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# MS11 – Food Industry Cereal, Grains and Oils – Application

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Aldemir Oliveira – Global Market Manager Food



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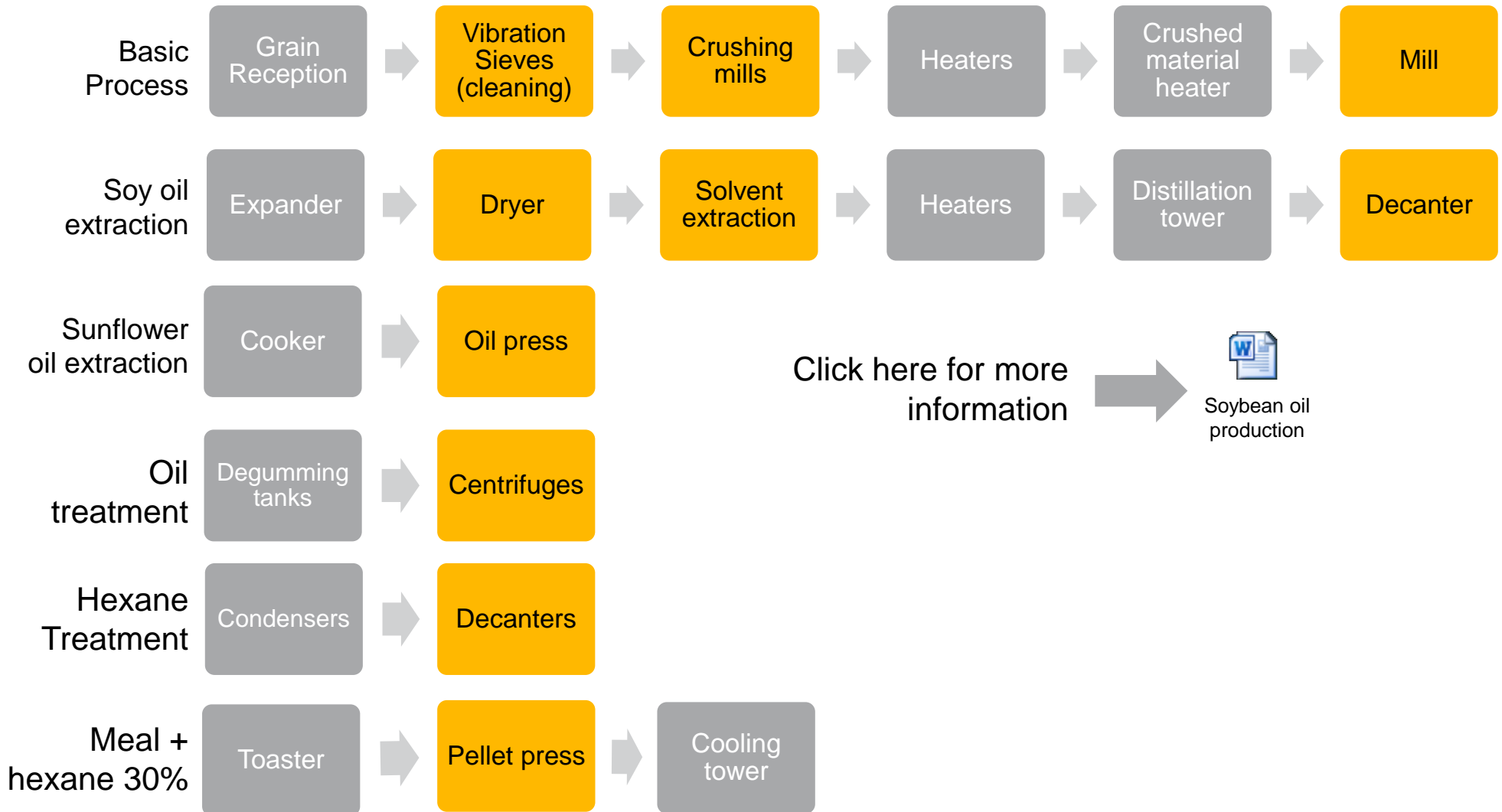
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# Cereals, grains and Oils

