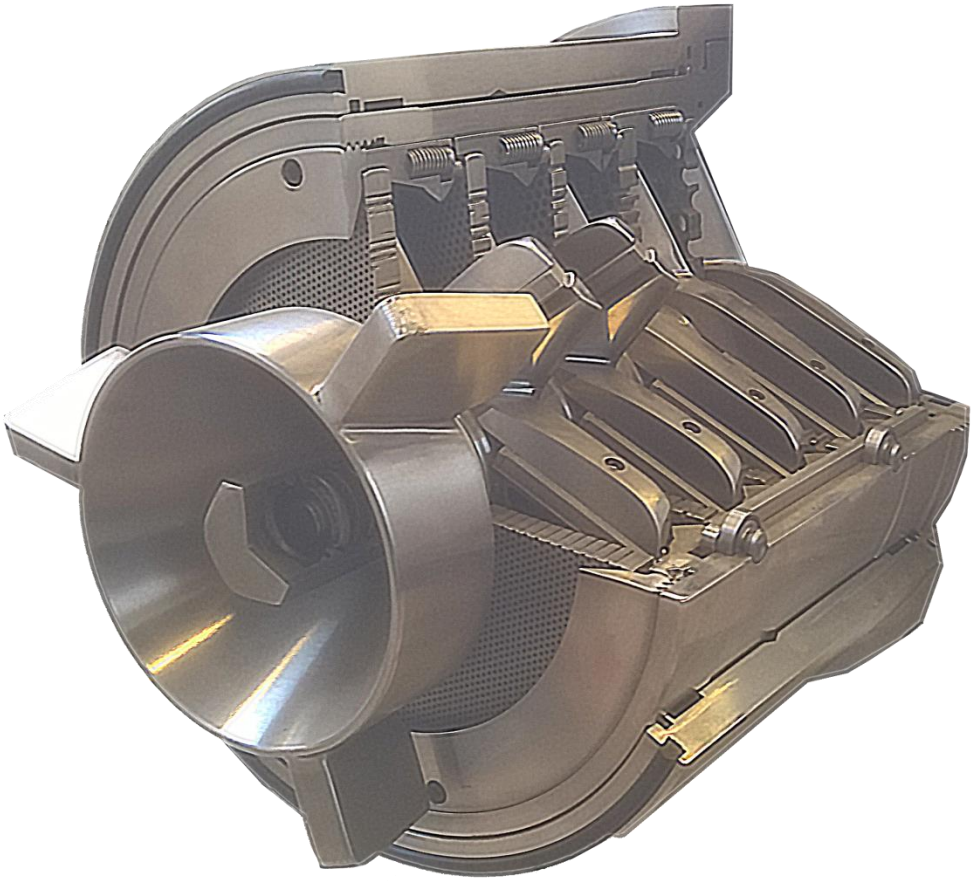


Content

1 Different working principals in emulsifying

1.1 Hole plates and cutting heads

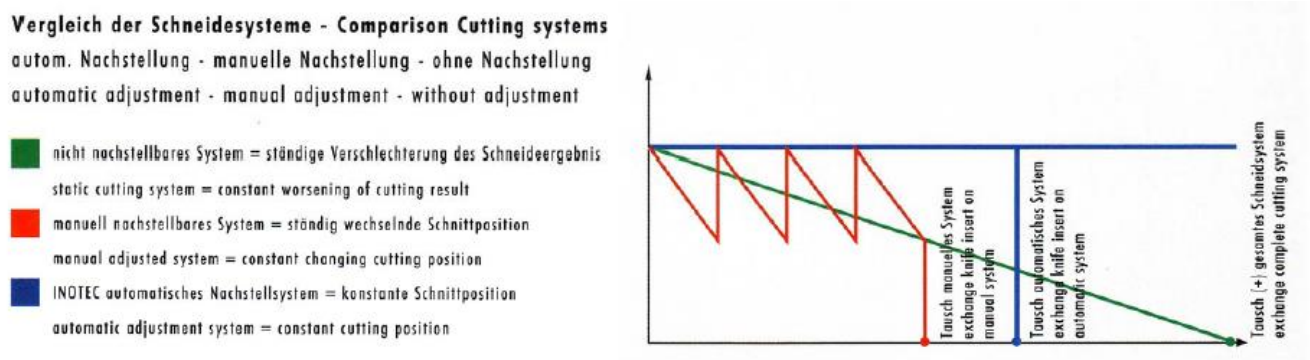
Karl Schnell	2-3 hole plates, 2-3 cutting heads, manual adjustment before and during production 2 sizes and small vertical hopper machines 175 and 225
GEA (CFS K&G – Ecocut) GEA (CFS Wolfking)	2 hole plates, 3 cutting heads 1 hole plate, 2 cutting heads, pump spring loaded adjustment, 2 sizes 175 and 225
Cozzini	2 hole plates, 2 cutting heads, drive motor 1500 – 3600 rpm (frequency converter) spring loaded adjustment 3 sizes (since 2017) , similar to Inotec but in inches
Laska	3 hole plates, 3 cutting heads, automatic adjustment, hydraulic pressing of plates to knifes 2 sizes 175 and 225
INOTEC	3-4 hole plates, 3-4 cutting heads automatic adjustment and automatic wear compensation 3 sizes: I 140, I 175, I 225

1.2 Rotor + Stator

Stephan Microcutter	Rotor and stator with blades, product is pressed by centrifugal effect to the housing through the machine
Kilia Finecut (since IFFA 2007)	„Weltneuheit“ – machine with vertical cutting set „Stephan“ type
Alpina - Busser	Alpina purchased „Busser“ in 2010 before Iffa –
Glass	Machines with cutting set „Stephan“ type

1.3 Only hole plates

Seydelmann Konti-Kutter	7 hole plates – 3 fix, 4 mounted on motor shaft, 2 sizes KK 140 and KK 250



2 Arguments about the different competitors

2.1 Hole plates and cutting heads

2.1.1 Karl Schnell / KS

2.1.1.1 Cutting principle

2(3) knife heads, 2(3) hole plates

adjustable lug ring (with a special adjusting tool, the cutting set has to be adjusted before working outside of the machine housing, adjustment of wear during production manually by hand wheel)

2.1.1.2 Advantages / disadvantages

Advantages:

- Constant product qualtity depending on the skills of the operator (manual adjustment / readjustment)
- Wear at the blades can be adjusted by means of a hand wheel
- After aprox. 2 mm wear the blades have to be changed and the hole plates have to be regrinded.

