

*The effective technology*

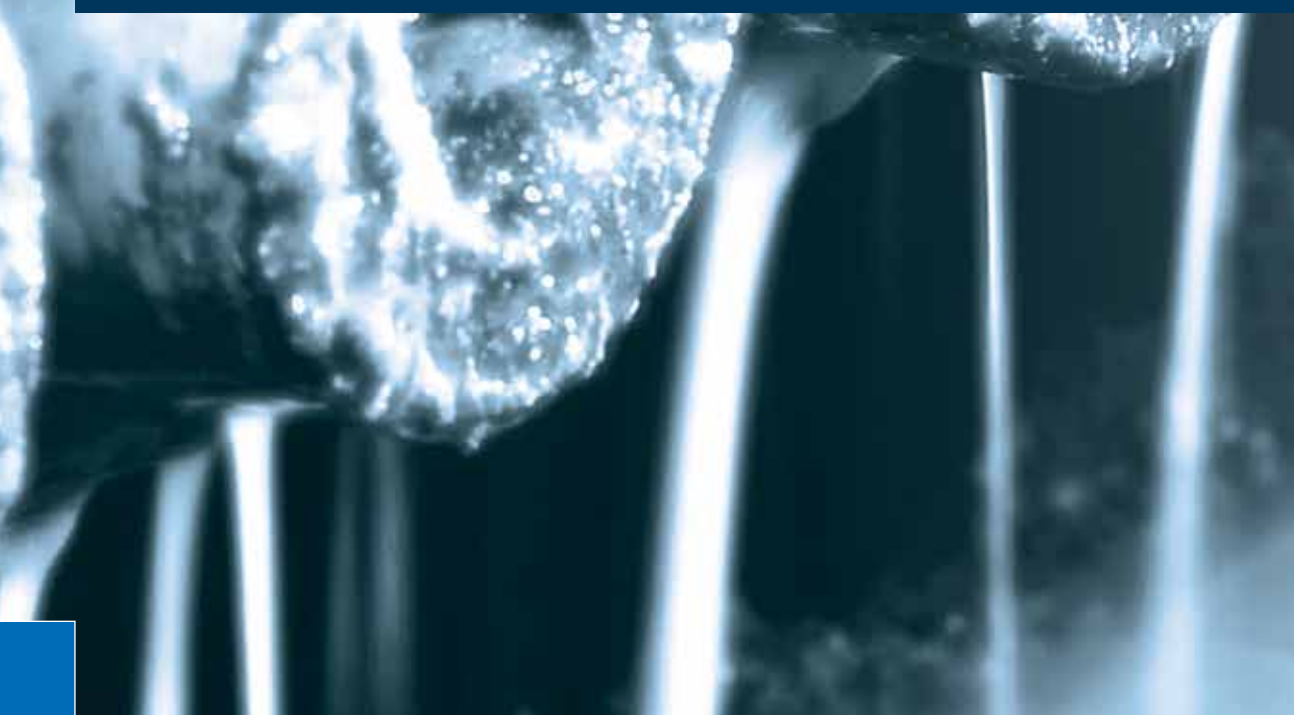


**OIL & FEED TECH**





# COMPANY INTRODUCTION







## **Farmet**

- Farmet a. s. is dynamically developing Czech company that focuses on the development, production, distribution, and servicing of agricultural machinery for the purposes of soil processing, sowing, technologies for oilseeds and vegetable oil processing, and for production and extrusion of feed.
- The Farmet brand represents products of high quality and utility, which are competitive worldwide in the demanding conditions of agricultural and manufacturing industries.