## 1. Vegetable oil production

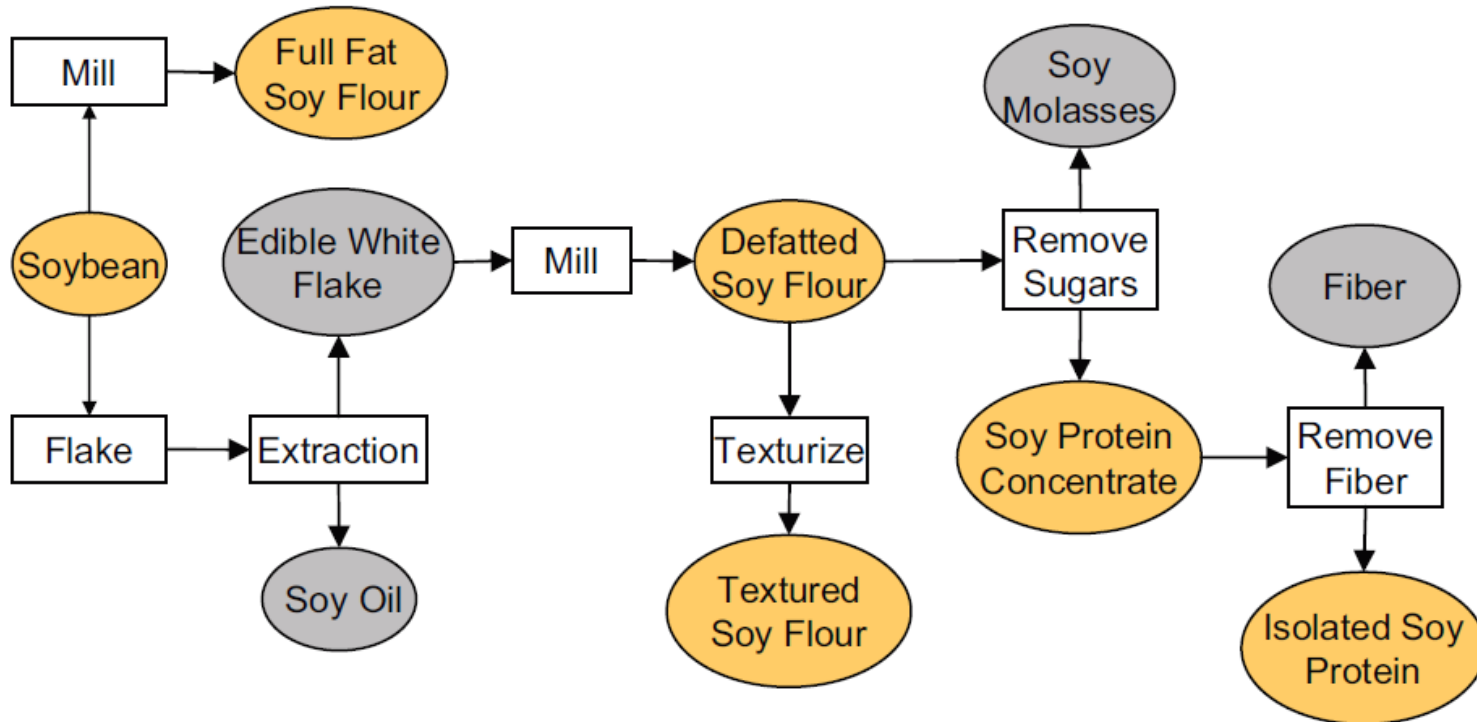
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LUBRICATION