Disadvantages:

- Manual preadjustment of cutting set necessary – error source
- Manual adjustment of wear during production necessary: higher wear because no indication for the adjustment (no adjustment ➔ outlet temperature increases, finess suffers)
- No running without product – otherwise higher wear

2017: updated design, still traditional technology:

2.1.1.3 Direct comparison to INOTEC

INOTEC – I 175 (225) CD D	**Karl Schnell / KS**
3-stage-system as standard 4-stage, 2-stage or 1-stage systems also available (flexible settings are possible without modifications of the machine) **Iffa 2013 – 5 stages system presented**	2-stage-system as standard since approx. IFFA 2004 a 3-stage-system is promoted but only few equipments are installed
More cutting stages = less grinding before emulsifier Final product finish 1,2 mm➔ possible to enter with raw material ground to 13 mm ➔ INOTEC = 5 – 3 – 1,7 – 1,2 mm ➔ higher capacity of the complete production line	Less cutting stages = previous grinder must work more Final product finish 1,2 mm➔ raw material should be ground at least to 5- 6 mm ➔ hole plate combination of emulsifier 2,5 – 1,2 mm ➔ less line productivity
Automatic adjustment of the cutting set: components are mounted one after the other in the housing – the machine starts an automatical initial run and places the cutting set in the standby position – the equipment is ready to work	Cutting set has to be premounted and preadjusted manually outside of the machine ➔ possibility of errors and malfunctions
Cutting set adjustment: Knife holders = fixed position Hole plates are moved RADIALLY ➔ precision 0,01 mm	Cutting set adjustment: Knife holders = moving axially (by gear wheels) ➔ less precision Hole plates = fixed position
INOTEC Ceramic Cutting Tools available = no wearing of hole plates + product safety	No ceramic system
Automatic readjustment of the cutting set during the production to compensate the wearing of the knife inserts	Readjustment manually by hand wheel Approx. since mid of 2005 the hand wheel is driven by a motor ➔ not very accurate
Constant product quality (finess and temperature) as a result of the automatic compensation of the wearing of the knife inserts	If the manual readjustment is not done the product quality goes down (finess gets worse and the temperature goes up) because the product is not cutted)
Between product changes: Flushing of the machine without dismounting the cutting set (cleaning position)	Complete dismounting of the cutting set required in case of product changes
Compelte stainless steel construction	Some parts are only painted
Hopper volume (standard) 200 liter	Hopper volume (standard) 140 liter

INOTEC – I 175 (225) CD D	Karl Schnell / KS
Infeed and outlet temperature are shown in the display (standard equipment)	Outlet temperature against upcharge price
Motor bearings maintenance free, heated bearings against condensate water and motor enclosure IP 56 (protection against dust and water)	Higher wearing of the bearings because no adjustment is possible, no heating – condensate gets on the bearings, motor enclosure only IP 23- electrical motor is less protected against dust and water
Approx. 20% more capacity with the same configuration of hole plates	Less capacity
Parameters to be adjusted (CPU control): Cutting position Readjustment time	No CPU – all parameter adjustments are depending on the operator

2.1.1.4 KS – "automatic" readjustment, 3-stage system (since approx. middle of 2005)

- The cutting set must be adjusted before mounting - still manually by skilled operators (2 adjustment nuts)
- If the cutting set is mounted the operator has to move the cutting set against a stop point (operating panel OP 27, operator has to push constantly a button)
- Only one measurement – running distance of a toothed belt with 3 rollers is measured. The toothed belt is linked with the shaft of the "hand wheel" and a step motor. At the same time the tension lever of the toothed belt is opened by electrical motor
- On the operating panel OP 27 is shown an illustration of a shaft with knife head + inserts to hole plates, a button to find the stop point. It is shown the adjusted distance (not under 0,20 mm), the inlet and outlet temperature, the value of wearing of the knife inserts (remaining material), the rest working hours before the knife inserts have to be changed!
- It has been seen at customers that the hole plates are blocked up after approx. 10-12 tons of production due to an unaccurate readjustment
- Belt drive too unaccurate for start up of the main motor and to place the knife heads into the working position

2.1.1.5 KS Vacuum emulsifiers

	
Outside of KS vacuum emulsifier (presented on IFFA 2004)	Inner part of the vacuum hopper of KS vaccum emulsifier
Not a one piece machine – an assembly of different components Design of INOTEC I 175/225 CDV A machines with only one mixing shaft (up to 35 – 40 % vacuum maximum) – 2 generations (= 6 - 8 years) behind the actual INOTEC vacuum emulsifiers – **no intermediate pump = no temperature control** New INOTEC I175/225CDVM-P machines can make up to 95 % vacuum (depending on the product) Another version of KS' vacuum emulsifier is a cylindric / conical hopper with steep hopper walls (that was the very first vacuum emulsifier of INOTEC) – this machine is building wise cheaper but does not achieve high vacuum levels (approx. 15-20 % maximum)	

2.1.2 CFS (K&G Ecocut, Wolfking)

EcoCut	**EcoCut CAP 1 (2)**	**TembiVac ➔ 2017 – no longer in the sales portfolio presented (Interent)**
 175  225		
The CFS EcoCut programme of emulsifiers cover the full spectrum of production - and capacity needs. The product range starts with the smallest 140 mm self propelling model and goes via 175 mm medium capacity machines for pump or hopper infeed to the pump fed 225 mm high performance emulsifier. The machines are able to produce coarse as well as super fine emulsions and can be equipped with a multitude of knife set combinations with up to triple set cutting system. A variety of production effective and proven options such as BES Bone elimination system, DAKS Dynamic Automatic Knife adjustment System for minimum cutting set wear, TembiVac inline emulsifier/vacuumizer or VacuSpin de-aerator are some of the possibilities.	The EcoCut CAP 2 is a fully automated and multifunctional machine consisting of infeed hopper with agitator, vacuumized variable speed positive displacement pump, variable speed cutting head with dual knife cutting system and automatic bone elimination device, dual cone emulsifier head with vacuum. The EcoCut CAP 2 offers a very high flexibility in product structure, degree of emulsification and density. All variables such as speeds, throughput, temperature increase and vacuum levels are monitored and controlled by the programmable control system, which also can be remotely operated which makes this machine ideal for line applications. The system provides extremely stable emulsions within a wide range of granulation.	The CFS TembiVac brings more stability to emulsions coming from the EcoCut. The application is typically for emulsions having a high content of frozen ingredients such as chicken MDM, beef fat etc. The conical rotor stator system and the hereto applied vacuum, improve the binding abilities by adding the right temperature increase and at the same time the adjustable vacuum remove enclosed air, whereby higher density, improved coloration and longer product shelf-life are achieved.

2.1.2.1 Cutting principle

Ecocut:
2 knife heads, 2 hole plates, 1 colloidal head for vaccum with tensioning system (spring package) – vaccuum applied when the incoming product is already emulsified

2.1.2.2 Advantages / disadvantages

Advantages:

