X	X	
Non carbonated Soft drinks	X	X		X
Alcoholic drinks	X		X	
Wine	X			X
Dairy	X			X

X = Combination is common
* = PET is the name used for Plastic bottles and means Polyethylene Terephtalate

Beverage Landscape

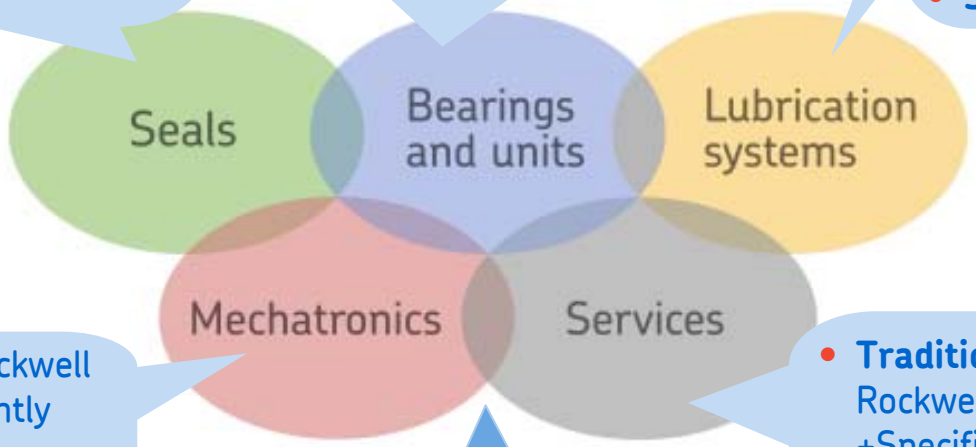


Main competitors in the industry

- **Traditional;** Freudenberg, Trelleborg, Dowty, Busak & Shamban
- **Niche;** John Crane (mechanical)

- **Traditional;** INA/FAG, NSK/RHP, Dodge, Koyo, NTN, Fenner, Rexnord
- **Niche;** Igus, Systemplast, Askubal, Cobra, Sealmaster, EDT, SMB Sapporo

- **Traditional;** Bijur, Lincon, Rocol, Perma
- **Niche;** Kluber, Fuchs, Ecolab, Diversey
- **Service;** Rocol



- **Traditional;** Rockwell Automation, Bently Nevada
- **Niche;** -

- **All platforms :** None

- **Traditional;** Siemens, Rockwell, CSI, Bently, +Specific Como (01db, PrufTechnic)
- **Niche;** Johnson Diversey, Ecolab

Beverage Market - OEM

Market is dominated by 3 players: Krones, Sidel, KHS

- **Krones**. 9000 Employees
- **Sidel,** part of Tetra Laval, 5700 Employees – 150 new lines per year
- **KHS***, 4500 people, has already sold 6500 filling machines

Krones, Sidel, KHS provide engineering, installation, commissioning and services

Source: Krones, Sidel, KHS
KHS AG, Dortmund - was established in 1993 from a merger of Holstein & Kappert AG of Dortmund, founded in 1868, and Seitz-Werke GmbH

Beverage Market – Aftermarket

Market is dominated by global players:
Nestle, Danone, SAB Miller, Heineken

- Water is dominated by Nestle – 103 Bottling Plants – and Danone – 65 Bottling Plants
- Beer is dominated by Carlsberg, Heineken, Scottish & Newcastle, InBev and SAB Miller – 128 Breweries + 41 Bottling plants
- Soft Drink is dominated by Coca-Cola – Using Subcontractors to bottle like Femsa in LAM with 31 plants, Pepsi Co, Unilever, Cadbury
- Dairy Market players are Parmalat, Fonterra, Lactalis, Nestle

Opportunities in beverage industry

	Bearing & units	Services	Lubrication	Mechatronics	Seals
In portfolio	Yes	Yes	Yes	Few	Few
Potential	Medium	Very High	Very High	Low	High
Comments	Low volumes but low reliability	Key is AEO - MSR, ODR, MaPro, training & IMS	Lubrication is key % in tasks and impact reliability	Labour and efficiency - Invest in auto – to incl. PT	Contamination is a key issue

AEO is priority

- Producers have strong pressure for efficiency
- Rotating equipment key reasons for unplanned stops
- Low engineering skills -> training & outsourcing
- SKF high technical competence to deliver AEO is a key
- Diverse - relative low competition

Potential in beverage plant

- Values given for 5 lines production
- Potential within 5 platforms

Beverage Plant
Potential 200 000 Euros

Please only consider this as an indication an subject to variation, depending on sub-process, sales approach, customer situation...

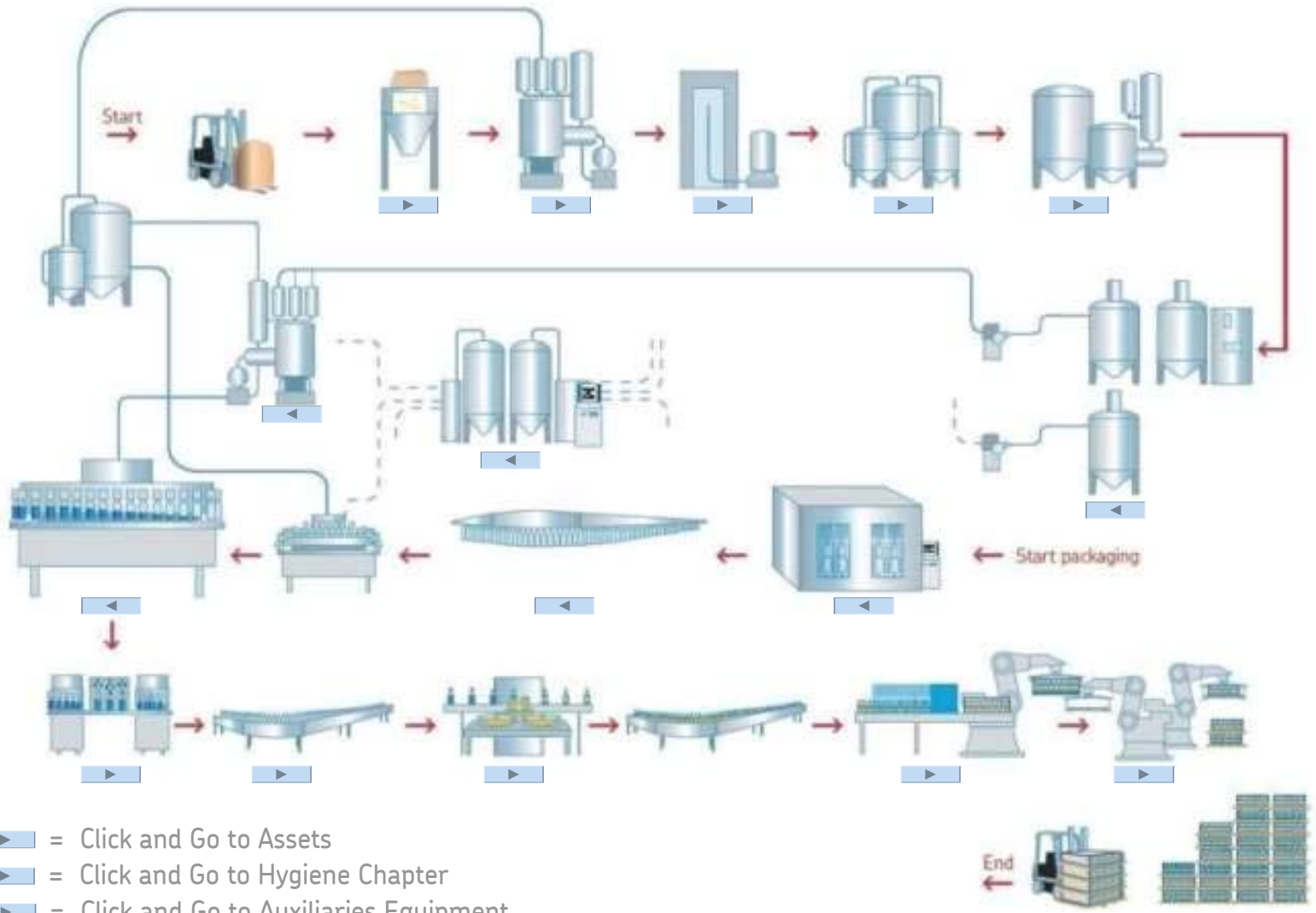
2

Beverage Process

Inside a beverage plant

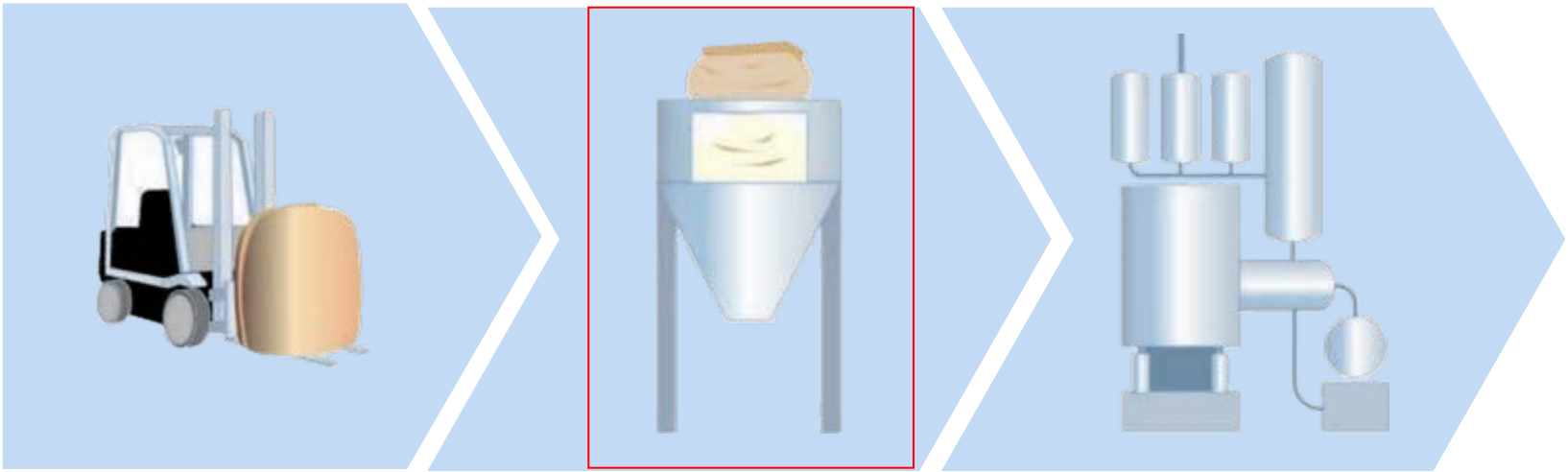
Photo Courtesy of Sidel

Beverage Process



▶ = Click and Go to Assets
▶ = Click and Go to Hygiene Chapter
▶ = Click and Go to Auxiliaries Equipment