# Cereals, grains and Oils

## 1. Vegetable oil production

### Soy Protein Ingredients & Processing

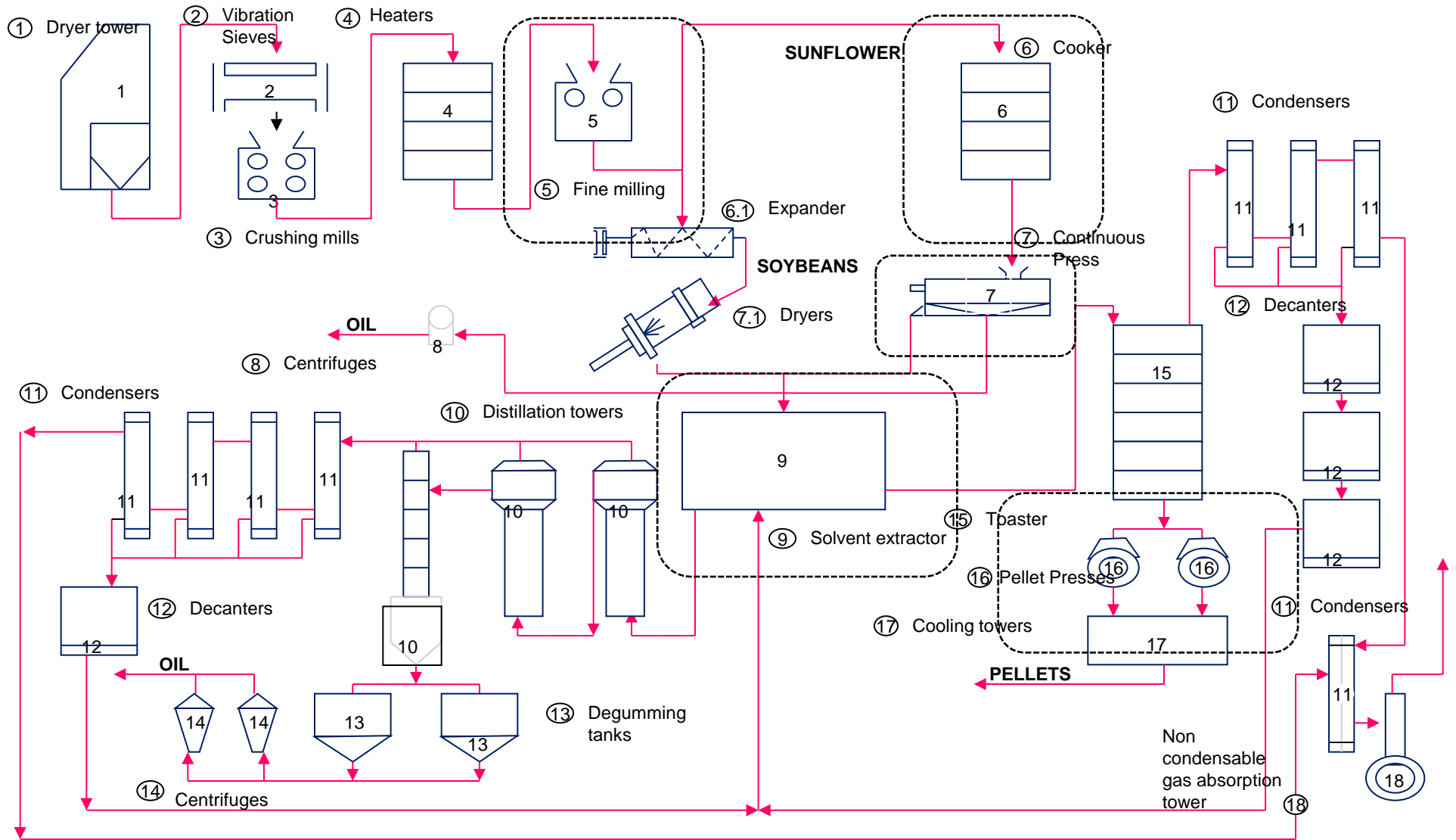


*Source: 2008 Soy Protein Report prepared by Soyatech*



# Cereals, grains and Oils

## 2. Process Layout for soybeans and sunflower



# Cereals, grains and Oils

## 3. General product recommendation (adapted from KLARG brochure)



Basic process						
Equipment	Application	Product	H1	NLGI	Base oil/ Thickener	Description and advantages
Crushing mills	Rolling bearings	STABURAGS NBU 8 EP	No	2	Mineral / Barium complex	High wear and media protection, EP and anticorrosion additives.
Fine milling (hammer mills), pellet presses, screeners, cookers, expanders and pellets cooling tower	Rolling and plain bearings	STABUTHERM GH 462 STABUTHERM GH 461	No	2	Mineral / Polyurea	High performance grease for low speeds, vibration. Good load absorption and anticorrosion properties.
		3				
		Klüberfood NH1 94-402	Yes	1-2	PAO / Calcium sulfonate complex	H1 grease for high loads and water resistant, applicable by means of centralized lubrication.
		Klüberfood NH1 34-401	Yes	1	PAO / Calcium complex soap	H1 grease with very low friction torque water resistance, applicable by means of centralized lubrication.
Seeds driers	Open gears and drier wheels	GRAFLOSCON CG 901	No	1	Mineral/ Aluminium complex + Graphite	High load support and adhesion, can be applied by mean of centralized lubrication
		GRAFLOSCON CSG 0 Ultra	No	0	Mineral / Aluminium complex + Graphite	High load support and adhesion, can be applied by mean of centralized lubrication.
		Klüberfluid CF3 Ultra	No	--	PAO + Mineral	Transparent lubricant with very high viscosity, excellent adhesiveness and corrosion protection.
		<b>Klüberfood NH1 94-120</b> Available from end of 2016	yes	0	PAO / Calcium sulfonate complex	H1 grease for high loads and water resistant with excellent adhesion properties..

# Cereals, grains and Oils

## 3. General product recommendation (adapted from KLARG brochure)



Solvent extraction zone						
Equipment	Application	Product	H1	NLGI	Base oil/ Thickener	Description and advantages
Solvent extractor, meal distillation tower, Hexane condenser, toasters, non condensable gas absorption tower	Rolling bearings, valves and seals	NOSOL GBY 2	No	2	Ester / Silicate	Excellent sealing effect, very stable against solvents, water and anti-freezing agents.
		Klübertemp GR AR 555	yes		PFPE / PTFE	Grease for applications under influence of aggressive media and high temperatures.

### Especial applications

Equipment	Application	Product	H1	Viscosity At 40° C	Base oil	Description and advantages
Especial applications	Barrier fluids	Klüber Summit FG 100	Yes	100 mm <sup>2</sup> /s	PAO	excellent high temperature stability properties as well as the ability to efficiently transfer heat , they are compatible with most commonly used seal materials
		Klüber Summit HySyn FG 15	Yes	15 mm <sup>2</sup> /s	PAO	
		PARALIQ P 12	Yes	21 mm <sup>2</sup> /s	Mineral	