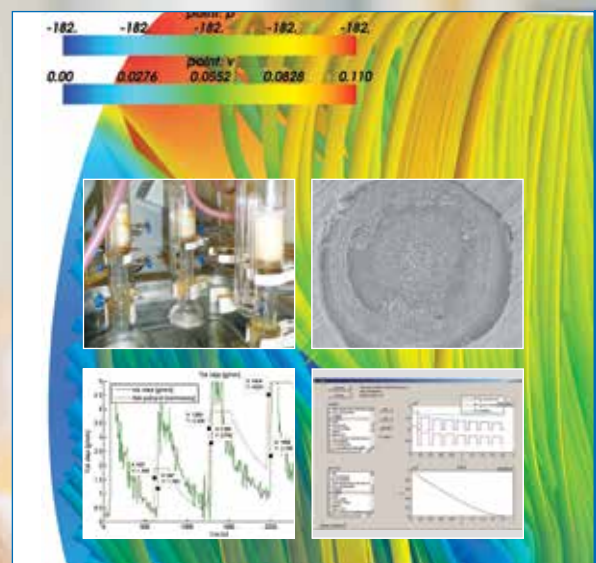
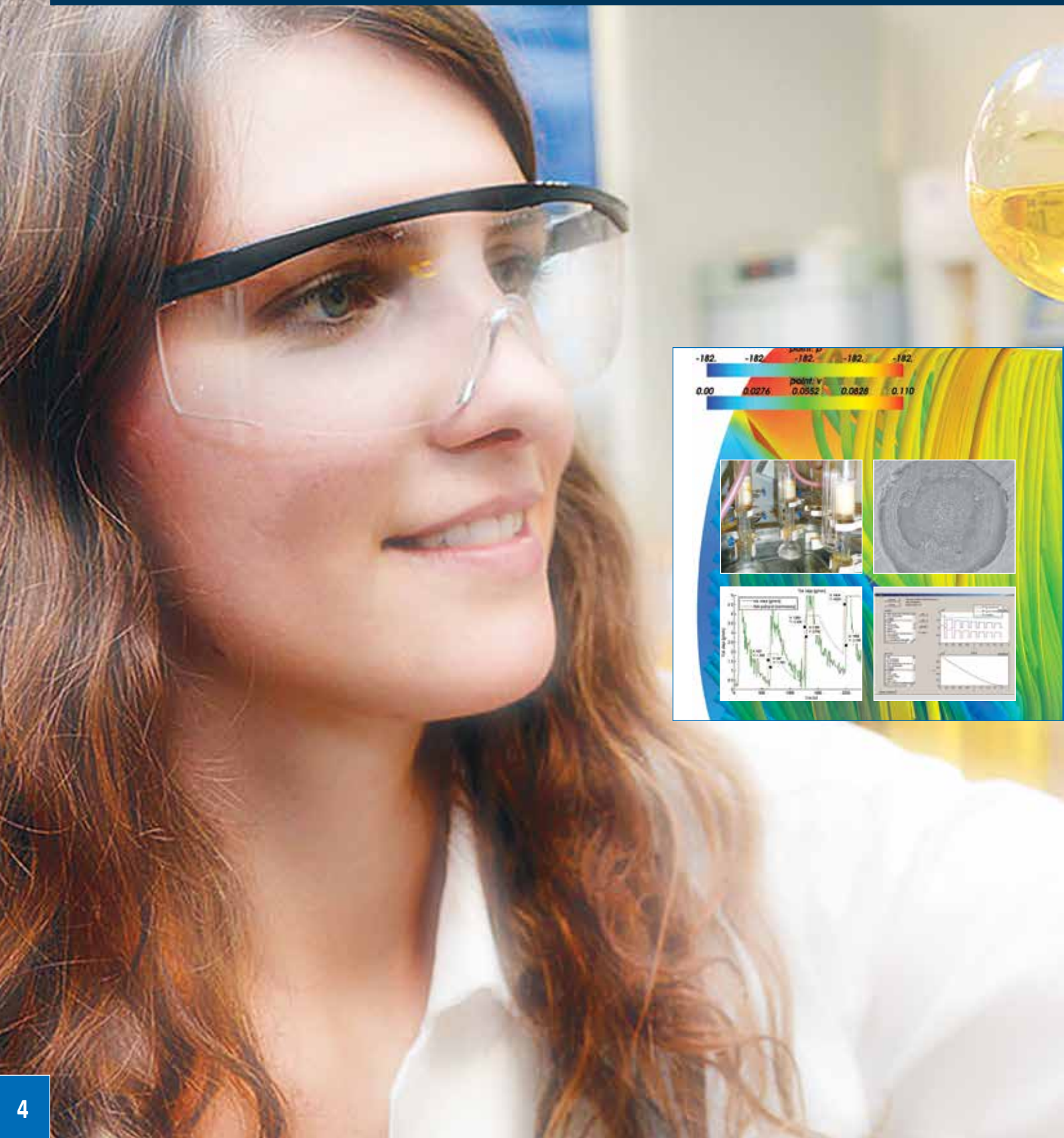
Our motto: *The effective technology*