Sugar Hoppers



Sugar Hoppers

Mixers

Sugar Hoppers – Function and Environment

- Sugar is with Water the major raw material
- Off-loaded by forklifts trucks for processing
- Sugar is conveyed by a screw conveyor
- Sugar is a very agressive product for seals

Liquid and Gas are often delivered through piping systems

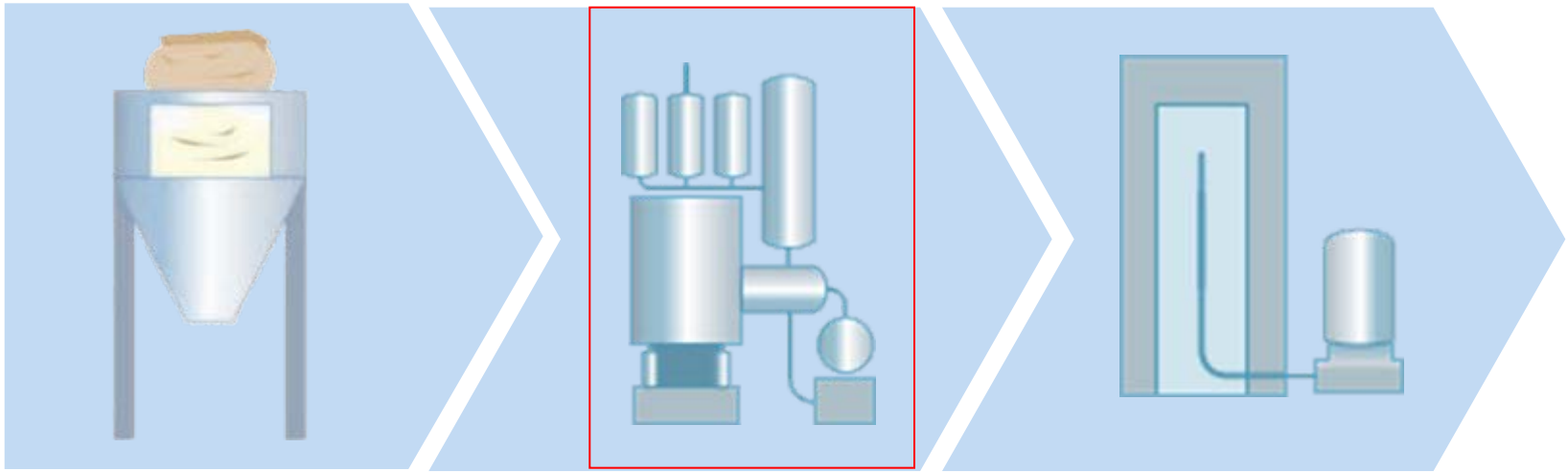
Go to Process Map

Sugar hoppers – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Ingress of Sugar to motor and gearboxes 	• Unplanned stops due to bearing failure • Risk of contamination (food/bearing) • Cost of labour and regrease due to frequent re-grease	• Seals • Condition Monitoring • Solid Oil	Line efficiency Waste cost Hygiene Safety

Go to Process Map

Mixers



Sugar Hoppers

Mixers

Heat exchangers

Mixers – Function and Environment

- Mixing sugar or other solids with water is common for soft drink
- In soft drink process, sugar is mixed with water to have a first mix. The temperature at this stage is around 85 °C

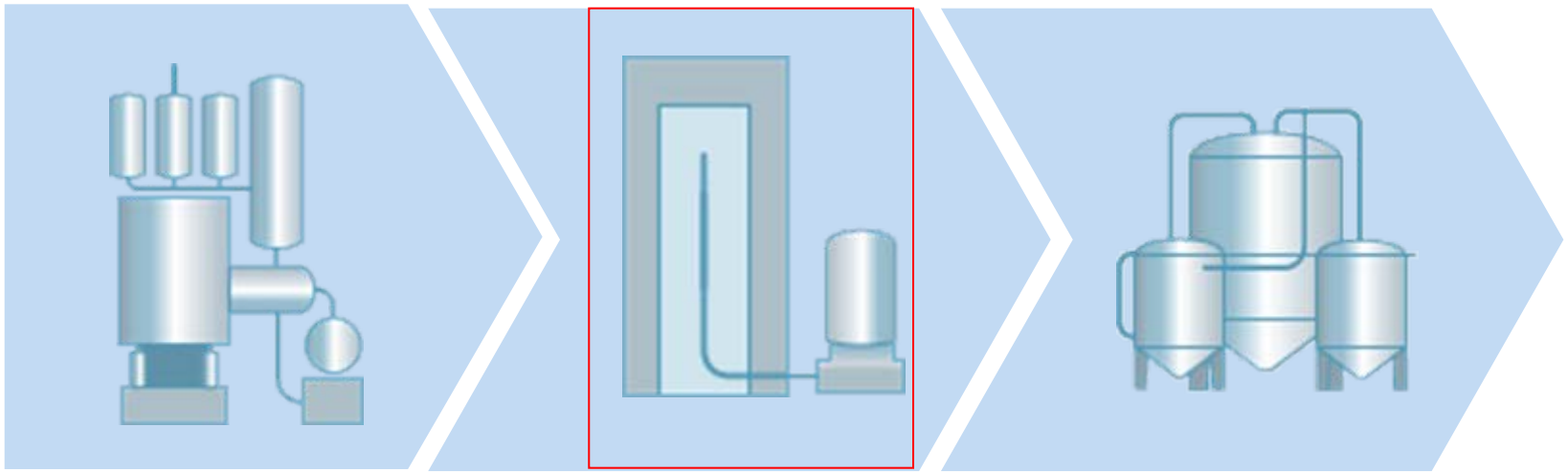
Go to Process Map

Mixers – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Ingress of Detergents, Water and Sugar	• Unplanned stops due to bearing failure • Risk of conta-mination (food/bearing) • Cost of labour and regrease due to frequent re-grease	• Seals • Condition Monitoring • Solid Oil	Line efficiency Waste cost Hygiene Safety

Go to Process Map

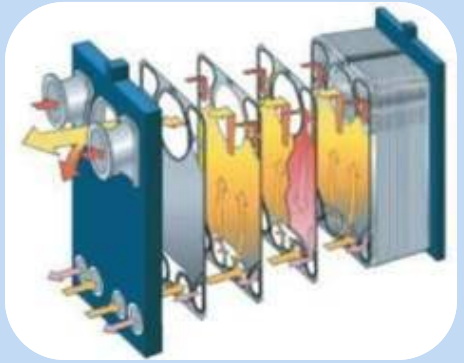
Mixers – Typical issues



Mixers Heat exchangers Filters

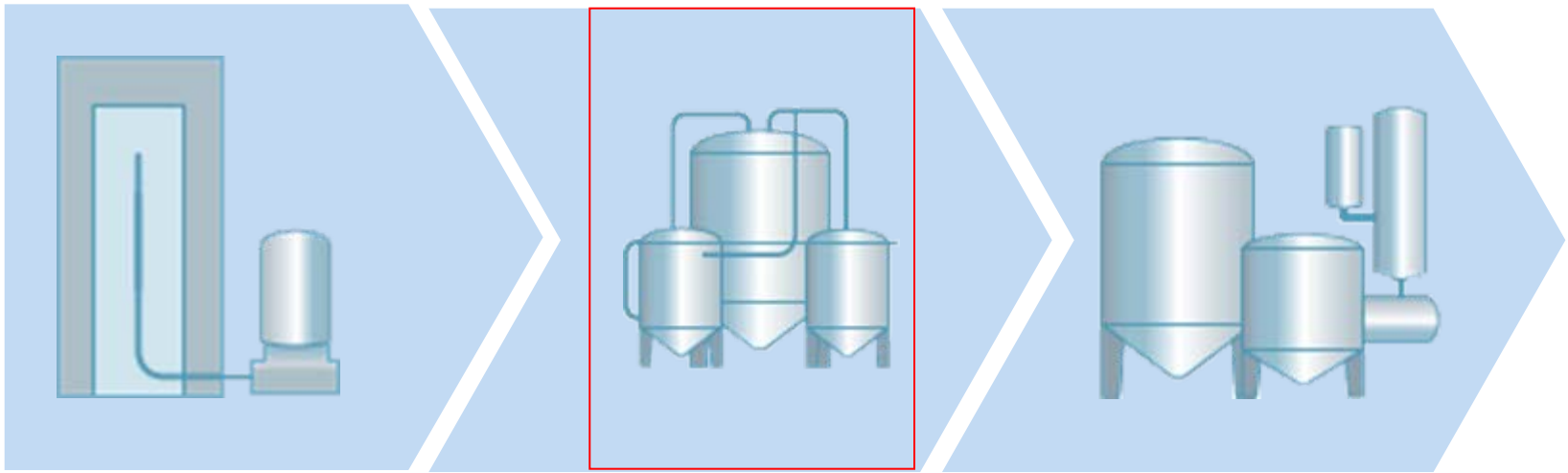
Heat Exchangers – Function and Environment

- To avoid foam formation, the mix is cooled-down. This operation is obtained using heat exchangers
- Heat Exchangers are also used to heat or pasteurize in certain applications