### Air blowers

Application	Product	H1	Viscosity At 40° C	Base oil	Description and advantages
Blowers – mainly bearing lubrication	Klüber Summit FG 500	Yes	150 mm <sup>2</sup> /s	PAO + ester	Very good oxidation stability due to the synthetic base oil, less oxidation residues and extending oil change intervals and the service life of oil filters and separators
	Klüberoil 4 UH1-150 N	Yes	150 mm <sup>2</sup> /s	PAO	



# Cereals, grains and Oils

## 4. Vibration sieves (cleaning & grading)

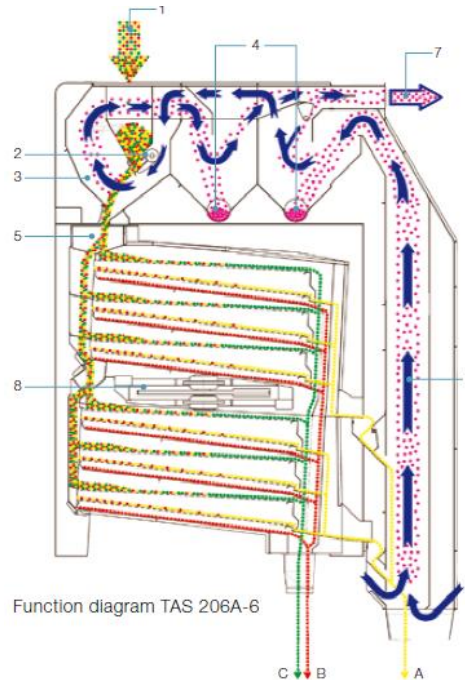
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[Video link](#)

### Working Conditions:

Vibration loads over the rolling bearings  
Difficult access points to re-lubricate.



Function diagram TAS 206A-6

- 1) Product inlet
  - 2) Distribution gate
  - 3) Inlet aspiration
  - 4) Expansion chambers with discharge screws
  - 5) Product distribution onto screens
  - 6) Vertical sifter
  - 7) Exhaust air
  - 8) Screen box drive
- A) 1st grade  
B) 2nd grade  
C) Coarse particles

### Appropriated lubricating greases:

STABURAGS NBU 8 EP (vibratory motor)  
Klübersynth UH1 64-62  
Klüberfood NH1 94-402  
Klüberpaste UH1 84-402 (Keyed Shafts,  
bearing press, Fits, Screws, Linkages etc)



# Cereals, grains and Oils

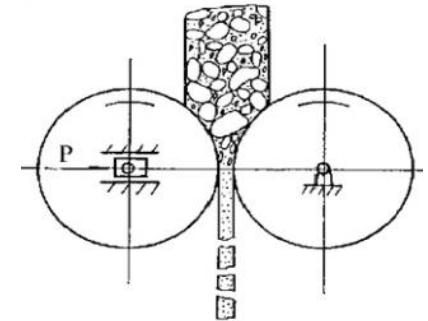
## 5. Crushing mills and fine milling

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### Roller mills

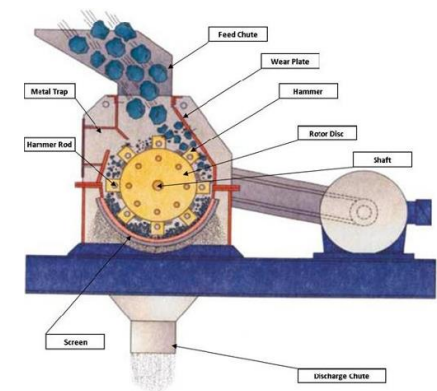
Recommended for obtaining bigger particle size / flakes. They adopt usually corrugated rollers and consume less energy, compared to hammer mills.

They are more applied in the pre-grinding phase, or crushing mills as showed before using the flowchart.



### Hammer mills

Hammer mills are preferred when it's required finer particle size, the size reduction is obtained with the impact of the hammers on the grains, therefore greases offering resistant against impact are usually preferred.



it's usual finding both machine concepts in a grain & oil production plant.

In most of the cases it's possible to determine a lubricating grease attending both demands

# Cereals, grains and Oils

## 6. Crushing mills (Roller mills)

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**Working Conditions\_Bühler**  
 Speed range: 440 to 770 rpm  
 Temperature: 50 to 100° C  
 High load and vibration  
 Klüberlub BE 31-102  
 Klübersynth UH1 14-222

Usually manual re-lubrication.

Depending on the number of rolls, different quantity of grease is applied.

Average re lubrication interval is 4.000 hours

The mentioned amounts and intervals are calculated or generally available in the machine manual.