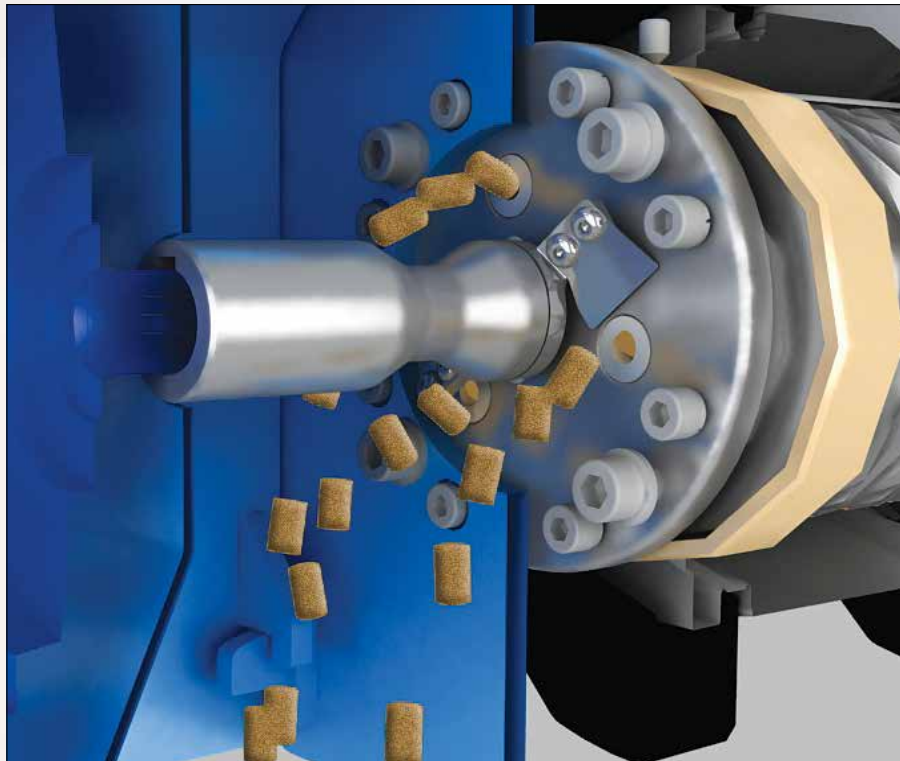
### **Main fields of activity:**

- Agricultural machinery.
- OIL & FEED TECH – technological equipment for processing of oilseeds, gaining and processing of vegetable oils, production and extrusion of compound feed.



# RESEARCH & DEVELOPMENT, EDUCATION





- We analyze properties of each oilseed species and variety and we design optimal solutions for their processing.
- We study individual rheological properties of pressed materials and simulate the processes that occur during pressing.
- We transfer the results of R&D into industrial use and employ our own test press shop for such purposes.
- Our analyses of oilseeds, press cakes and oils are carried out in our own laboratory with the use of state-of-the-art analytical tools.

- We optimize processes and develop machinery and equipment so that the customer gets high effectiveness at minimum costs. We study and analyze processes and events that occur during the pressing of oilseeds.
- We employ results of our own research and development. As a result, the technology we deliver meets both our customer's technological and economical requirements.
- During the development of new machinery, we also stress environmental efficiency.
- We collaborate with prominent research institutions and universities within and beyond the country borders.