Go to Process Map

Filters



Heat exchangers

Filters

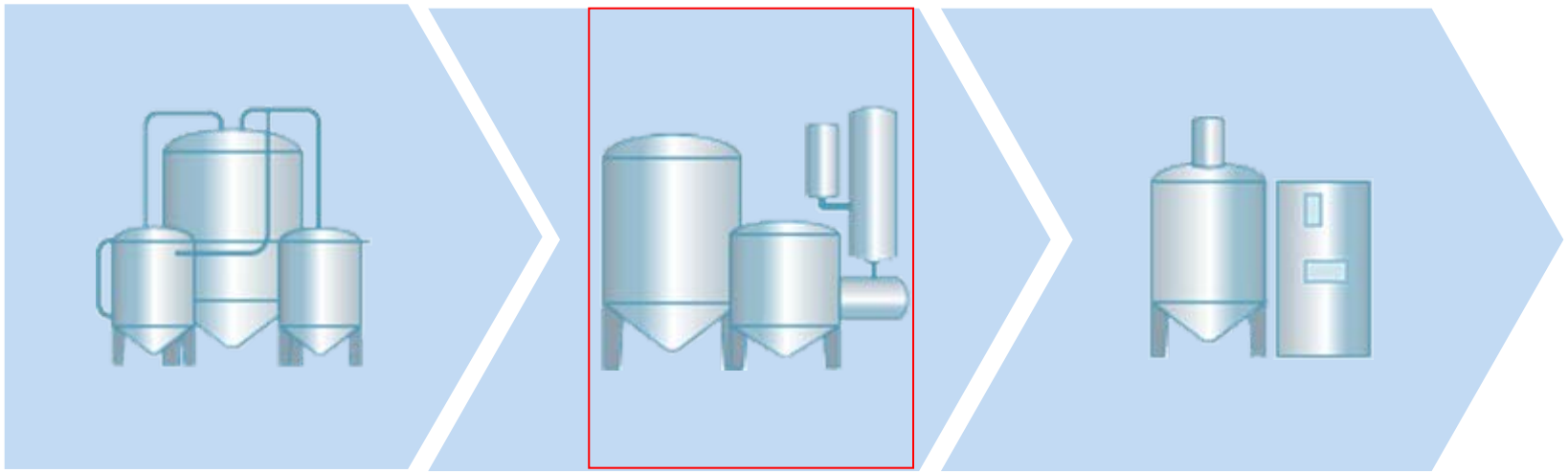
Blenders

Filters – Function and Environment

- Filters function is to remove impurities from the syrup, but also from the air, water
- Technology can be based on Resins, Membranes, Charcoal filtration, plate filtration… depending on impurities
- Charcoal is carbon. Activated charcoal is charcoal that has been treated with oxygen to open up millions of tiny pores between the carbon atoms
- De-carbonation filters (plate filters) will be used in case of charcoal filtration

Go to Process Map

Filters



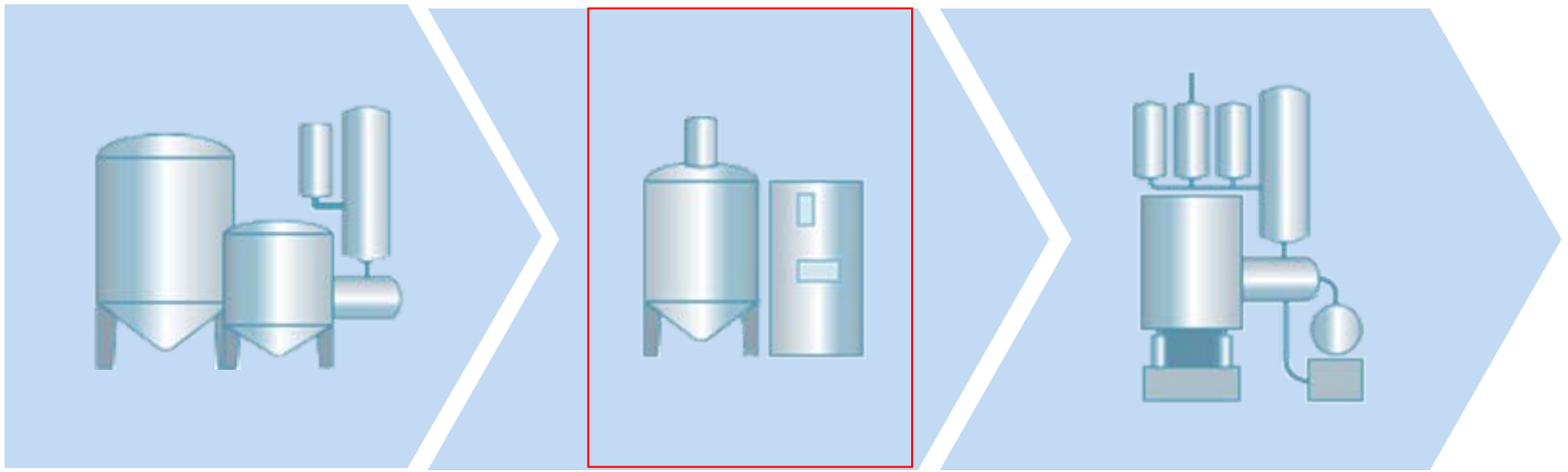
Filters Blenders Tank storage

Blenders – Function and Environment

- Blenders are used to mix different products, like sweetener, syrup, water of flavours
- Many variations on blenders types depending on ingredients to blend

Go to Process Map

Storage Tanks



Blenders | Storage tanks | Mixers: Carbonators

Storage Tanks – Function and Environment

- Base syrup is stored in tanks, continuously mixed, this is an accumulation zone to give flexibility in the “packaging areas”
- On top of these tanks, motors and gearboxes drive impellers to ensure a good homogeneity quality
- Pumps are massively used to transfer fluids from tank to tank
- For hygiene reasons, detergents spills onto gearboxes and leads to oil leakage on tanks and floors

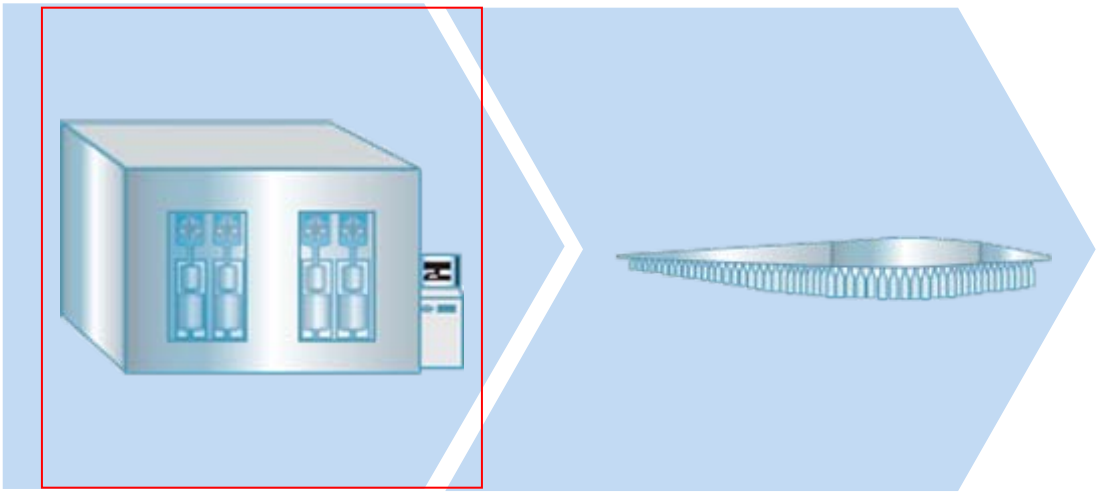
Go to Process Map

Storage Tanks – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Ingress of water + detergents on: • **Motor and gearboxes** • **Pumps**	• Lubricant pollution leads to frequent refill • Seals damage leads to lubricant leakage which is unhygienic and leads to frequent cleanings • Unplanned stops	• Seals • Condition Monitoring	*Line efficiency* *Foreign body prevention* *Waste* *Hygiene* *Safety*

Go to Process Map

Bottle Blowers

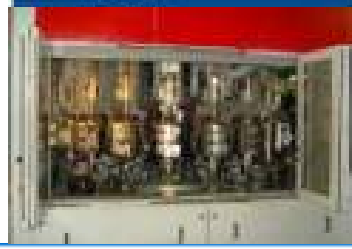


Bottle blowers

Air conveyors

Bottle Blowers – Function and Environment

- Plants producing beverage in pet bottles are blowing their bottles on site
- The preform is first injection molded
- The preform is then reheated and blew in a second machine to make the bottles. The moulds rotate and air pressure is injected with hig temperature into the mould and expands the preform



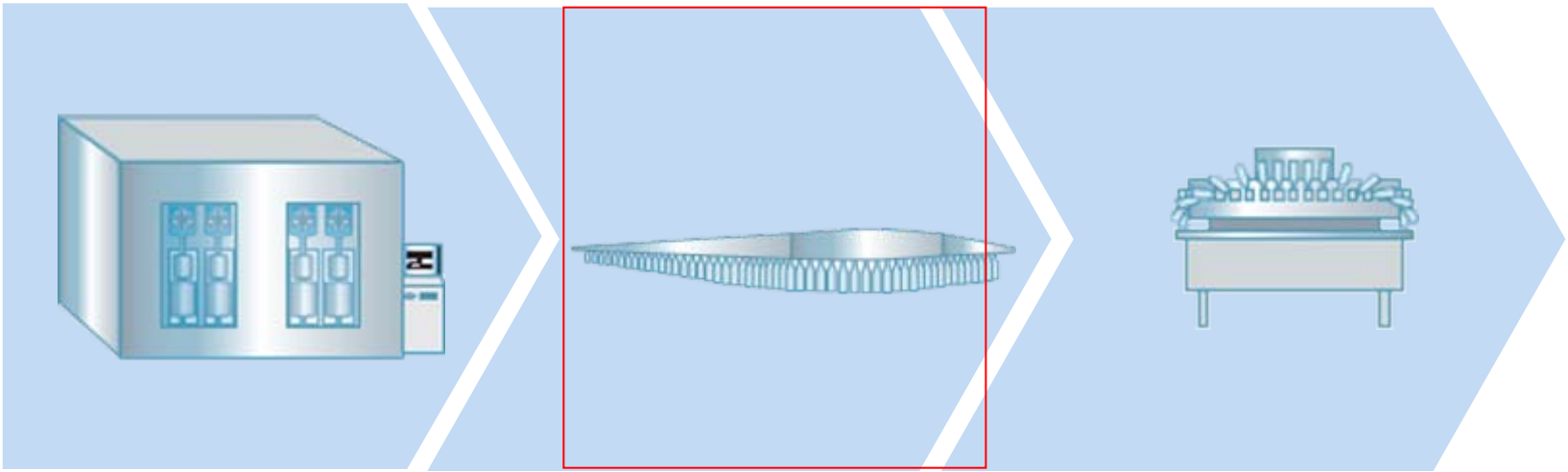
Go to Process Map

Bottle Blowers – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Lubrication is impossible when machine in operation	• Unplanned stops • Too much planned stops for lubri-cations tasks	• Lubrication systems • Distribution systems	*Line efficiency* 

Go to Process Map

Bottle Blowers



Bottle blowers

Air conveyors

Fillers

Air Conveyors – Function and Environment

- Pet bottles are conveyed after blowers using air conveyor systems to rinsers before filling
- Bottles are picked up and controlled by the neck ring on the bottle. They are then transported single file using pressurized air,
- Line speeds of up to 1200 bpm (Bottles per minute) are attainable
- Pressure in each zone of conveyor can be regulated at each blower. This will control the speed range of the section, and allows each zone to be treated separately as required