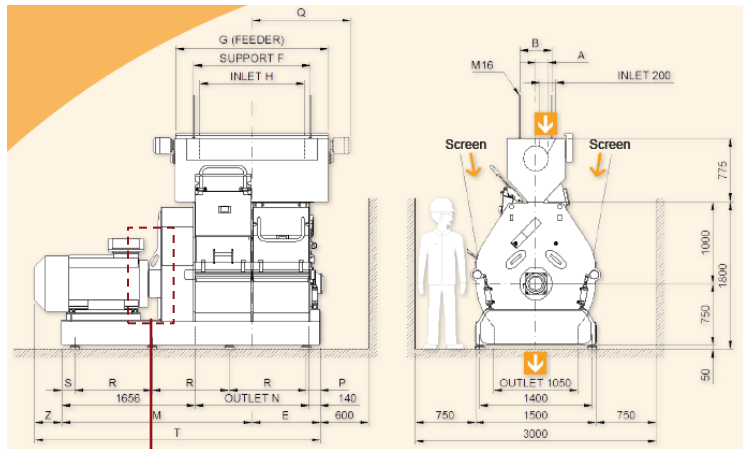
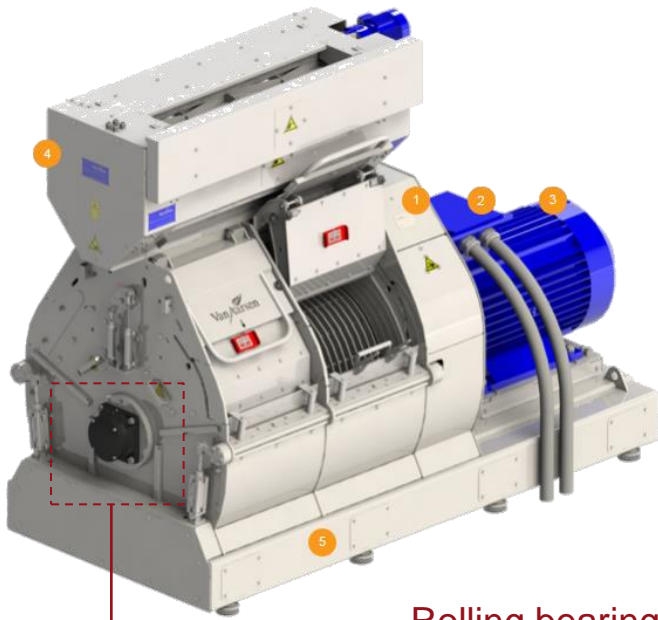
[Video link](#)

# Cereals, grains and Oils

## 7. Fine milling (Hammer mills)

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Mills are mainly designed for the animal feed and Grains industries, to grind raw materials into small particles. Hammer mills covers usually a very broad capacities range (from 5 to more than 100 tons/hour), dependent on type of raw material, formula and required grinding structure.



### Rolling bearings

Klüberfood NH1 94-402 (preferred H1 grease, good adhesiveness and wear protection (ndm <300.000)  
STABUTHERM GH 462 (preferred non H1 grease), others: STABURAGS NBU 8

Klübersynth UH1 14-151 (300.000 < ndm < 500.000)  
Klübersynth UH1 64-62 (300.000 < ndm < 500.000)

Please check NDM and temperatures to select the most suitable grease.

# Cereals, grains and Oils

## 8. Fine milling (KLPOL Case – hammer mill)

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### Business Objective

- Cost and time reduction of lubrication in Buhler hammer mills
- Prepare the area for external quality audit.
- Decrease temperature of main shaft bearing – reduce wear of bearing

### Competitor

Electric motor bearing (Mobil UNIREX N3) not H1 – Failed internal audit

Main shaft bearing (Cassida EPS 2): Poor performance and high consumption

### Application

Lubrication of Buhler hammer mill for animal feed pellets. Main shaft - roller ball bearings double row, self aligning: SKF 1220 K / C3 . Electric motor deep groove ball bearing SKF 6319/C3 and cylindrical roller bearing SKF NU324EC/CC.

### Solution

- **Klüberfood NH1 94-402** in Klübermatic STAR VARIO for main shaft bearing
- **Klübersynth UH1 64-62** for electric motors bearings
- Labelling for H1 product and lube points

### Benefit and Value

- Better load-carrying capacity for main shaft bearings –reduced temperature,
- Eliminated over lubrication, using Klübermatic.
- LED information status: transparent information about empty LC or battery failure
- Proven and tested product for ABB electric motors used in Buhler mill





# Cereals, grains and Oils

## 9. Fine milling (KLARG Case – hammer mill)

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### Case – Fine mills (laminator)

#### Business Issue (Problem)

Grease getting very fluid with time (low work resistance).  
Bearings failures causing production stops.

#### Lubricant recommended

STABURAGS NBU 12

UNIMOLY GLP 2

MICROLUBE GL 262

#### Advantages

High load carry capacity even at low speeds.

Withstands very high temperatures without fluidized (stability)

*PS: For fine milling, generally hammer mills are applied, were H1 requirement is present, products like Klübersynth UH1 64-62 and Klübersynth UH1 14-151 are suitable, according to the parameters.*

*New H1 product developments (based on Calcium sulfonate and Polyurea) will bring some innovative H1 solutions for that application*



# Cereals, grains and Oils

## 10. Conveying – (KLARG Case anti-dust wax chain treatment)

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Chain Lubrication for conveying systems used in silo and storage facilities for grains and other bulk goods.

Also processing plants for malt, rice, grain, animal feed and oil mills).