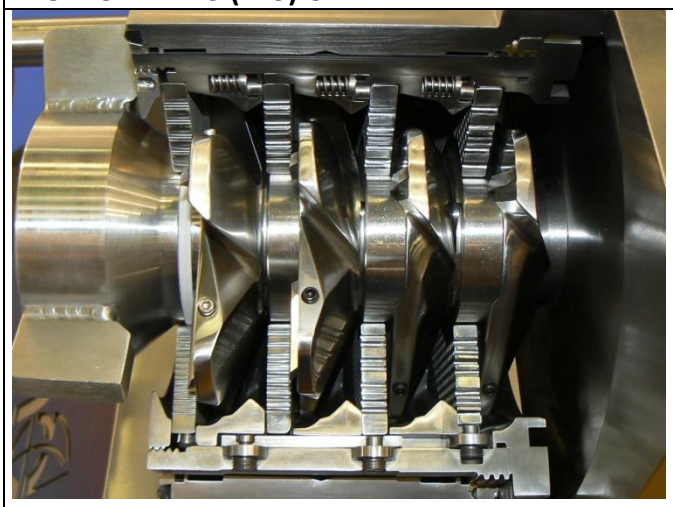
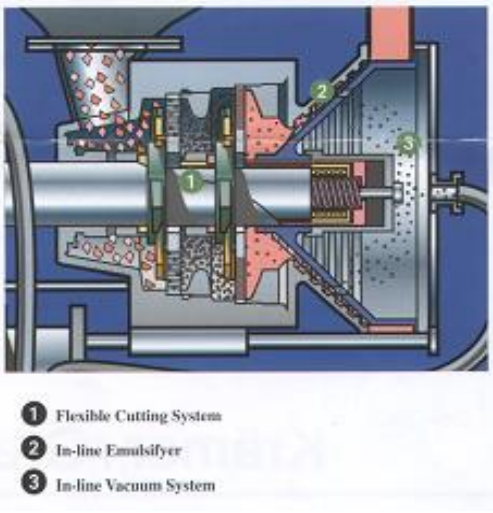
- strong marketing, Wolfking has lot of references in production lines
- also availability of smaller machines (hole plates 145 mm)

Disadvantages:

- vacuum process after fine mincing
- difficult to evacuate the fine emulsion
- high operating costs (very expensive cutting tools) – conical hole plates
- DAKS Dynamic Automatic Knife adjustment System for minimum cutting set wear is only a spring loaded system. The spring load is the same for tough and for soft products

2.1.2.3 Direct comparison to INOTEC

INOTEC – I 175 (225) CD D	**CFS / K&G, Wolfking**
3-stage-system as standard 4-stage, 2-stage or 1-stage systems also available (flexible settings are possible without modifications of the machine) Standard straightly drilled hole plates **Iffa 2013 – 5 stages system presented**	1 or 2-stage-systems Conical hole plates = high operating costs If conical hole plate is resharpened the holes are getting bigger!!!
More cutting stages = less grinding before emulsifier Final product finish 1,2 mm➔ possible to enter with raw material ground to 13 mm ➔ INOTEC = 5 – 3 – 1,7 – 1,2 mm ➔ higher capacity of the complete production line	Less cutting stages = previous grinder must work more Final product finish 1,2 mm➔ raw material should be ground at least to 5- 6 mm ➔ hole plate combination of emulsifier 2,5 – 1,2 mm ➔ less line productivity

INOTEC – I 175 (225) CD D	**CFS / K&G, Wolfking**
	 Tesion spring for pressure 
Automatic adjustment of the cutting set: components are mounted one after the other in the housing – the machine starts an automatical initial run and places the cutting set in the standby position – the equipment is ready to work = Standard	DAKS Dynamic Automatic Knife adjustment System for minimum cutting set wear is a spring loaded system Operator has to adjust spring pressure ➔ source of errors in the daily working practice the spring load remains the same for tough and for soft products
Automatic readjustment of the cutting set during the production to compensate the wearing of the knife inserts	Only a spring loaded system
Cutting set adjustment: Knife holders = fixed position Hole plates are moved RADIALLY ➔ precision 0,01 mm	Cutting set adjustment: Knife holders = moving axially (by motor + against spring) ➔ less precision Hole plates = fixed position
INOTEC Ceramic Cutting Tools available = no wearing of hole plates + product safety	No ceramic system

INOTEC – I 175 (225) CD D	**CFS / K&G, Wolfking**
Constant product quality (finess and temperature) as a result of the automatic compensation of the wearing of the knife inserts	A lot of parameters to adjust at the high end machines are requiring good skilled operators
Between product changes: Flushing of the machine without dismounting the cutting set (cleaning position)	Complete dismounting of the cutting set required in case of product changes
Infeed and outlet temperature are shown in the display (standard equipment)	Against upcharges
Motor bearings maintenance free, heated bearings against condensate water and motor enclosure IP 56 (protection against dust and water)	No heating – condensate gets on the bearings, motor enclosure only IP 23- electrical motor is less protected against dust and water
Parameters to be adjusted (CPU control): Cutting position Readjustment time	CPU control only on the high end machines
Vacuum machines: INOTEC mixes the coarse product under vacuum before entering into the cutting system. Emuslion comes out vacumized. Level of vacuum and mixing speeds and feeding speeds are adjustable. New temperature control (since Iffa 2010)	Vacuum machines: No vacumization of the coarse emuslion. Vacuum is placed after the emulsifying process. Emulsions are hardly to get vacumized because they are more compact than the coarse prodcut. Therefore CFS offers an additional system (TembiVac) to spread the emulsion (in order to get a bigger surface) under vacuum

2.1.3 Cozzini

2.1.3.1 Cutting principle

1 knife head / 1 hole plate rsp. 2 knife heads / 2 hole plates - Quad Cut (supposed to be a modular system) - not seen too often
adjustable speed of pump and cutting system for adjusting of product finess and outlet temperature (1500 – 3600 rpm)
different types with/without vacuum
vacuum process in separate vacuum pump

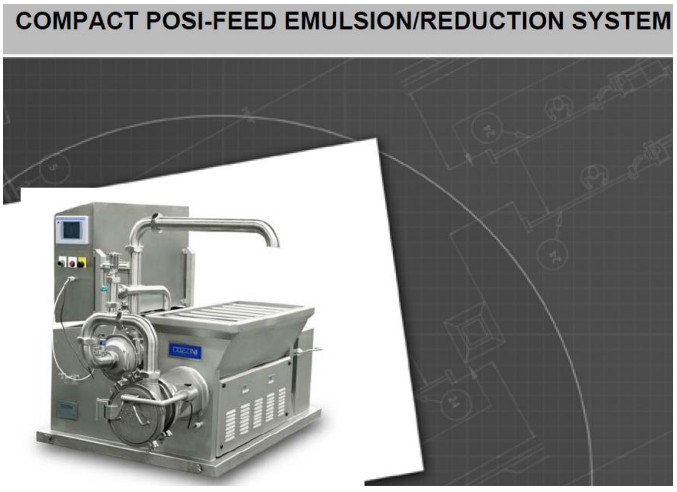
2.1.3.2 Advantages / disadvantages

Advantages:

- strong, high market shares in North America (estimated 65 %) and Latin America, good marketing
- successful in lines only
- Temperature sensor at product outlet controls speeds of drive motor and pumps – adjusted outlet temperature is maintained