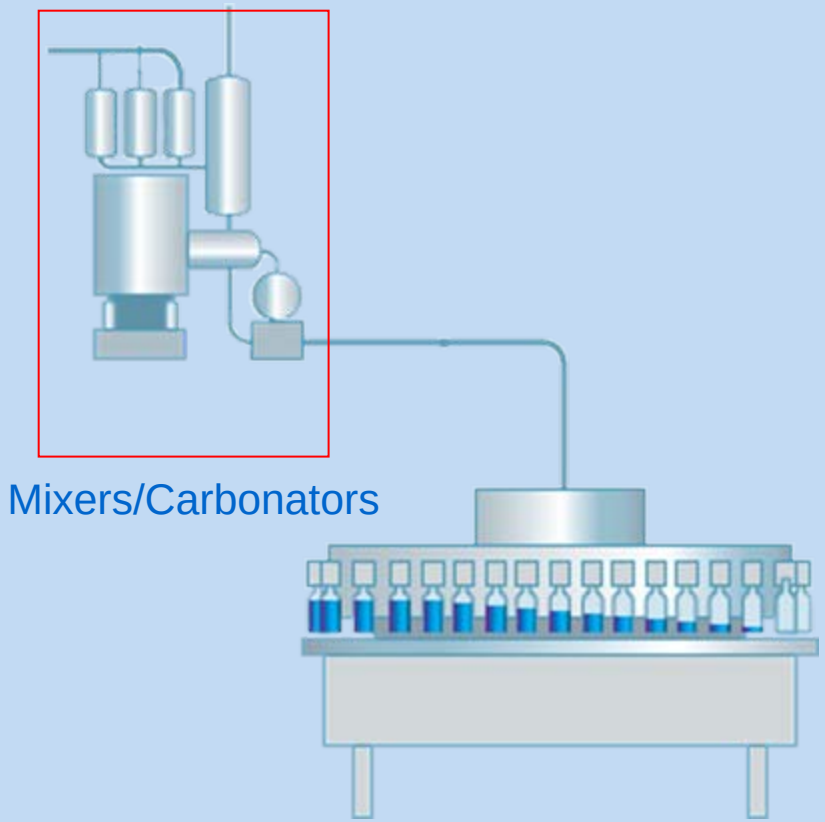
Go to Process Map

Air conveyors – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Unbalance and Misalignment on blowers	• Unplanned stops • Energy consumption by overheating • Grease consumption	• Lubrication systems • Distribution systems	*Line efficiency* 

Go to Process Map

Mixers/Carbonators



Mixers/Carbonators – Function and Environment

- The aim of this important process is to dissolve a quantity of carbonic gas into different products to obtain a carbonated final product
- A carbonator combines CO2 gas with the liquid to be carbonated. Two main categories; those that carbonate water only and those that carbonate the finished product mixture of syrup and water. These are sometimes coupled with coolers, often referred to as carbo-coolers

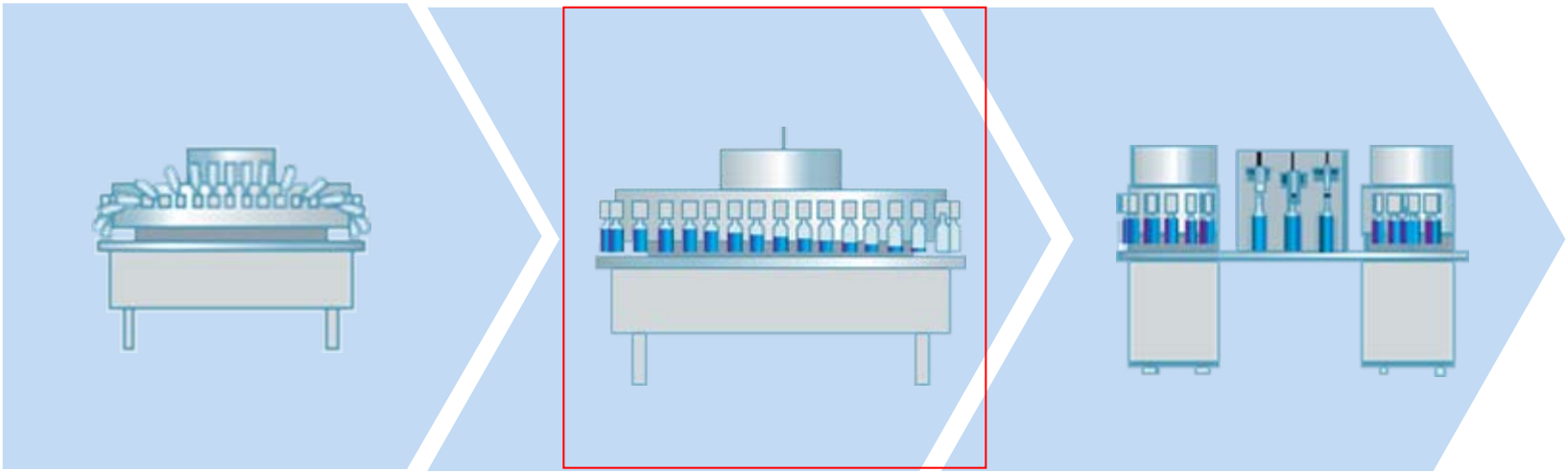
Go to Process Map

Air conveyors – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Ingress of Detergents, Water and Sugar	• Seals damage leads to risk of contamination (food/bearing)	• Seals • Speedi Sleeves	*Line efficiency* *Waste cost* *Hygiene* *Safety*

Go to Process Map

Rinsers/Fillers



Rinsers Fillers Cappers

Rinsers/Fillers – Function and Environment

- Final step before capping, topping and packing. The aim is to fill the bottles or cans with the final product
- Several technologies in use:
  - Volumetric filling process using dosing tank
  - Gravimetric filling system is used mainly for water
  - Mechanical counter pressure with electro pneumatic control system
- These machines include several star wheel gearboxes, below transported products, working under severe environmental conditions, like water, frequent wash downs with cleaning agents

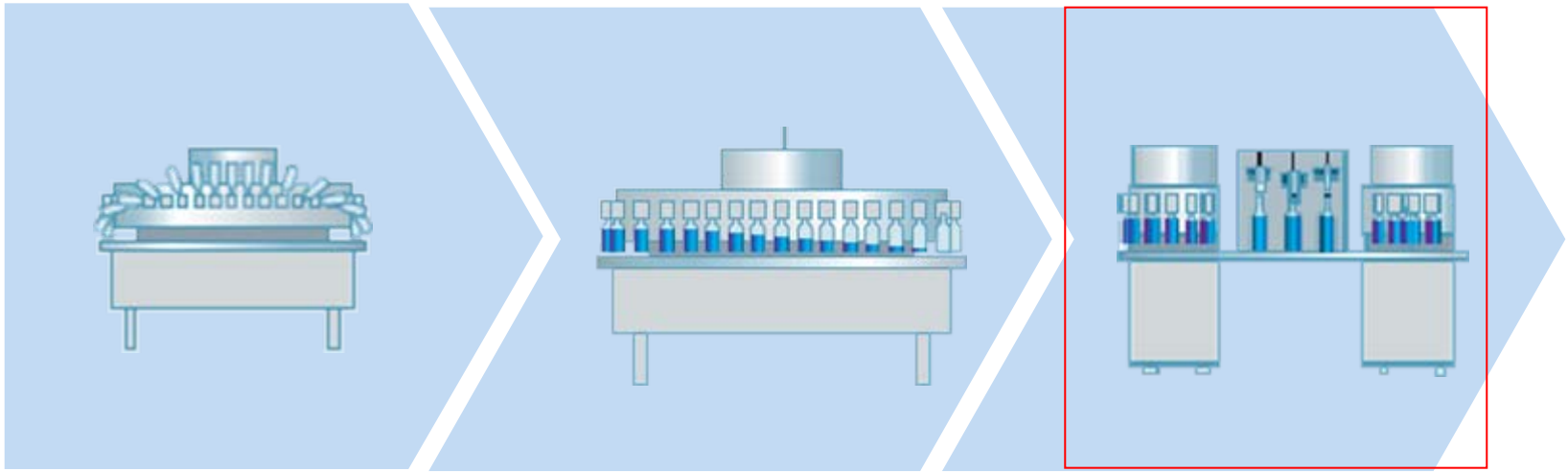
Go to Process Map

Rinsers/Fillers – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Ingress of water and sugar on star-wheel gearboxes	• Unplanned stops • Lubricant pollution leads to frequent refill	• Seals • Condition Monitoring	*Line efficiency* *Waste*
Ingress of water and sugar on Slewing Bearings	• Unplanned stops • Lubricant pollution leads to frequent re-grease	• Seals • Condition Monitoring • Lub. Systems	*Line efficiency* *Waste*

Go to Process Map

Cappers



Rinsers

Fillers

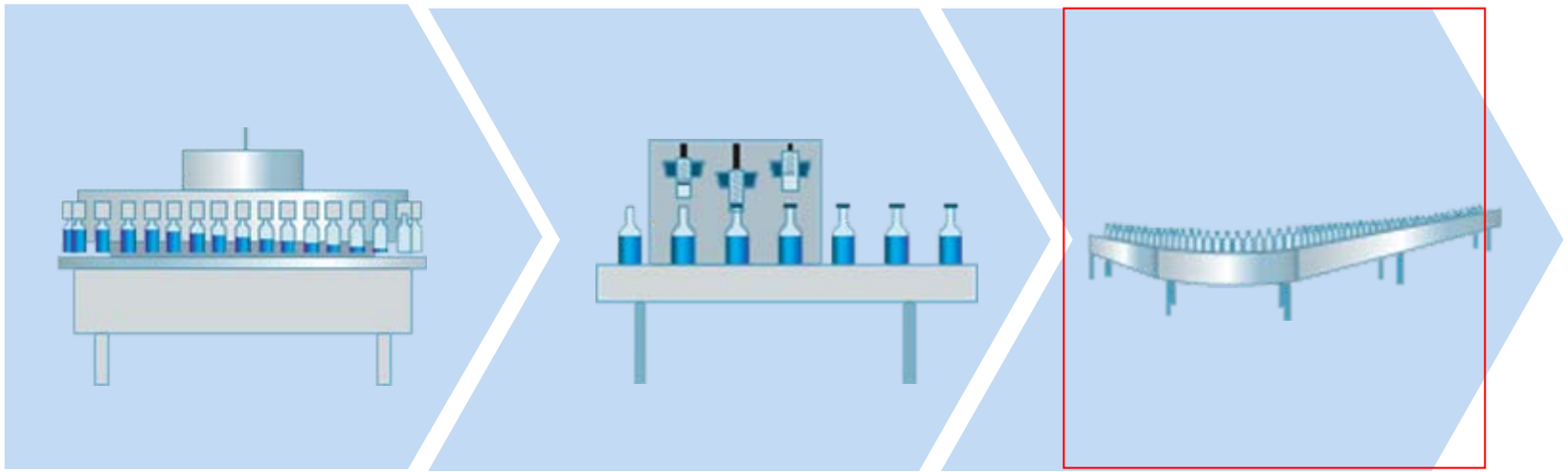
Cappers

Cappers – Function and Environment

- The bottles are closed, ensuring a good product shell life
- This step is often critical in the process, as it can stop a plant in case of unplanned downtime
- Depending on the type of packaging, several types of machineries. Cans are seamed, bottles are sealed with metallic caps, plastic caps or cork