### Parameters

Length: up to 100 m

Angle of inclination: max 15°

Chain type: plate link chain

Chain tension limit: up to 67 kN

Width: up to 600mm

Ambient: lots of powder and dirt from the grains transported.

\*\* some chains are coated, requiring no lubrication.

Chain types



*For anti-dust treatment, chains have to be disassembled.*

# Cereals, grains and Oils

## 10. Conveying – (KLARG Case anti-dust wax chain treatment)

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Before

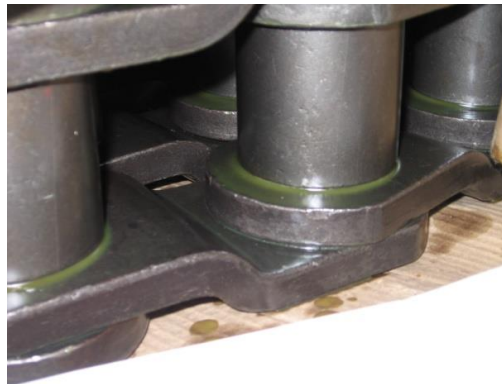


After



KLARG (Argentina) charges per meter, according to the chain type (link simple, double, etc.).

Most important here is the given value by the service of treatment, rather than selling the wax. (e.g.: Klüberplus SK 02-295)



For more details, including treatment procedure, please contact Mariela Morgado (KLARG) or Aldemir Oliveira (KLM).





# Cereals, grains and Oils

## 10. Conveying – (KLARG Case anti-dust wax chain treatment)



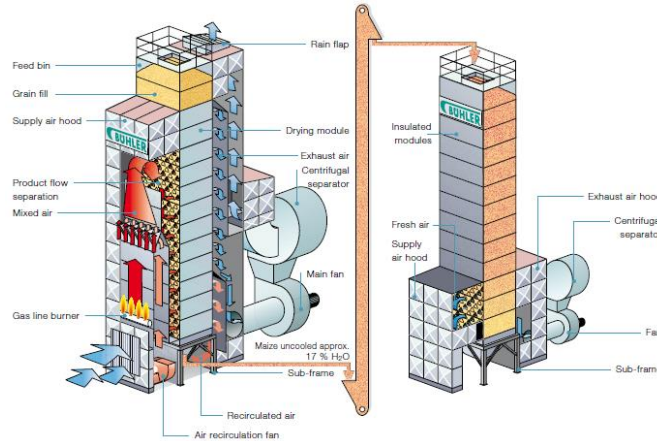
### List of installed bathes with lubricating waxes for chains

- IWIS Antriebssysteme, Wilnsdorf/Germany (chain manufacturer)  
IWIDUR (NSF H1-Registration)
- IWIS Antriebssysteme, München/Germany (chain manufacturer)  
IPW (changeover to IWIDUR is planned)
- Renold, Einbeck/Germany (chain manufacturer)  
Klüberplus SK 11-299  
Klüberplus SK 02-295 (is mixed with oil)
- Rexnord, Betzdorf/Germany (chain manufacturer)  
Klüberplus SK 02-295 (is mixed with oil)
- Wippermann jr., Hagen/Germany (chain manufacturer)  
Klüberplus SK 11-299

# Cereals, grains and Oils

## 11. Driers

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### Vertical driers

Operates as a strictly counter-current dryer with the grain moving downward against a stream of hot air. The grain moves through the hopper as it falls through a restricting funnel and is returned to the top via a grain elevator. Input moisture content is typically less than a 35% moisture content and full drying requires 15 to 24h.

### Silo driers

The silo or fixed bed dryer is well suited for coffee and can be built with a minimum of technical input since the bulk of the fabric can be constructed in common building materials. The only moving part is the centrifugal fan and by combining pre-drying with final drying.