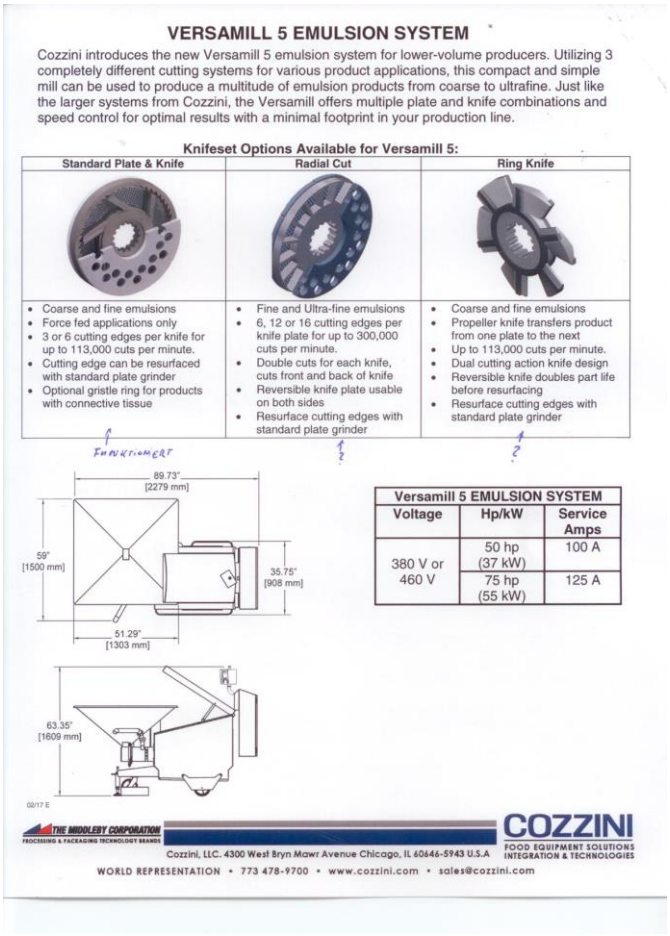
Disadvantages:

- Emulsion not so fine
- With constant outlet temperature the finess of the product varies
- More parameters to be adjusted during operation
- Poor in stand alone machines



New Cozzini (February 2016: - gravity fed, approx. 140 mm):

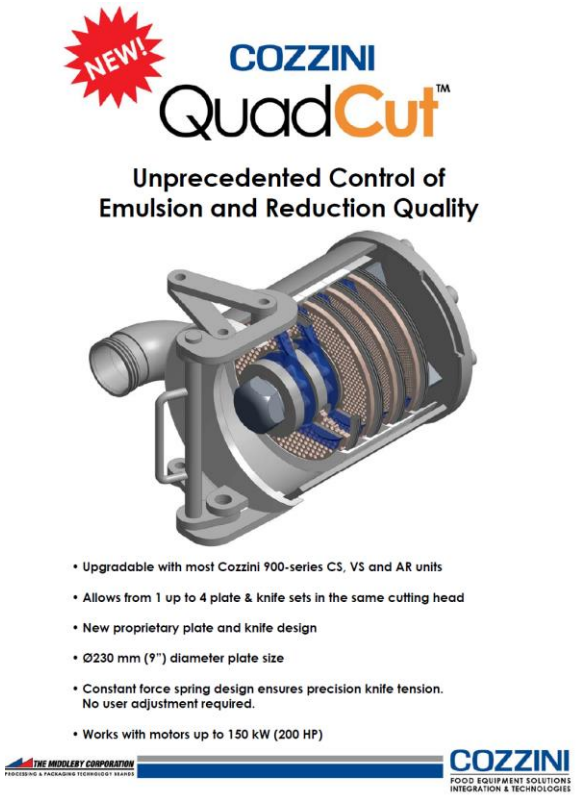
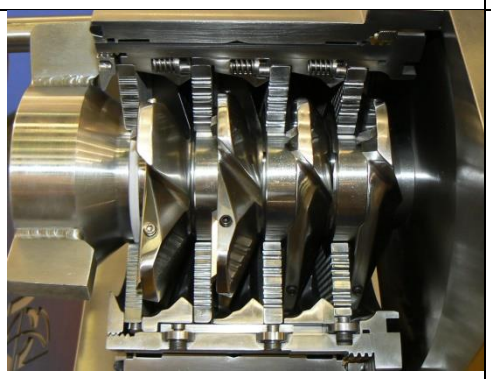
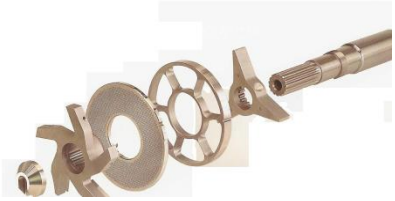
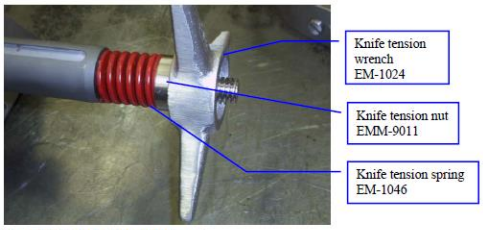
Also Cozzini offeres different systems in the meantime – from Cozzini source following information:

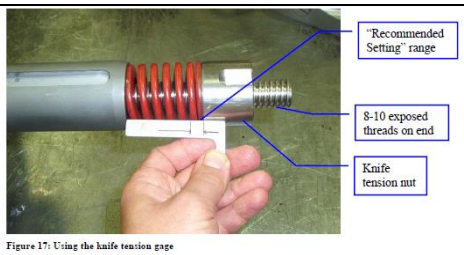


Very small product inlet – mitght have suction problems as Inotec had with the first I 140 machines

2.1.3.3 Direct comparison to INOTEC

	INOTEC	COZZINI
Product finess:	3-stage-system as standard 4-stage, 2-stage or 1-stage systems also available (flexible settings are	2 knife heads and 2 hole plates (with the same speed and the same hole plate diameter not so fine emulsion)

	INOTEC	COZZINI
	possible without modifications of the machine) **Iffa 2013 – 5 stages system presented**	Since 2012 Cozzini promotes 4 plates (Quad Cut) – leaflet from 2016 (February): 
Cutting set:		 Tension springs for the pressure   Figure 16: Tightening the knife tension nut

	INOTEC	COZZINI
		 Figure 17: Using the knife tension gage Precision: approx. 1 cm!!!
Product binding:	More fat and water binding due to the 3 (4)-stage-system	Only 2-stage system – Quad Cut – never seen
Temperature control:	Main motor fixed number of revolutions: 3000 rpm Temperature can be controlled by the applied cutting position (distance between knife inserts and hole plates), the configuration of the knife heads and an outlet valve. The philosophy of INTOEC ist to maintain the cutting position in order to obtain a constant product finess and therefore the outlet temperature will never escape. For vacuum emulsifiers is available the new control generation which has also the temperature control (since IFFA 2010).	Frequency controlled motor from 1500 to 3600 rpm In order to control the temperature of the emulsion the speed of the main motor is varied. At the same time the finess is modified (the slower the motor moves the coarser and warmer is the emulsion)
Cutting position:	Automatic compensation of the wear of the knife inserts and the hole plates Always constant cutting position Optimized and constant emulsion untill the knife inserts are completely worn	No compensation of the wear – only a spring pushes the knife head on the hole plate Cutting position varies between stiff and soft products If cutting set is new the cutting is good – if more wearing the finess varies
Adjustment – precision:	Cutting set adjustment: Knife holders = fixed position Hole plates are moved RADIALLY ➔ precision 0,01 mm	Cutting set adjustment: Knife holders = moving axially (by springs) ➔ less precision Hole plates = fixed position
Ceramic Technology:	INOTEC Ceramic Cutting Tools available = no wearing of hole plates + product safety	No ceramic system