Go to Process Map

Conveyors



Fillers Closers Conveyors

Conveyors – Function and Environment

- Used to convey bottles form assets to assets
- Several technologies and chains materials depending on bottles material
- Accumulation areas designed due to different asset speeds in the process
- Wet lubrication largely used to reduce friction
- Frequent cleanings

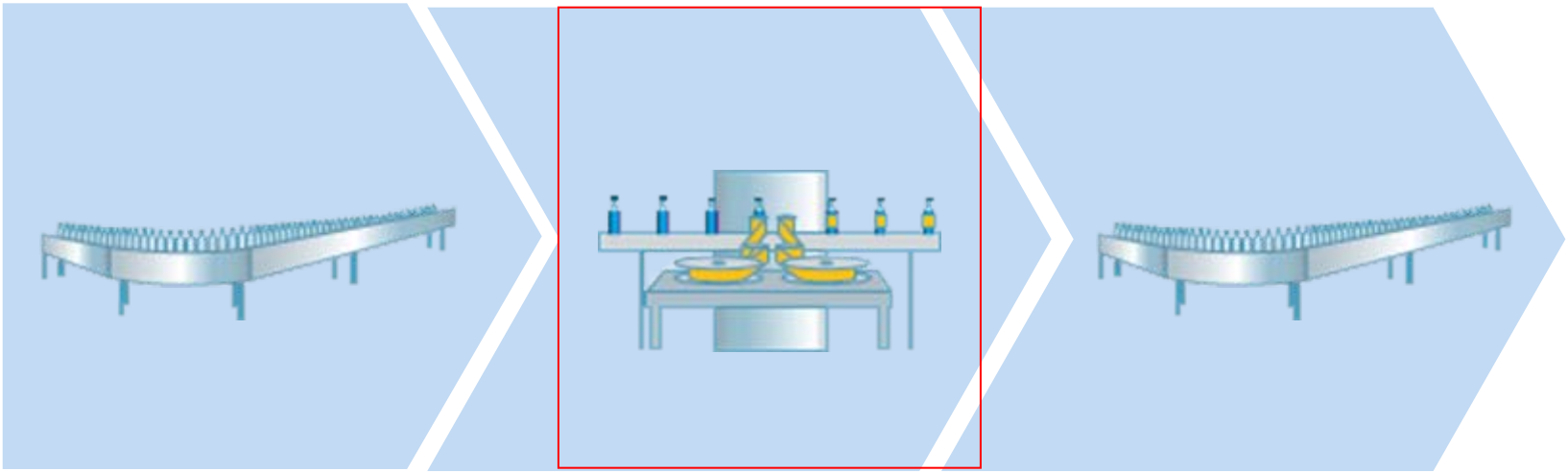
Go to Process Map

Cappers – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Water & lubricant consumption & waste	• High cost of water + lubricant consumption • Cost for purification and recycling (90.000 Water Lt + 320 Lubricant Lt / Month)	• SKF Dry-Lubrication	*Line efficiency* *Foreign body prevention** *Waste water* *Hygiene* *Safety*
Moisture on package	• Non quality costs + customer complaint		
Organic development	• Lubrication system failures (plugged nozzles) • Lack of lubrication increase wear		
Wet and slippery floors	• Personal injuries (37% of all major injuries with more than 3 days off are slips and trips)		
Additional fixtures	• Additional dripping pans cost • Increase area of potential micro-biological growth		
Micro-biological growth	• Risk of bacterial growth in water and humidity can lead to contamination • Increase needs of frequent cleanings		
Corrosion on Housings	• Corrosion leads to replacement costs	• SKF Y-Units L range	FBP * , Waste
Bearing grease washout	• Grease leakage on floors + Frequent re-grease	• SKF Y-bearings	Safety, Waste

Go to Process Map

Labellers



Conveyors Labellers Conveyors

Labellers – Function and Environment

- Bottles have to be labelled before final packaging
- Labeling stations in Water process are usually washed once per week and labeling is one of the critical components in a bottling line

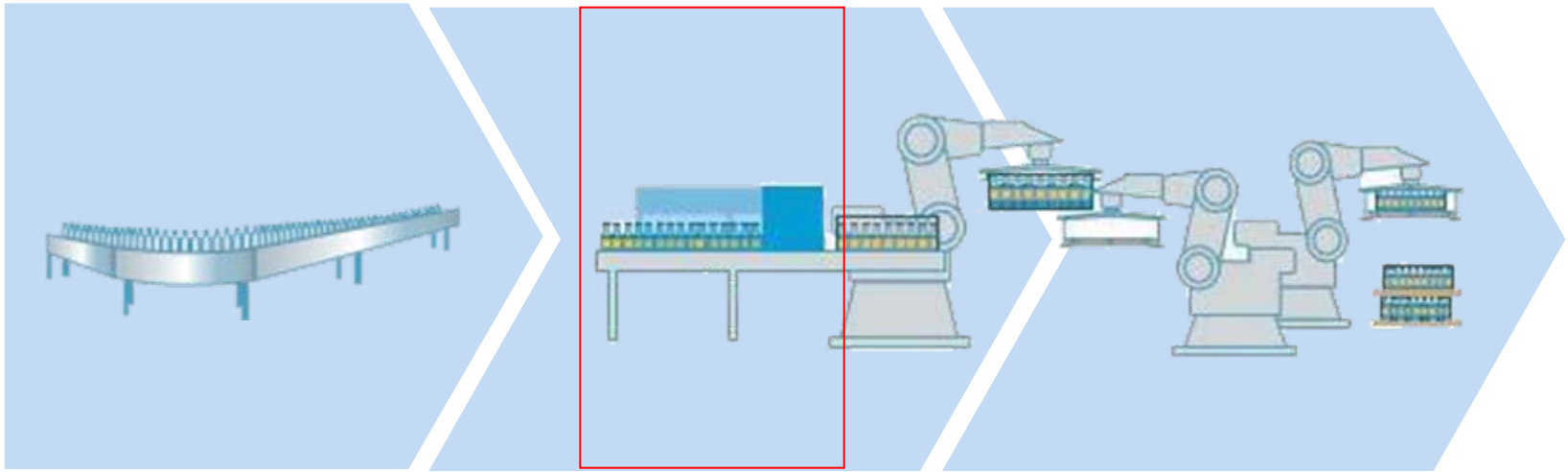
Go to Process Map

Labellers – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Ingress of Water in bottle supports	• High corrosion leads to unplanned stops	• Stainless Steel bearings • Solid Oil • Compound bearings	*Line efficiency*

Go to Process Map

Shrink Packers



Conveyors

Shrink Packers

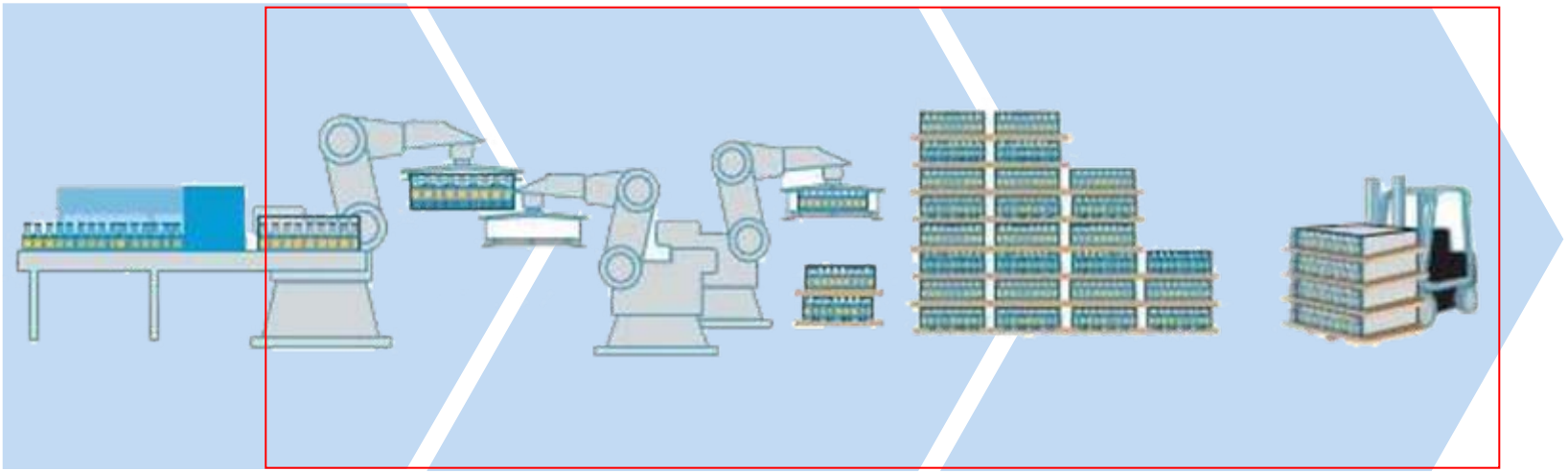
Paletizers

Shrink Packers – Function and Environment

- Shrink packs are primarily made from Polyethylene film to protect single collations of products such as cans, bottles
- Once the film has passed through the shrink tunnel the product collation is held securely within the tray. The pack is extremely strong and ideal for palletizing for transportation from manufacturer to the wholesaler/supermarket. About 70 percent of supermarket products arrive using this method
- Various designs and OEMs

Go to Process Map

Paletizers



Shrink Packers Paletizers

Paletizers – Function and Environment

- Large diversity of assets. Automation is extremely important and common
- Depending on volumes, type of packaging, different technologies will be used. Robots are now intensively used in these areas