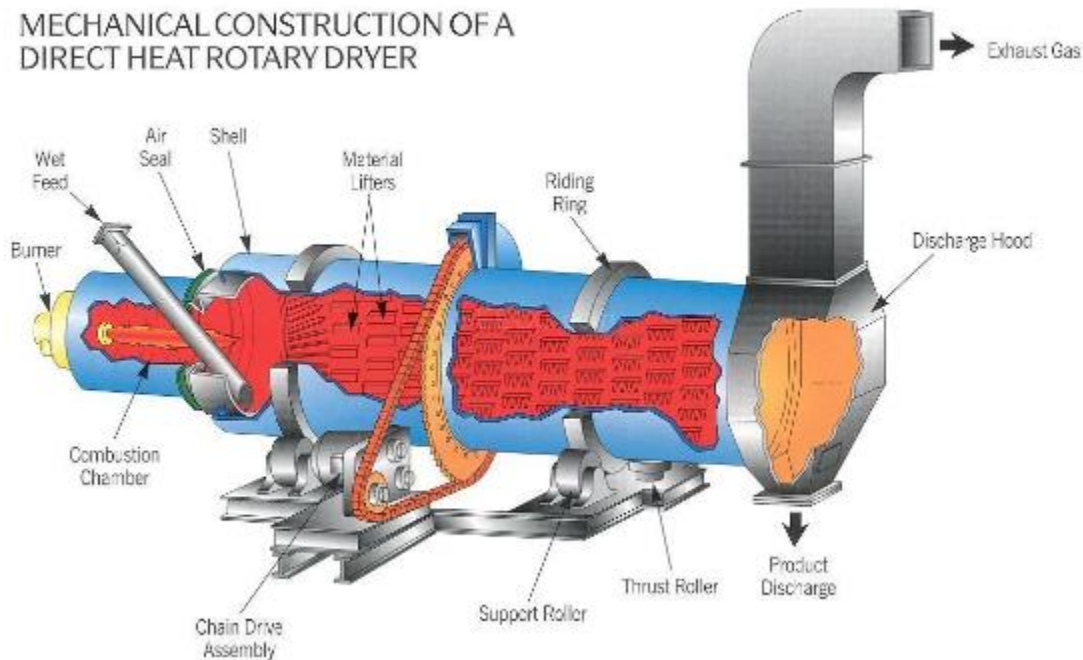


# Cereals, grains and Oils

## 11. Driers

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MECHANICAL CONSTRUCTION OF A DIRECT HEAT ROTARY DRYER



### Horizontal dryers

The flow of air in the horizontal dryer is introduced along the axis of the grain chamber and is directed out along the length of it. The path is relatively short, a maximum of the chamber radius, and drying efficiency is sensitive to loading.

Rotation speed is not normally adjustable so the control parameters for the operator comprise initial moisture content of the grain, loading (as near to design capacity as possible) and inlet temperature.

Input moisture content is typically less than 35% and the drying period is similar to that of vertical dryers – 15 to 24h.



# Cereals, grains and Oils

## 12. Driers (KLARG case, horizontal dryer)

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### Case 1 – Horizontal/ Tubular dryer

#### Problem

Continuous lubrication due to lack of adhesiveness of the product used.  
Pitting formation (also in rollers and wheels dryers)

#### Lubricant recommended

GRAFLOSCON CG 901

#### Advantages

Lower quantities and longer lubrication intervals, due to the very high adhesiveness. Pitting protection with solid content of lubricant.



### Case 2 – Horizontal/ Tubular dryer

#### Problem

Overconsumption and lubrication failures, the grease can't be sprayed. Bad adhesion property.

#### Lubricant recommended

GRAFLOSCON CSG 0 Ultra

#### Advantages

Applicable through centralized system, solid content supporting emergency lubrication and very good adhesion