	INOTEC	**COZZINI**
Start up:	Waiting Position – Motor ON – after 10 seconds the cutting set moves automatically in the Cutting Position ➔ minimum wearing at the start up	At the assembly of the cutting set the knifes are pressed against the hole plates - Motor ON – start up wearing is tremendous (from 0 to 3600 RPM with metal contact ➔ cruel wearing)
Line productivity:	More cutting stages = less grinding before emulsifier Final product finish 1,2 mm➔ possible to enter with raw material ground to 13 mm ➔ INOTEC = 5 – 3 – 1,7 – 1,2 mm ➔ higher capacity of the complete production line	Less cutting stages = previous grinder must work more Final product finish 1,2 mm➔ raw material should be ground at least to 5- 6 mm ➔ hole plate combination of emulsifier 2,5 – 1,2 mm ➔ less line productivity
Wearing parts:	Less consumption of the hole plates and wearing of the knife inserts – the cutting position is always controlled and readjusted	More consumption of the hole plates and knife inserts – the pressure of a spring is never constant
Feeding pump for vacuum machines	INOTEC works with IBP 11 NM 076 pump (rotor – stator principle): This pump is hermetic against vacuum – INOTEC maintains the vacuum With other pumps systems is needed a ball valve (one component more to control + higher investment price – the cheaper flap valves are immediately blocked by meat fibers)	Cozzini is sucking by the vacuum of the emulsifier – butterfly valve is used ➔ not vacuum proof.
Motor shaft sealing:	Carbon sealing (I 175 CDVM(-P)) or ceramic sealing with oil lubrication (I 225 CDVM(-P)) – one change in approx. 6 months	Lip seals which have to be changed approx. once a week
Motor and bearings:	Motor bearings maintenance free, heated bearings against condensate water and motor enclosure IP 56 (protection against dust and water)	No heating – condensate gets on the bearings, motor enclosure only IP 23- electrical motor is less protected against dust and water

2.1.4 Laska

2.1.4.1 Cutting principle

New (since 2008, first time presented on Anuga Foodtec 2009) – not too much details yet known. 3 hole plates, 3 knife heads, one expeller with 2 wings. Automatic adjustment of the cutting set.

2.1.4.2 Advantages / disadvantages

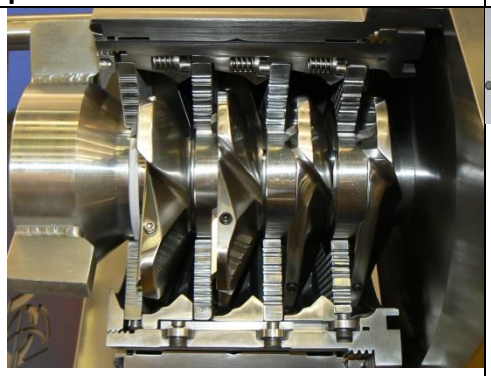
Advantages:

- Very good reputation of high quality equipment
- successful in bowl cutters and meat grinders
- More details up to now unknown

Disadvantages:

- Very low experience and no references in emulsifiers – wearing + metal friction becomes other dimensions with 3000 rpm instead of 200 – 400 rpm like in grinders.

2.1.4.3 Direct comparison to INOTEC

	INOTEC	**LASKA**
Product finess:	3-stage-system as standard 4-stage, 2-stage or 1-stage systems also available (flexible settings are possible without modifications of the machine) **Iffa 2013 – 5 stages system presented**	3-stage system, no possibility of 4 stages
Cutting set:		 3 hole plates 3 knife heads 3 distance discs only 175 and 225 mm hole plate diameter
Product binding:	Better fat and water binding due to 4 cutting stages (more protein extraction) 4 stages are better specially for cheap recipes with a lot of dry ingredients	Only 3 cutting stages
Line productivity:	More cutting stages = less grinding before emulsifier Final product finish 1,2 mm➔ possible to enter with raw material ground to 13 mm ➔ INOTEC = 5 – 3 – 1,7 – 1,2 mm ➔ higher capacity of the complete production line	Less cutting stages = previous grinder must work more Final product finish 1,2 mm➔ raw material should be ground at least to 5- 6 mm ➔ hole plate combination of emulsifier 3-1,7-1,2 mm ➔ less line productivity
Adjustment – precision:	Cutting set adjustment: Knife holders = fixed position Hole plates are moved RADIALLY ➔ precision 0,01 mm	Cutting set adjustment: Knife holders = moving axially (by motor + against hydraulic) ➔ less precision Hole plates = fixed position
Ceramic Technology:	INOTEC Ceramic Cutting Tools available = no wearing of hole plates + product safety	No ceramic system
Cutting position:	Automatic compensation of the wear of the knife inserts and the hole plates	Hole plates are fix Shaft is moved with the knife heads in axial way

	INOTEC	**LASKA**
	Always constant cutting position Optimized and constant emulsion untill the knife inserts are completely worn	2 adjustment sections: 1st and 2nd knife heads are moved on the motor shaft in axial way – movement is guided by a thread and made by a step motor 3rd knife head touches the finest hole plate with a defined pressure Knife heads are pressed hydraulically against the hole plates (hydraulically = oil in the product)
Wearing parts:	Less consumption of the hole plates and wearing of the knife inserts – the cutting position is always controlled and readjusted	Hydraulical compression of the knifes against the hole plates ➔ wearing (!!!???)
Versions	Hopper, hopper + agitation, hopper + agitation + precutter, inline, vacuum Three sizes Each size with various motor sizes (I 225 = 110 + 132 kW=	Only hopper machine (200 L square hopper) 132 kW
Display	Touch button display with temperature (in + out), amperage, wearing of the knifes	5,7” touch screen display (critical at a hopper machine because the fingers of a cutter pilot are never clean), temperature (in+out), indication of knife wearing
Motor shaft sealing:	Carbon sealing (I 175 CDVM) or ceramic sealing with oil lubrication (I 225 CDVM) – one change in approx. 6 months	
Motor and bearings:	Motor bearings maintenance free, heated bearings against condensate water and motor enclosure IP 56 (protection against dust and water)	Motor shaft is a hollow shaft construction – mechanically very complex construction Drive shaft is mounted on 3 radial bearings and 2 axial bearings ➔ change of the bearings is very difficult No heated bearings The axial bearings are very far from the cutting set ➔ this will cause problems at temperature changes (undefined expansion of the drive shaft)

	INOTEC	**LASKA**
References	INOTEC = approx. 1000 units running all over the world, widest range of emulsifiers (with vacuum, without vacuum, with agitation hopper for petfood, as inline equipment for soups, 3 cutting set diameters (140, 175 and 225 mm) available in order to match all capacity requirements	Only 225 mm (175 mm ???), only one type almost no reference, Patent conflict with INOTEC

2.2 Rotor / Stator

2.2.1 Stephan Microcutter

2.2.1.1 Cutting principle

Rotor and stator with cutting rings. Radial cutting - product is pressed by centrifugal effect to the housing through the machine. Different types available (no vacuum and vacuum systems available), often used in two stages. Stephan indicates in the cutting rings always the distance between the internal and external ring. The length of the knifes is not considered.