Go to Process Map

Paletizers – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
High shocks and loads leads to housing failures	• Housing failures and unplanned stops	• Maintenance free Stainless Steel housings	*Line efficiency*
Lubrication is impossible when machine in operation	• Unplanned stops • Too much planned stops for lubrications tasks	• Lubrication systems • Distribution systems • Mapro Lub.	*Line efficiency* *Safety* *Waste*
Poor chain lubrication	• Unplanned stops	• Mapro chain lub LHFP 150 + LAGD, LAGE • F&B Lub System	*Line Efficiency*

Go to Process Map

Auxiliaries Equipment

Energy generation

- Beverage plants require electrical and thermal energy for the process
- Electricity is needed for lighting, for process control of the installation, for heating, for refrigeration and as the driving power for machinery. It is usually generated and supplied by utility companies
- Thermal energy is needed for heating processing lines and buildings. The heat generated by the combustion of fossil fuels is transferred to the consumers by means of heat transfer media, which, depending on the requirements, are steam, hot water, air or thermal oil
- The basic boiler/generator design generally consists of a combustion chamber, where fuel combustion takes place. The heat is initially transferred by radiation, followed by a tubular heat exchanger for heat transfer by convection

Auxiliaries Equipment

Compressed Air Generation

- Compressed air is generated to run simple air tools, e.g. for pneumatic transfer, or for more complex tasks such as pneumatic controls
- Widely used on manufacturing and packaging lines, oil-free compressed air is required in the FDM sector. The air used has to be of food quality. This is achieved by passing it through several filters at the outlet of the compressor
- Air Generation is a high energy consuming activity

Go to Process Map

Gearboxes – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Water ingress	• Water content in oil • Corrosion to bearings, gears & shafts (typical 1 year life cycle)	• Seals • Como • Endoscopes	*Line efficiency* *Product quality*
Condensation	• Water in oil • Reduced lubrication properties • Corrosion	• Seals	*Line efficiency* *Product quality*
High pressure cleaning	• Breathing in box • Detergent creep • Seal failure • Direct water ingress	• Seals	*Line efficiency* *Product quality*
Refurbishment	• Costly and difficult replacement • Manual labour costs	• Services	*Line efficiency* *Product quality*
Requirement to keep spare gearbox	• Additional cost		*Line efficiency* *Product quality*

Centrifugal Pumps (Fluid Transportation) – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Critical assets (A) with low reliability (MTBF)	• Unpredictable failures (due to typical failure causes, as lubrication problems) can cause process stoppages, and even product losses	• Como • Seals • RSH DGBB	*Line efficiency* *Waste*
Poor fitting and grouting erosion	• Low rigidity of the system increases effects of vibrations due to resonance reducing bearings and seals life		*Line efficiency* *Waste*
High pressure cleaning	• Water ingress to the motor connections • Water ingress to the bearings and motor leading to lubrication problems in bearings		*Line efficiency* *Waste*
"Dirty" product	• Contaminants in the product can lead to unbalance and erosion of impeller and axial seal		*Line efficiency*
Poor maintenance and operation practices	• Pumps operate in a out of alignment leading to lower life of parts, and increase energy consumption • Product connections can introduce tensions in the pump, affecting life of parts • Operation far from BEP can lead to cavitation affecting reliability	• Alignment • Trainings • Thermal • Camera	*Line efficiency* *Waste* *Energy*



Centrifugal Pumps (Fluid Transportation) – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Operation regime	• Frequent starts – stops • Not constant flow does not allow an even operation near BEP • Not constant composition of products (different density, viscosity, etc) affects pump operation	• Como	*Line efficiency* *Product quality* *Foreign Body Prevention*
The pump operation regime can affect the product	• Uneven flows, high tangential forces in the impeller, and cavitation, can affect the product quality	• Como	*Line efficiency* *Product quality*
Erosion of pump	• Particles from pump parts (impeller, seal, housing, ...) erosion can contaminate the product	• Como	*Foreign Body Prevention*

Main centrifugal pumps features:

- Typical duties: raw juice transport; mixing;
- Various sizes, but typically small (around 20 kW); mainly direct drive coupling, or moto-pumps; larger pumps can use frecuency converter. Mounted horizontal or vertical
- Special impeller design (to avoid product stress)
- Cleanable seals; large internal rounding
- Easy (fast) maintenance; standard spare parts (modularity)
- Low power consumption and noise levels

General service Pumps – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Poor maintenance and operation practices	• Pumps operate with misalignment → lower life of parts, and increased energy consumption • Product connections can introduce tensions in the pump, affecting system life • Operation far from BEP can lead to cavitation affecting reliability • In outsourced maintenance contracts pumps are often out of the scope still under customer responsibility	• Alignment tools and Trainings • Como	*Line efficiency* *Product quality* *Energy savings*
Erosion of grouting	• Uneven flows, high tangential forces in the impeller, and cavitation, can affect the product quality		*Line efficiency*

Main service pumps features:

- Typical use: service water; firefighting; waste water; vacuum pums
- When large with direct drive coupling; can be single or multi-stage; in some applications can use frequency converter. Submersible version(for water mainly)
- Normally grouped, not in the same production facility, and have dedicated maintenance (Auxiliary Systems or Service staff)

Process and Air conditioning Fans – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Product stick on fan blades	• Unbalance		*Line efficiency*
Variable speeds	• Many frequencies in the vibration "signature" of the system → rigidity losses or degradation of anti-vibration feet, can lead to high vibration due to resonance	• Como • ODS	*Line efficiency*
Poor maintenance practices	• Belts failures • PT system not properly sized → higher energy consumption and non standard spare parts	• PT products + TMEB • Trainings • Ultra Sonic Leak • Detectors – Mapro	*Line efficiency* *Energy Savings*
Poor quality of components	• Low quality PTP to reduce purchasing costs, can lead to failures of the system • Poor performance of sealing systems, will lead to contamination in bearings	• PT products	*Line efficiency*

Fan main features

- Process fans are common in Dry Milk plants, Flour, Pet food
- Conditioning fans are common in cooling towers, panel fans for general unducted ventilation
- Can be considerable large in size. Usually motors don´t have frequency converters, but starting systems

Conveying Fans – Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Sticked Product on fan blades	• Unbalance	• Como	*Line efficiency* *Energy savings*
Difficult to detect failures	• Failures are detected only when power loss affects the process	• Como	*Line efficiency*
Requirement to keep spare pumps and spare parts	• Additional cost		*Waste*

Main features for conveying fans:

- Typically small size with direct drive coupled fans. See turbine blowers used in Air Conveyors for PET bottle conveying between the blower station and the filling station
- Usually part of the main production process

3

Hygiene and Automation

CIP/SIP Processes

For the Beverage Industry

Hygiene in Beverage Industry

Clean	Free from dirt, stain, or impurities
Sanitized	Free from elements that endanger health, reduction of micro organisms
Disinfect	Refers to inanimate objects and the destruction of all vegetative cells (not spores)
Sterilize	Refers to the statistical destruction and removal of all living organisms

CIP/SIP processes

Manually

Buckets and brushes, hoses, foams, HPLV-Systems (High Pressure Low Volume)

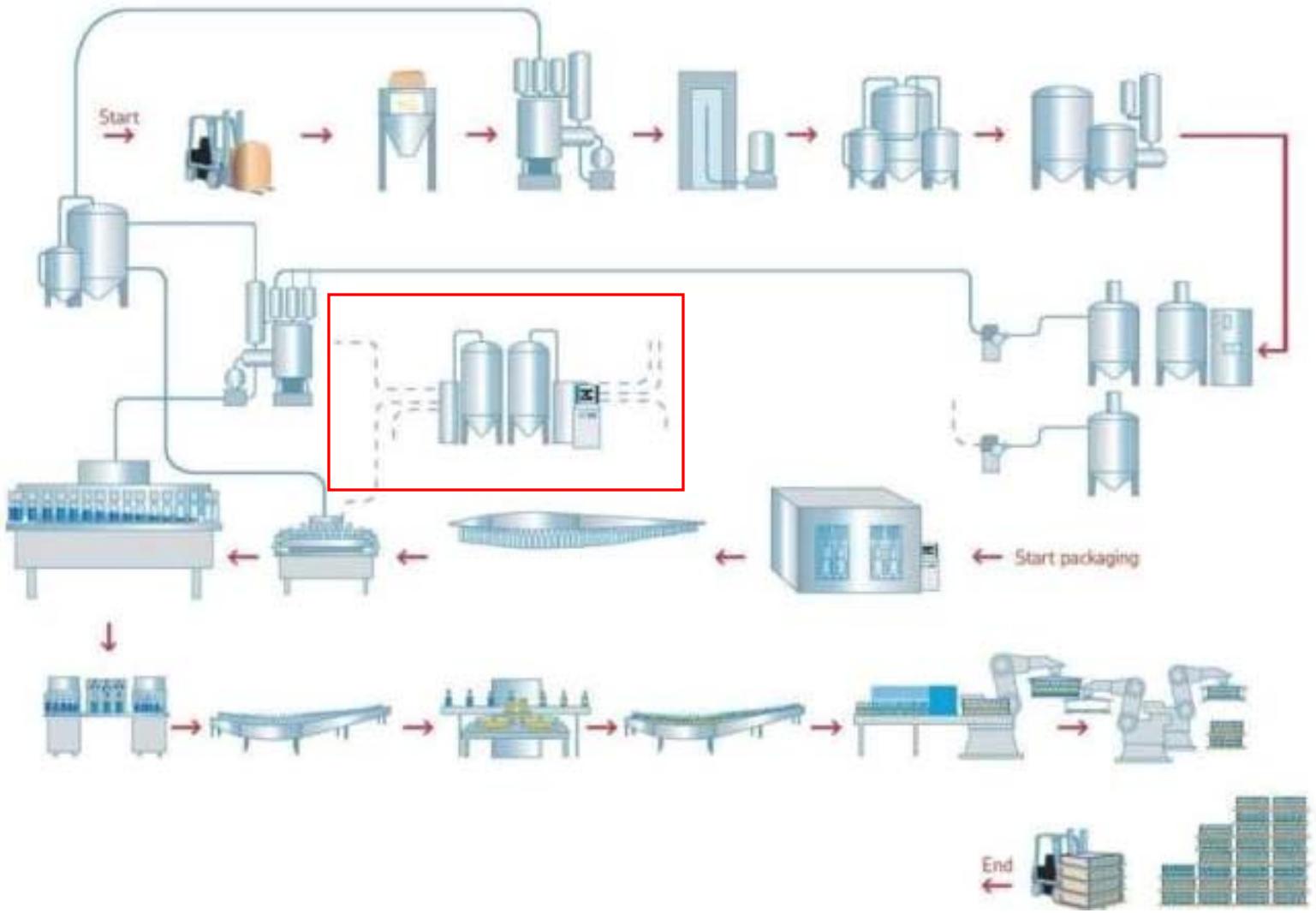
Mechanically

COP: (Cleaned Out of Place); System uses an agitated tank to clean components disassembled and placed in the tank, or the rinsing is by hand