a brand of  **FREUDENBERG**



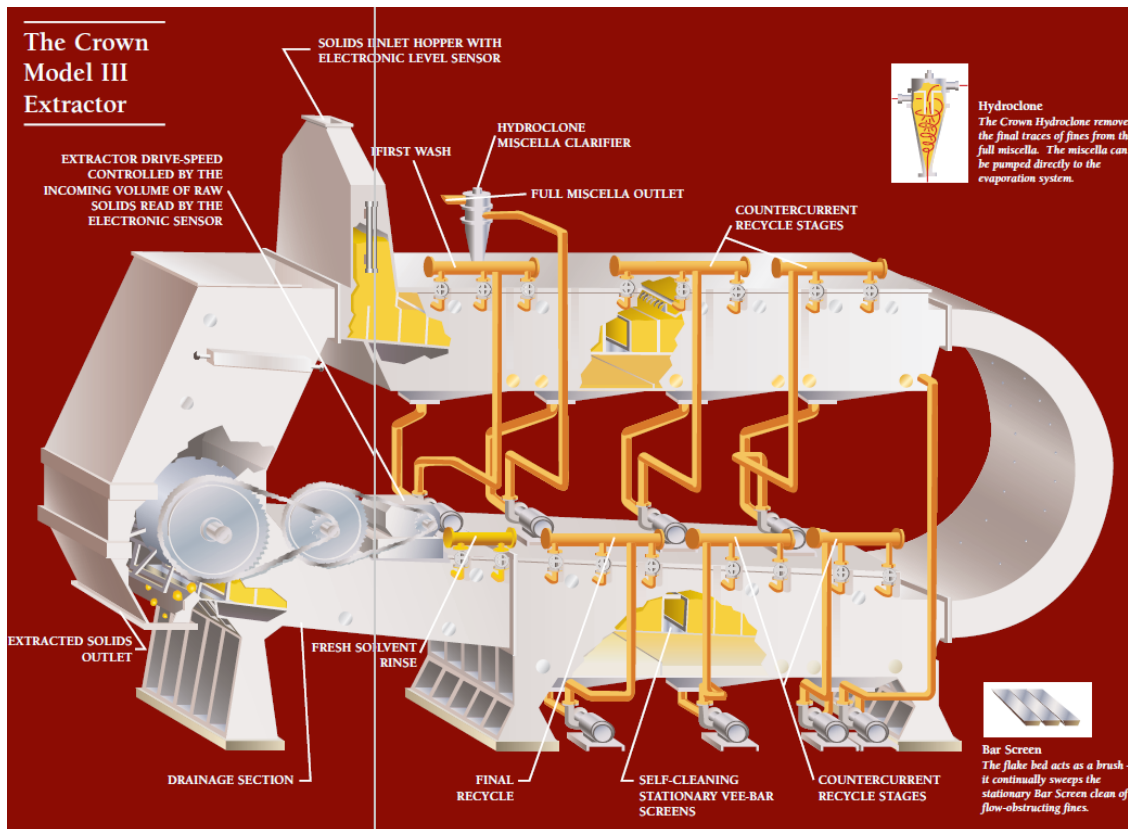
# Cereals, grains and Oils

## 13. Solvent extraction

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Hexane is the most used solvent for oil extraction, this solvent is aggressive towards standard greases, causing their dissolution in bearings, valves and seals. This dissolution produces failure and equipment downtime

All components which are in contact with hexane, must be lubricated with solvent resistant greases.



Klüber has accumulated experiences using PFPE/ PTFE greases, like **Klübertemp GR AR 555**, or ester/bentonite grease like **NOSOL GBY 2**.

Beside the benefits of using the above greases are:

1. Lower quantity and longer lubrication intervals
2. Longer bearing and seals lifetime
3. Reducer Hexane leakage
4. Higher process reliability

Next slide brings VCS from KLARG.

# Cereals, grains and Oils

## 14. Solvent extraction (KLARG case)

**KLUBER**  
LUBRICATION

### Business Issue

The use of Hexane produces dissolution of the standard grease in bearings, valves and seals. This dissolution produces failure and equipments downtime

### Anxiety Question

Do you know how many downtime in the year produces this failures? And how many litres of oil could you produce in this time?

### Application Machine

Solvent Extractor, Miscella Distillation Tower, Meal Toaster, mixers, redlers.

### Application Part

Roller bearings (axial bearings) in the main axle of the Extractor.

### Ssolution

NOSOL GBY 2 offered a heavy resistant to the Hexane dissolution. The lubricant provided an excellent sealing effect.

### Benefit and Value

Daily to weekly re-lubrication interval, reduced volume of grease used, increased bearing and seal life, reduced the leakage of hexane, reduced process downtime.



Seals in bearings and axles



Valves



Redlers and transportation systems  
between the Extractor and the Toaster

Mixer main  
bearings



# Cereals, grains and Oils

## 15. Seed conditioner (KLAUS case)

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### Business objective

Reduce unscheduled downtime due to bearing failures

Reduce spare part costs and increased machine reliability and efficiency

### Application point

Drive and support bearings of seed conditioner in a superheated steam (180 C) environment

Bearing temperature is about 130 to 140 C

Speed around 30-40 rpm

OEM = Krupp

### Competitor product used

MOBIL XHP 222, weekly re-lubrication intervals.

### Solution

Klübertemp GR AR 555, increased re-lubrication intervals to monthly basis.

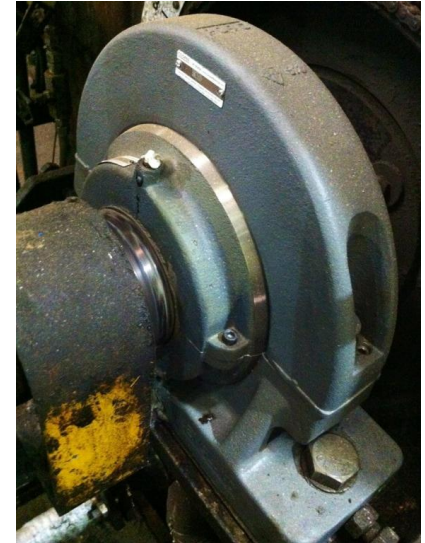
### Benefit and Value

Monthly re-lubrication period

3 seed conditioners are being lubricated with KLUBERTEMP GR AR 555 and the overall benefit p.a. is 99,000 €

Increase product safety by using a NSF-H1 registered lubricant

Minimize contamination to finished products



*PS: Seed conditioners are usually applied for oil seed peeling, before crushing and milling.*



# Cereals, grains and Oils

## 16. Soybeans pre-pressing (KLSEA case, Singapore)

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### Business objective

Avoid contamination risks

Improve food safety by using food grade hydraulic oil

### Application point

Machine: Soya pre-press

Application: Daikin hydraulic system, closed loop,

1,800 liter tank supplying 2 systems

Operation temperature 40-50 degree C.

### Competitor product used

BP Energol HLP 46

### Solution

Klüberfood 4 NH1 46 (Before oil change, they carried-out the repair of leakages).

### Benefit and Value

Our solution comprised an argumentation why H1 should be targeted, and we were providing add-on services like customized stock keeping for any refill measures and monitoring via OCA.

Future plan (after introduction and monitoring period): implement a regime for overhaul/flushing every 1-2 years, in dialogue with customer.



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Thank you