2.2.1.2 Advantages / disadvantages

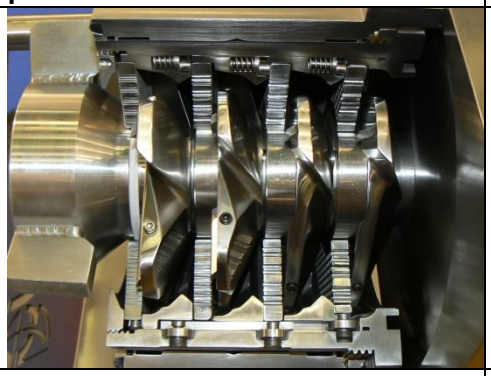
Advantages:

- No adjustment of cutting tools
- Running without product possible
- Easy operating

Disadvantages:

- Continuous reduction of product quality due to the wear of the cutting tools – if cutting tools are worn out ➔ high temperatures and low finess
- Cutting tools are very expensive (approx. 3.000-4.000 EURO per set) and have to be maintained / replaced by Stephan (factory)

2.2.1.3 Direct comparison to INOTEC

	INOTEC	**Stephan**
Product finess:	3-stage-system as standard 4-stage, 2-stage or 1-stage systems also available (flexible settings are possible without modifications of the machine) **Iffa 2013 – 5 stages system presented**	Continuous reduction of product quality due to the wear of the cutting tools – if cutting tools are worn out ➔ high temperatures and low finess
Cutting set:		
Product binding:	More fat and water binding due to the 3 (4)-stage-system – more impact on the product	1 or 2-stage system
Cutting position:	Automatic compensation of the wear of the knife inserts and the hole plates Always constant cutting position = constant quality of the emulsion	No compensation of the wear
Ceramic Technology:	INOTEC Ceramic Cutting Tools available = no wearing of hole plates + product safety	No ceramic system
Wearing parts:	Less consumption of the hole plates and wearing of the knife inserts – the cutting position is always controlled and readjusted – knife inserts and hole plates are exchangeable	Resharpening of the cutting set in Stephan factory (3.000 – 4.000 EURO)
Motor and bearings:	Motor bearings maintenance free, heated bearings against condensate water and motor enclosure IP 56 (protection against dust and water)	No heating – condensate gets on the bearings, motor enclosure only IP 23- electrical motor is less protected against dust and water

2.2.2 Kilia Finecut / Glass / Busser (Alpina) / PSS (Slovakia)

Kilia Finecutt (PSS):

TipperTie Alpina:

3 sizes: 125 (15 kW), 150 (55 kW), 180 (90 kW) – series FCH and FCH-D H

2.2.2.1 Cutting principle

Kilia Finecut - presented on IFFA 2007 as “Weltneuheit” – “world novelty”. On IFFA the machine was shown under the grinder outlet. Working principle identical to Stephan but vertically: Rotor and stator with cutting rings. Radial cutting - product is pressed by centrifugal effect to the housing through the machine.
Price approx. 60.000 – 65.000 EURO (Info June 2008) – August 2014 Kilia bankrupt.

Tipper Tie is active in the markets – mostly with Multivac. Equipment presented on exhibitions. Machines can be with one stage (1 Stator, 1 Rotor) or two stage (2 Stators, 2 Rotors). The indications of capacities of Tipper Tie shows that there is not a wide experience with stiff, high viscose products. The Cutting Set is expensive (Rotor + Stator = approx.. EURO 5.000,00), the knifes are inserts and can be changed. If the thread of the ring is damaged (happens often) the compete ring has to be changed.

2.2.2.2 Advantages / disadvantages

Same as Stephan

2.2.2.3 Direct comparison to INOTEC

Same as Stephan

2.3 Only hole plates

2.3.1 Seydelmann Konti Kutter

Extracted from Seydelmann catalogue ➔ Machine not suitable to load it directly from a bowl cutter

Steep hopper – weak product suction, very small outlet pipe – not suitable to pump the product to a filling machine.

Different working principals in emulsifying_20180314, FL

Inline Konti Kutter with previous vacuum mixer - only one mixing shaft (corresponds to INOTEC I175/225 CDV A machine from approx. 2002).

Konti-Kutter KK 250 AC-6 with
Vacuum-continuous pass Mixer KVM 210

Iffa 2016:

This machine is absolutely not suitable for high vacuum levels, no pumping effect – no suction effect of the cutting set.

2.3.1.1 Cutting principle

Coarse product is sucked through a vertical system. The cutting system consists of 7 hole plates (3 are fixed and 4 are rotating on the motor shaft.

2.3.1.2 Advantages / disadvantages

Advantages:

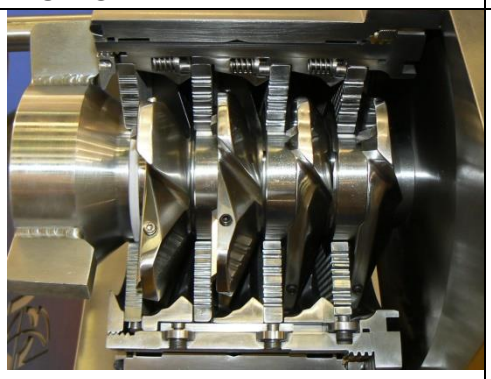
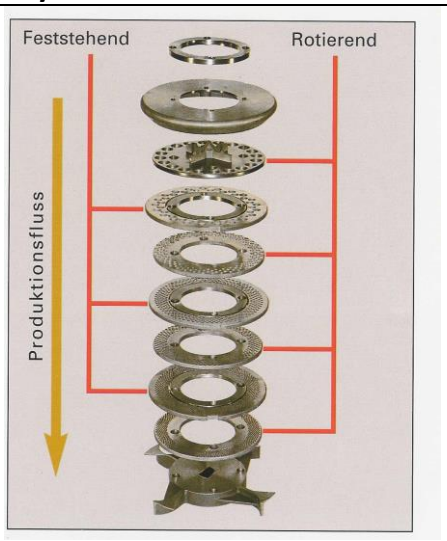
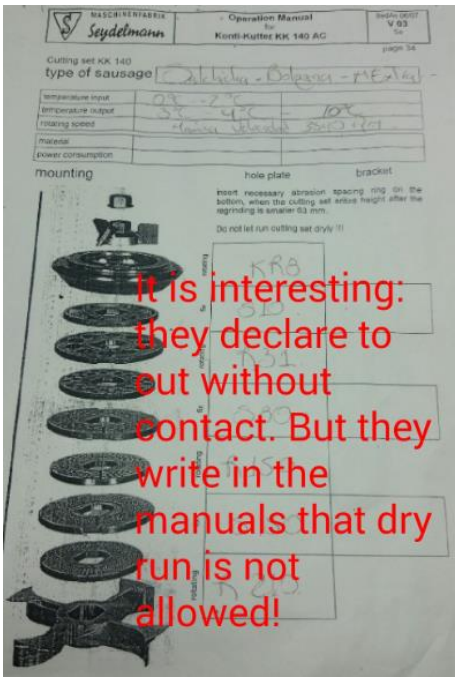
- Well known in bowl cutters
- International representations

Disadvantages:

- Product is sucked through the hole plates –cutting takes place with the edges of the holes of the plates
- Edges of the hole plates are worn out – this wearing is not compensated – quality of emulsion reduces during the operation
- Relatively new on the market – very few references
- Due to the construction the hole plates are expensive – 4 plates have to be mounted on the motor shaft
- Motor power: approx. 150 kW on the big machine (corresponding to I 225 with 110 kW) and 90 kW on the small machine (corresponding to a size between I 140 with 37 kW and I 175 with 75 kW)
- Old Conware (Reiser) emulsifiers have an O-Ring sealing which is removed for disassembly and cleaning. If the O-Ring sealing is not correctly mounted the broken O-Ring parts are going into the product. O-Rings are not detectable by metal checker (only X-Ray).