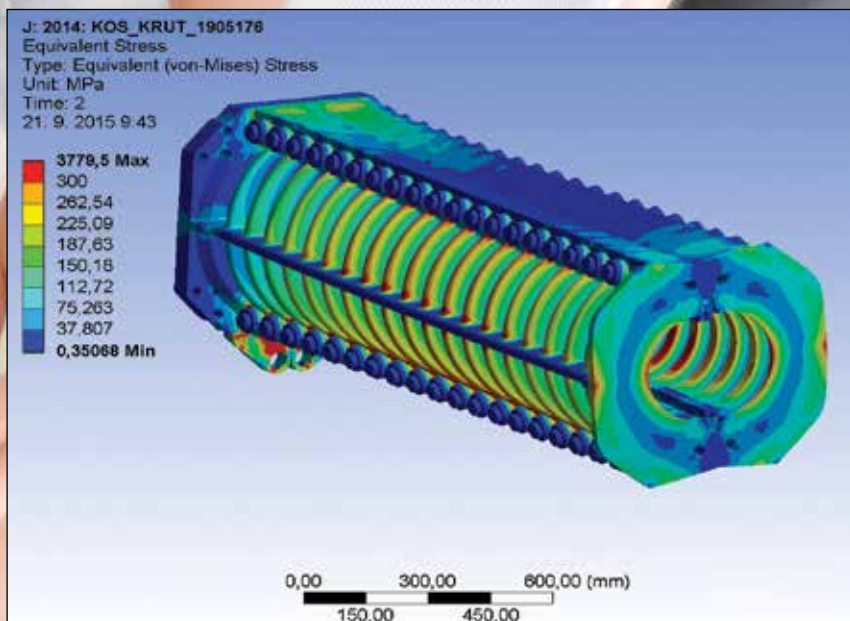


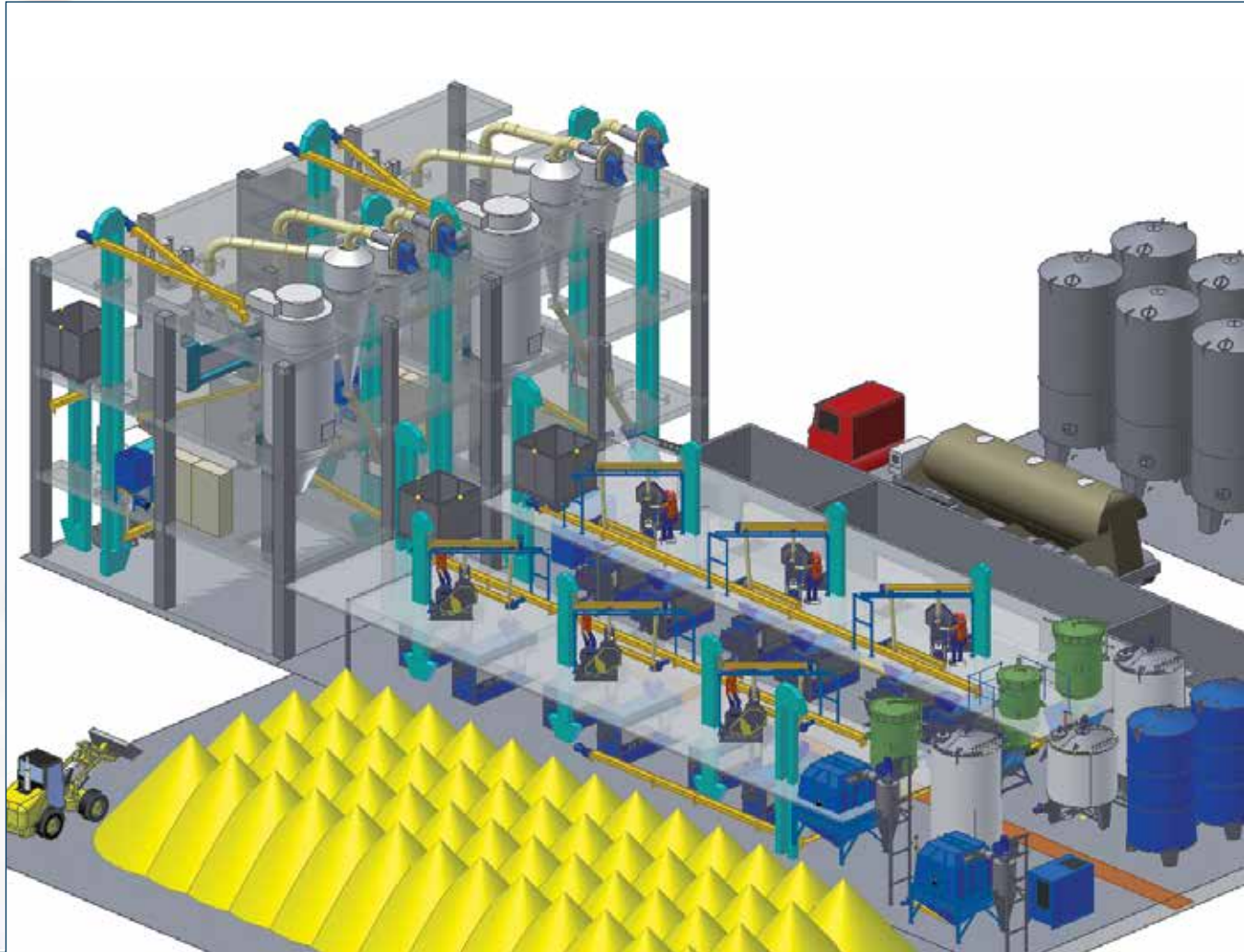




- In both our new designs and innovations of existing equipment we readily employ experience from our own research & development.
- We achieve optimal parameters at maximum efficiency for the customer.
- We design technologies based on our own extensive experience and customer feedback.
- We provide consulting services.
- We carry out project studies.

# ENGINEERING









# PRODUCTION

- Investments into state-of-the-art production and measurement technologies and mastering of their operation allow us to offer optimal solutions at reasonable prices.
- Extended service life of our components and their potential for renovation are secured with the technology of armouring of the working parts of the screw presses.
- Our own production facility gives us more flexibility when fitting the delivery to a particular customer's requirements.
- Key machinery and equipment used in Farmet technologies are manufactured in our own factory.
- Quality – one of the highest priorities in our company – is a cornerstone of our work.







## CUSTOMER CARE



- Individual solutions for each customer (an offer that meets particular requirements).
- Guarantee of parameters.
- Innovation of existing equipment in order to increase effectiveness.
- Training of operating staff.
- Professional sales representatives in local offices.

- Direct consulting with experts for optimal setting up of the technology.
- A professional and swift response of the service (local service centers; trained personnel).
- Direct consulting with the responsible Product Manager via the Technical Support Centre.
- Planning of spare part replacement.





# OILSEED PRESSING

- The technology of pressing is designed for maximum oil yield. The core of the technology are highly-efficient screw presses in various configurations, which are always optimized for the particular task.
- The technology is supplemented with other specially-designed equipment that meets the technological demands and requirements of our customers.
- By modifying the machines themselves or their arrangement, we can achieve a wide range of production scale: From small-capacity presses for pressing of special crops up to large-scale processing plants with a capacity up to 1000 tons a day, both with one-level pressing and two-level pressing technology.







**Technologies for oilseed processing:**

- Cold pressing.
- Hot pressing.
- Cold/hot pressing.
- Extrusion pressing.
- Pre-pressing prior to chemical extraction.



# OILSEED PRESSING

- The entire process is controlled by our own system for control and visualization: Farnet Intelligent Control (**FIC**). We also developed individual control algorithms for every step in the process in order to ensure a seamless operation of the technology, maintaining availability for parameter optimization by operating staff.