CIP: (Clean In Place); Accomplished via chemical action based on spray or pressure re-circulation of the flush, wash, and rinse solutions under controlled conditions of time, temperature and chemical concentration. It involves the washing of processing and storage tanks, the piping systems and integrated equipment

SIP: (Sterilization In Place); the objective is to sterilize all sterile product contact equipment at its point of use to eliminate or reduce the need for aseptic additions or connections

CIP Systems



Chemical agents used

Chemical	Example	Concentration	Temperature [°C]	Time [min]
Chlorinated Alkalies	Mild solution of caustic soda	max. 0,5 %	55 – 70	5 – 20
Acidified Rinse	Post rinse, fresh water, acid sol.	pH 5,5 – 6,0	RT	---
Strong Alkalies	Caustic soda	0,5 – 5 %	up to 90	45 – 60
Strong Acids	Phosphoric acid, Nitric acid	pH ~ 2	75 – 90	20 – 30
Sanitizer	Sodium hypochlorite	0,02 %	Cold	2+
Hot water			80 – 90	
Steam			~ 130	

CIP Pumps - Typical issues

Issues	Implications	SKF Capabilities	Drivers Affected
Chemical attack of CIP solutions	• Failure of seals • Wear of impeller	• Como • Seals	*Line efficiency* *Product quality*
Poor fitting and grouting erosion	• Low rigidity → increased effects of vibrations due to resonance, reduces bearings and seal life	• Como	*Line efficiency* *Product quality*
High pressure cleaning	• Water ingress to the motor connections • Water ingress to the bearings and motor → lubrication problems in bearings		*Line efficiency* *Product quality*
Difficult failure condition detection between cycles	• A failed pump will be detected when staring the CIP cycle, and would delay the hole process		*Line efficiency* *Product quality*
Requirement to keep spare pumps and spare parts	• Additional cost	• Como	*Line efficiency* *Product quality*

Specific features for these pumps:

- 1 to 20 kW are normal sizes; moto-pump; no frecuency converters
- Cleanable seals; large internal roundings
- Adjustable legs (as are commonly not to fit in the ground)
- Possible to pump liquids that contain air or gases (like liquid ring pumps), to pump from a suction line partially filled with air

Hygiene in Beverage Industry

The requirements of materials are:

- Chemical resistance against the product
- Chemical resistance against the used CIP media
- Good cleanability and sterilizability surface
- Good resistance against abrasion caused by solid parts of the product
- Non toxic material – Food Grade
- Installation without any dead spots (spaces)

Go to Process Map

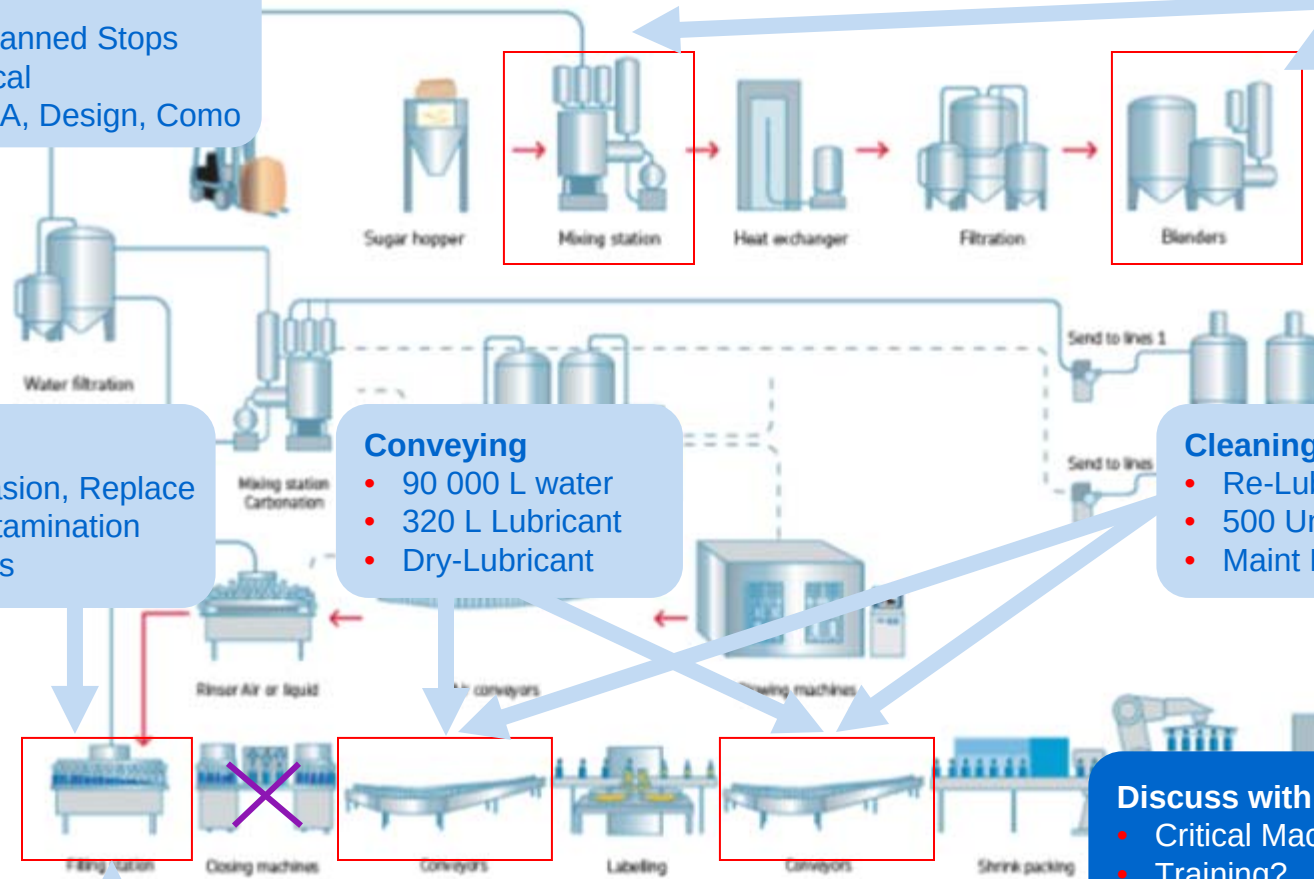
4

Process approach and Summary

Process approach – Beverage Plant

Fans
- Unplanned Stops
- Critical
- RCFA, Design, Como

SRCM?



Filling
- Abrasion, Replace
- Contamination
- Seals

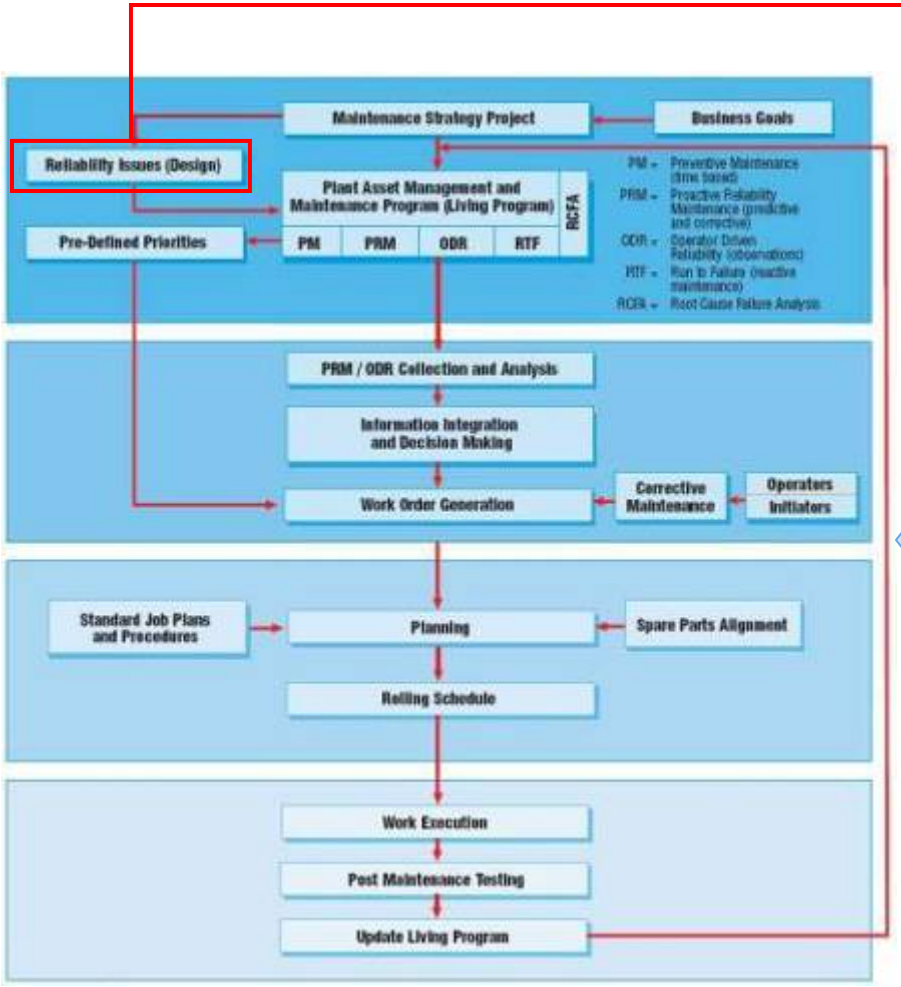
Conveying
- 90 000 L water
- 320 L Lubricant
- Dry-Lubricant