2.3.1.3 Direct comparison to INOTEC

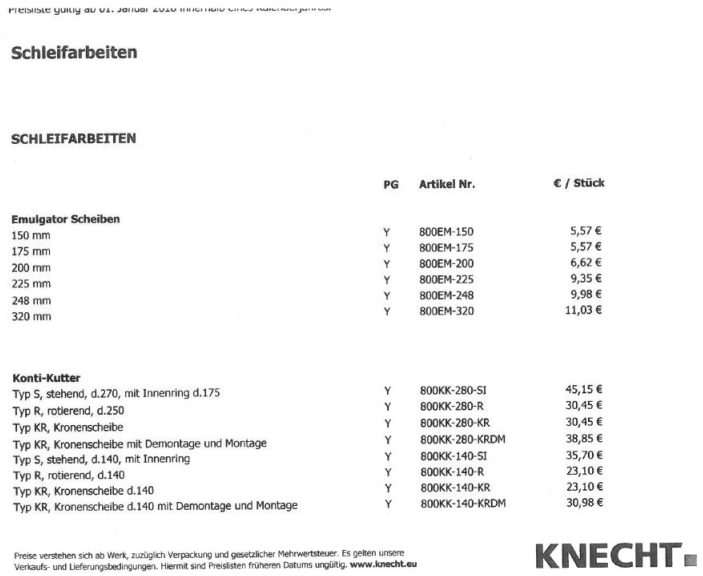
	INOTEC	**Seydelmann**
Product finess:	3-stage-system as standard 4-stage, 2-stage or 1-stage systems also available (flexible settings are possible without modifications of the machine) **Iffa 2013 – 5 stages system presented, Speed Spin**	Continuous reduction of product quality due to the wear of the edges of the hole plates
Sucking:	INOTEC emulsifier sucks the product due to the geometry of the knife heads and the expeller	No sucking of the product (just gravity / pump feeding)

	INOTEC	**Seydelmann**
Cutting set:		
Dry run:	INOTEC cutting set is not designed for dry run but there are several possibilities to avoid dry running (a wide cutting position, level sensor, switch off considering an amperage drop down)	Seydelmann declares that the cutting action of this machine is without contact but the machine is not suitable for running dry: 
Ceramic Technology:	INOTEC Ceramic Cutting Tools available = no wearing of hole plates + product safety	No ceramic system
Product binding:	More fat and water binding due to the 3 (4)-stage-system – more impact on the product	No impact on the product with the knife heads
Products:	Pork skins, sinews, bones = no problem (also bone emulsions)	In a german customer during trials (Feb. 2008) Seydelmann was not cutting pork skins and on coarse

	INOTEC	**Seydelmann**
		emulsions the product has lost completely the bite
Cutting position:	Automatic compensation of the wear of the knife inserts and the hole plates Always constant cutting position = constant quality of the emulsion	Remains always the same because it is preadjusted but there is no compensation of the wear of the hole plate edges
Wearing parts:	Less consumption of the hole plates and wearing of the knife inserts – the cutting position is always controlled and readjusted – knife inserts and hole plates are exchangeable	Resharpening of the hole plates necessary – change of the hole plates is expensive due to the construction (4 hole plates have to be mounted on the motor shaft Experience in german customer: 30 tons per side – than sharpening the hole plates and 1 x 30 tons ➔ totol 90 tons per set !!! Indication of Seydelmann is still 2000 – 4000 tons but they do not indicate how often the plates have to be resharpened! 
“No metal friction”	INOTEC does not deny wearing, ceramic hole plates can avoid this	
Operating costs / grinding of hole plates:		Grinding costs for the hole plates 2 to 4,5 times more expensive (Price List of Knecht grinding service)

	INOTEC	Seydelmann
	Emulgator Scheiben 150 mm 175 mm 200 mm 225 mm 248 mm 320 mm **Konti-Kutter** Typ S, stehend, d.270, mit Innenring d.175 Typ R, rotierend, d.250 Typ KR, Kronenscheibe Typ KR, Kronenscheibe mit Demontage und Montage Typ S, stehend, d.140, mit Innenring Typ R, rotierend, d.140 Typ KR, Kronenscheibe d.140 Typ KR, Kronenscheibe d.140 mit Demontage und Montage	**PG** / **Artikel Nr.** / **€ / Stück** Y 800EM-150 5,57 € Y 800EM-175 5,57 € Y 800EM-200 6,62 € Y 800EM-225 9,35 € Y 800EM-248 9,98 € Y 800EM-320 11,03 € Y 800KK-280-SI 45,15 € Y 800KK-280-R 30,45 € Y 800KK-280-KR 30,45 € Y 800KK-280-KRDM 38,85 € Y 800KK-140-SI 35,70 € Y 800KK-140-R 23,10 € Y 800KK-140-KR 23,10 € Y 800KK-140-KRDM 30,98 €
Motor and bearings:	Motor bearings maintenance free, heated bearings against condensate water and motor enclosure IP 56 (protection against dust and water)	No heating – condensate gets on the bearings, motor enclosure only IP 23- electrical motor is less protected against dust and water The transmission from the motor to the cutting set is by belt ➔ very big consumption of motor and cutting set bearings (INOTEC has the experience with the old belt machines (I225) – each month to 6 weeks changing of bearings.
Motor Power / Efficiency:	INOTEC I 225 CD 110 / 132 D, 110 or 132 kW for 28pprox.. 8-12 t/h INOTEC I 175 CD 75 / 90 D with 75 or 90 kW for aprox. 3,5 to 7 t/h I 140 CD 37 D with 37 kW for aprox. 2,5 to 3,5 t/h	KK 250 ➔ 140 or 200 kW for 8-10 t/h ➔ Seydelmann needs always bigger motors, capacity wise the KK 250 is closer to the I 175 than to the I 225. KK 140 ➔ 90 kW – capacity wise close to INOTEC I 140 CD 37 D with 37 kW
Shaft sealing:	No O-Rings in contact with the product	O-Rings – which may broke
Production speed:	Demo in Austria: I 175 CD 75 D – product at least as good as produced by Seydelmann Konticutter 140 (small machine): Only Bowl cutter: 5 batches of 350 kg per hour Meat grinded to 2 mm Bowl cutter with INOTEC I 175 CD 75 D with setting 3-1,7-1,4-1,0 (3-	

	INOTEC	**Seydelmann**
	3-3-6): 9 batches in 53 minutes (5 batches with using vacuum at the bowl cutter) Meat grinded to 13 mm (➔ also preparation is quicker)	Bowl cutter with Seydelmann Kontikutter 140: 6 batches per hour Meat grinded to 5 mm
Experience with senews:	Shanghui group has in total about 35 INOTEC emulsifiers I 225 CD 110 D. Shanghui plant in Guangzhou has about 20 of these emulsifiers running well.	Tests in China with Seydelmann Kontikutter: Problems to cut senews – after 2-4 hours of production the cutting set must be disassembled and cleaned because the senews are accumulated between the hole plates ➔ nothing goes trough in this case. This can be compensated in the assembly a little bit by giving a higher on the hole plates package ➔ much higher wearing. Due to this in China at the biggest meat producer worldwide (Shanghui in Guangzhou plant) Seydelmann is out.
Prices / investment:		Are more expensive – small KK approx. 65.000 EUR, big KK approx.. 95.000 EUR (may vary)



Preisliste gültig ab 01. Januar 2018 innerhalb EWG Kalenderjahres

Schleifarbeiten

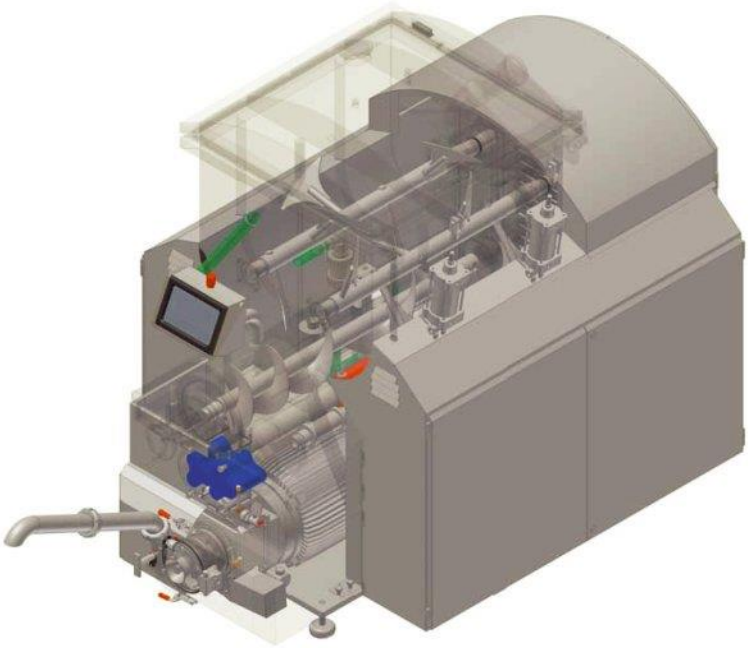
SCHLEIFARBEITEN

	PG	Artikel Nr.	€ / Stück
Emulgator Scheiben			
150 mm	Y	800EM-150	5,57 €
175 mm	Y	800EM-175	5,57 €
200 mm	Y	800EM-200	6,62 €
225 mm	Y	800EM-225	9,35 €
248 mm	Y	800EM-248	9,98 €
320 mm	Y	800EM-320	11,03 €
Konti-Kutter			
Typ S, stehend, d.270, mit Innenring d.175	Y	800KK-280-SI	45,15 €
Typ R, rotierend, d.250	Y	800KK-280-R	30,45 €
Typ KR, Kronenscheibe	Y	800KK-280-KR	30,45 €
Typ KR, Kronenscheibe mit Demontage und Montage	Y	800KK-280-KRDM	38,85 €
Typ S, stehend, d.140, mit Innenring	Y	800KK-140-SI	35,70 €
Typ R, rotierend, d.140	Y	800KK-140-R	23,10 €
Typ KR, Kronenscheibe d.140	Y	800KK-140-KR	23,10 €
Typ KR, Kronenscheibe d.140 mit Demontage und Montage	Y	800KK-140-KRDM	30,98 €

Preise verstehen sich ab Werk, zuzüglich Verpackung und gesetzlicher Mehrwertsteuer. Es gelten unsere Verkaufs- und Lieferungsbedingungen. Hiermit sind Preislisten früheren Datums ungültig. **www.knecht.eu**

KNECHT

3 Vacuum emulsifiers



3.1 Description of INOTEC vacuum emulsifiers

INOTEC is feeding their vacuum emulsifiers by a Mohno pump (rotor stator principle). The pump is already almost vacuum sealed due to the design. Also the product in the pipe and in the hopper are making the pump vacuum proof. The vacuum is created into the hopper of the emulsifier – 2 paddle shaft are mixing the pre-emulsion under vacuum in order to remove air bubbles. Vacuum expands the product – previous intensive mix before the emulsifying. The feeding devices (screw and rotary piston (lobe) pump are moving the product in the cutting section). The outlet is also sealed by the emulsified product. The lobe pump also allows to influence the outlet temperature (slow motion = warmer outlet).

In order to have the best influence of the vacuum to the product INOTEC makes the vacuum previously to the emuslifying system. A vacumization with spreading the fine emulsion (after the emulsifying system) on a cone or in a mixing device is not effective – air bubbles are remaining.

Differences to competitors:
see Cozzini, CFS and KS. Stephan is making vacuum emulsifiers with cilindrical / conical hoppers which do not allow much vacuum (only about 20 %) – vacuum pulls the product away from the cutting elements up to the cover and a vertical agitation system does not press enough downwards.

3.2 Benefits of INOTEC high end vacuum emulsifiers

3.2.1 Hot dogs

- To maintain the bite / texture if the product has to be very fine (open emulsifier: the finer the product the more suffers the bite / texture)
- Very homgeneous crosscut picture
- More lively colour (more red) due to the vacuum
- Emulsion + final product is more compact ➔ less casing + packaging material needed
- Better binding of fat and water (depending on the recipe approx. 3 % more) ➔ higher yield
- Less air in the product improves the shelf life (less bacteria growth)

3.2.2 Big calibers (Mortadela etc.)

- Very homogeneous surface picture (no raw material pieces in the surface picture (MDM feather strunk rests, skin particles etc. are completely size reduced and invisble)
- A firmer texture makes slicing easier (slicing under higher temperatures and/or thinner slices are possible, evtl. even shock freezing of the logs can be saved)
- More lively colour (more red) due to the vacuum
- Emulsion + final product is more compact ➔ less casing + packaging material needed
- Better binding of fat and water (depending on the recipe approx. 3 % more) ➔ higher yield
- Less air in the product improves the shelf life (less bacteria growth)

Example: Mainly MDM based mortadla product:	Example: German recipe sausage with pork meat and skin emulsion:
	

3.2.3 Canned meat (Luncheon etc.)

- Very homogeneous surface picture (no raw material pieces in the surface picture (MDM feather strunk rests, skin particles etc. are completely size reduced and invisble)
- More lively colour (more red) due to the vacuum
- Better binding of fat and water (depending on the recipe approx. 3 % more) ➔ higher yield
- Less air in the product improves the shelf life (less bacteria growth) – very important issue for the autoclaving process – rest air in the product + autoclaving + bacteria growth in the air bubble = cans are getting blown up