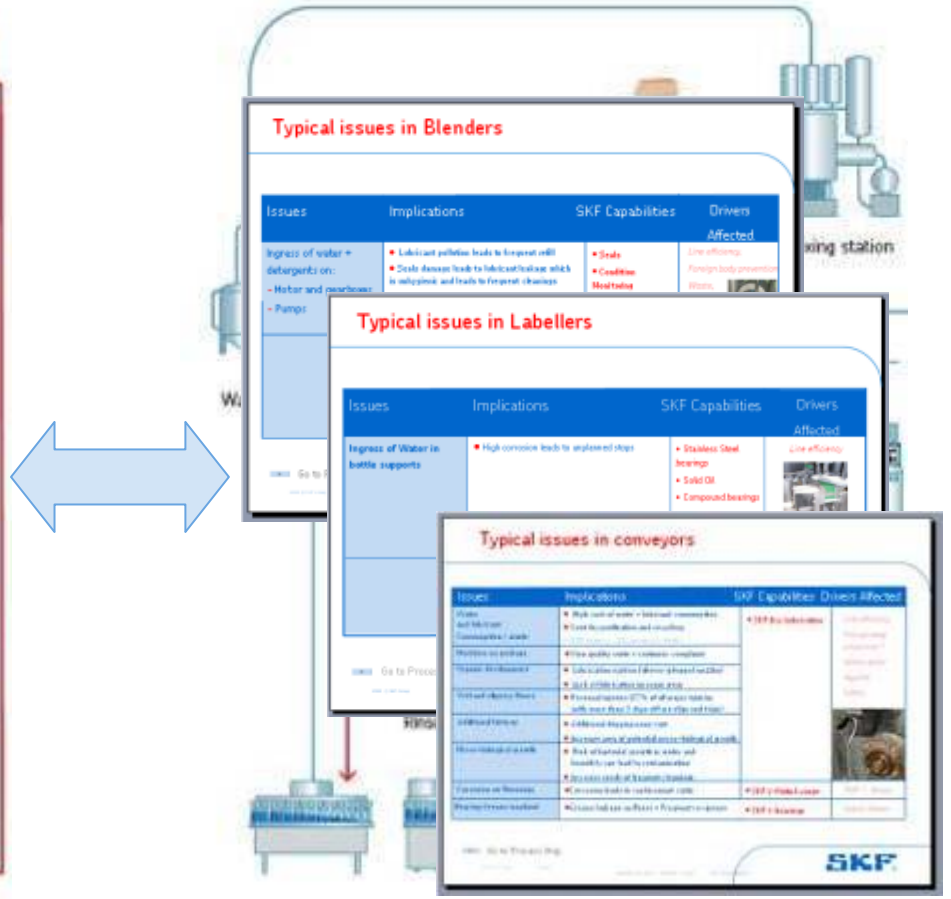
Cleaning
- Re-Lube, Safety
- 500 Units
- Maint Free Units

Discuss with customer
- Critical Machine?
- Training?
- CNA?

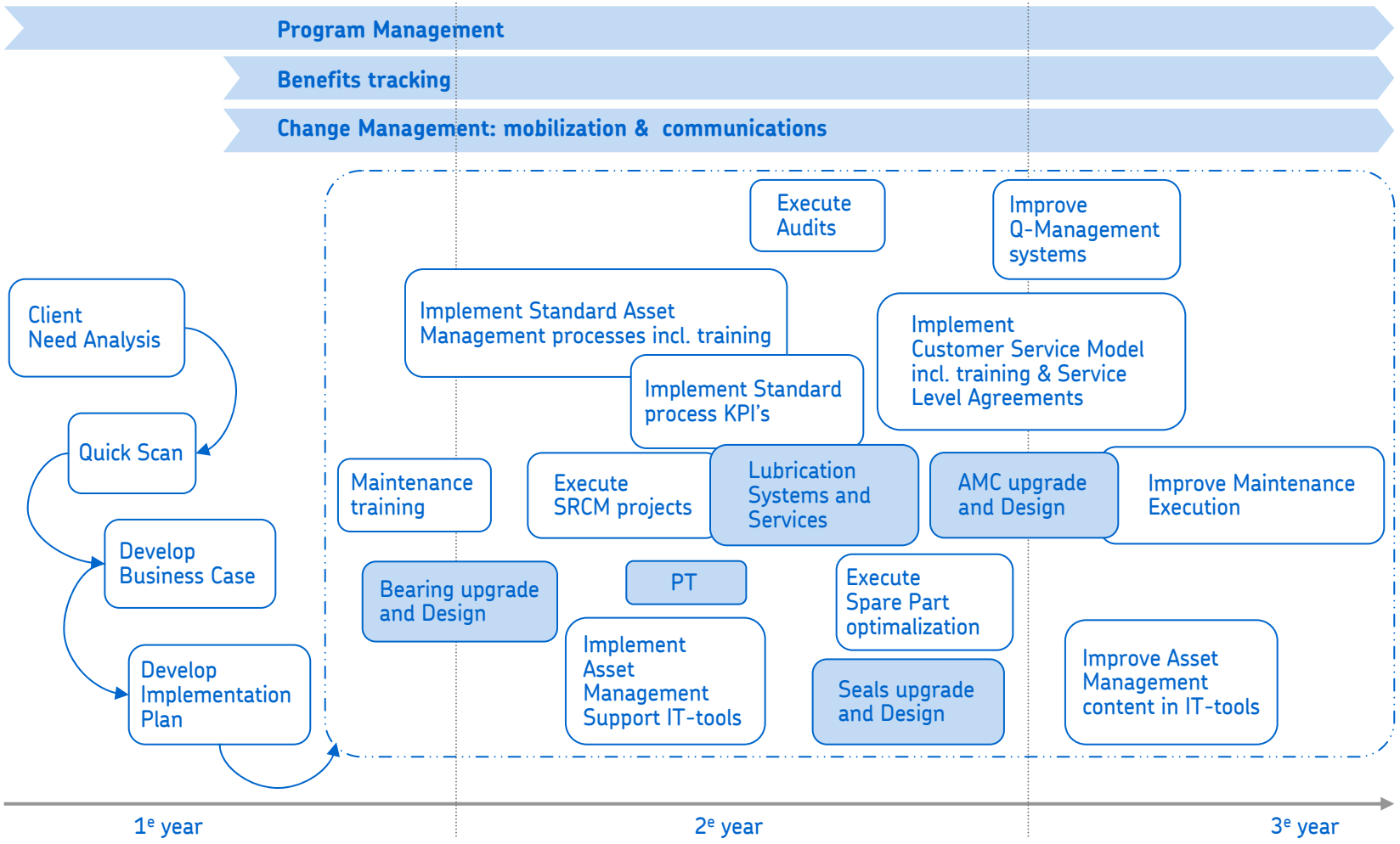
Capabilities

Service Approach with Process and Asset Knowledge





From CNA to Implementation



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Segment contacts

The F&B segment and SD global KAM team

DC – Alireza Afshar

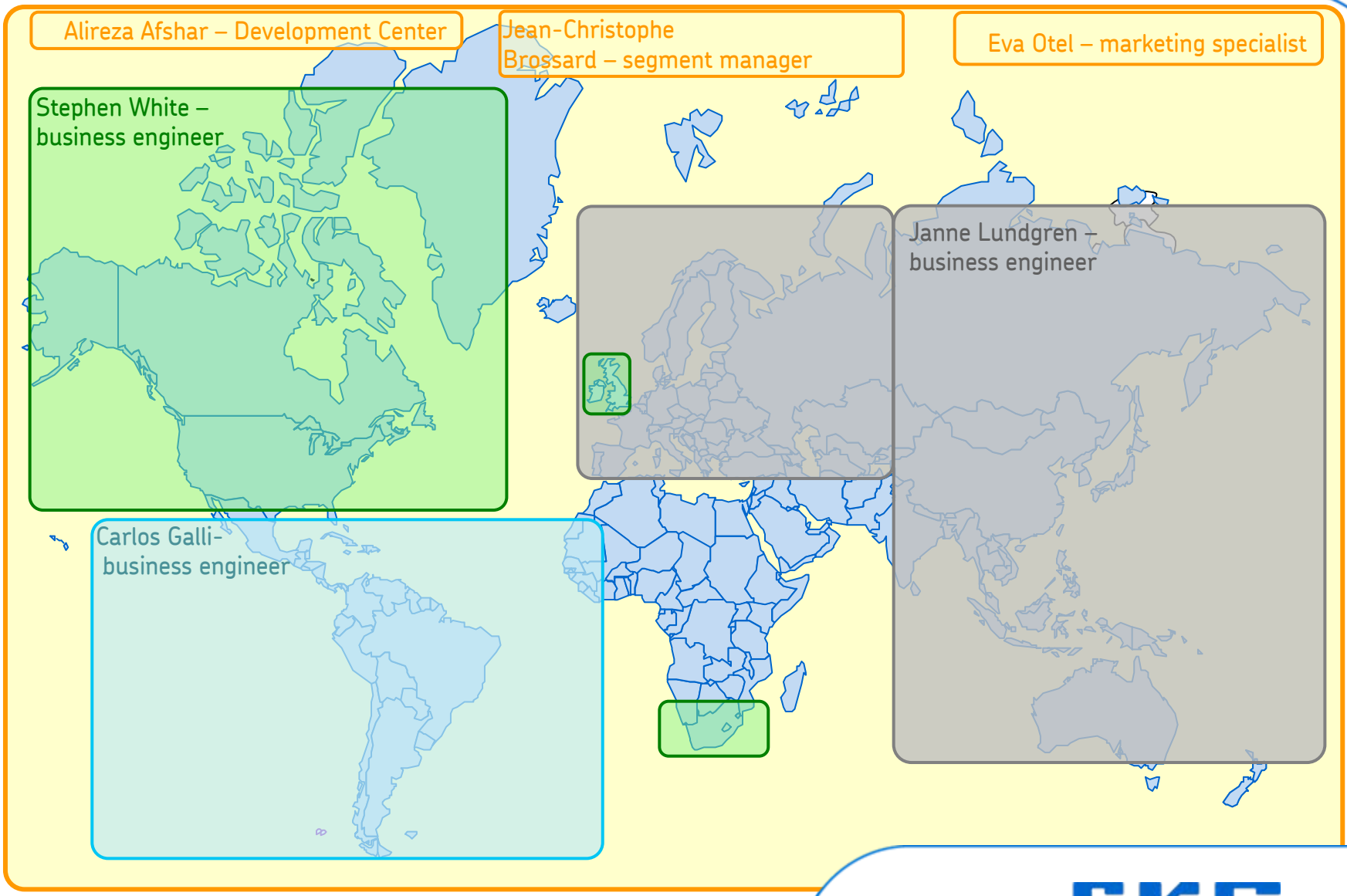
Segment – Jean-Christophe Brossard

Segment – Eva Otel

Segment – Stephen White

Segment – Carlos Galli

Nestle – Corrado Cesti


Alireza Afshar – Development Center
Jean-Christophe Brossard – segment manager
Eva Otel – marketing specialist
Stephen White – business engineer
Janne Lundgren – business engineer
Carlos Galli- business engineer


Thank You !


SKF