## The FIC system facilitates:

- Protection of the drive against overloading in emergency events.
- Optimization of the process.
- Remote control that also allows our specialists to remotely optimize parameters.
- Logging and archiving of important data for diagnostics.







- We closely cooperate with our customers not only during all the steps of delivery realization, but also after commissioning, to achieve maximum effectiveness of the installed technology.
- We will gladly assist you with the choice of appropriate technology for your project.





# PRE-TREATMENT OF INPUT MATERIAL

- Proper pre-treatment of the input seed material is an important requirement for high efficiency of the following processes. It also significantly influences the final products: oil, press cakes or extrudate.



- Our technology offers an optimized solution for treatment of the input material. According to particular demands, the following options can be implemented:

## **Seed cleaning**

- Protects the technology from damage.
- Improves the service life of wearable components.
- Allows reaching better parameters.

## **Weighing**

- Ensures a perfect overview of the amount of processed material as well as real-time performance of the technology.

## **Temperature stabilization**

- Ensures necessary heating of the seeds prior to pressing for proper performance in colder climates.

## **Dehulling and hull separation**

- Allows reaching better parameters of the pressing.
- Increases oil quality.
- Is a way to obtain press cakes low in fibre content.

## **Crushing**

- Allows a more efficient transformation of nutritional and anti-nutritional substances during conditioning and extrusion.
- Proper crushing ensures a smooth operation of the extruder.
- Improves the service life of wear parts.

## **Flaking**

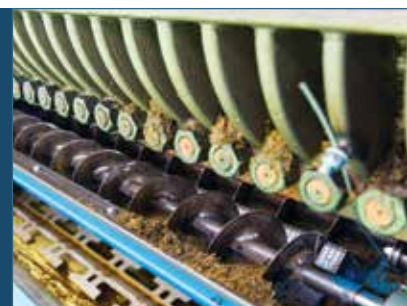
- Flaking leads to disruption of cells (cell rupture) which improves the potential yield. Flaked seeds receive heat more rapidly than raw seeds, which results in a more efficient heating process.





## SCREW OILSEED PRESSES FS 1010, FS 4015

- Screw presses of the line FS offer an optimal solution for maximum oil yields. These presses are the core of Farnet technology – designed and produced by our engineers; intended for larger capacities.



- The FS 1010 press is a versatile next-generation expeller press for oilseeds. The heart of the press lies in the multi-level pressing geometry. As the shape of the screw shaft changes, compression of seeds occurs inside the press, which leads to a gradual separation of the oil from the seeds. Eventually, the oil seeps out through the outlet screen. The longitudinal organization of the plates allows a larger drainage area and therefore a higher oil yield.
- The presses can be delivered with modifications that ensure appropriate processing of different oilseeds (one- or two-level pressing; both hot and cold pressing; pressing with extrusion).

### Main advantages of the next-generation presses are:

- A larger drainage area.
- Built-in pumps.
- Built-in hydraulic opening of the cage.
- Easy replacement of the working components.
- Effective cooling of the shaft for in the mode for hot pressing.
- Low energy demands.
- Equipped with a compact transmission with an axial placement of the shaft.

### Parameters

	FS 1010	FS 4015
Throughput [kg/hr]	1000–4000	4000–16000
Input [kW]	60–132	250–500
Length [mm]	3800	6900
Width [mm]	1570	2000
Height [mm]	1700	2200
Weight [kg]	7600–8500	22000–27000

Values can vary according to the technology and seed material used.





# COMPACT – MODULAR PRESS SHOP

■ With the modular press shop Compact we offer an entirely new solution to oilseed pressing. It represents an ideal solution for those interested in processing their own oilseeds. With this technology you get a high-quality filtered oil and press cakes of a high feed value.

■ Thanks to its modular design, Compact offers a universal tool for pressing with extrusion or cold pressing of a number of oilseeds. This product is a complete solution that meets the most stringent requirements for modern production facilities.



## Main advantages of this technology are:

- A compact solution, pre-assembled, properly wired, easy to use and maintain.
- A complete equipment that includes seed pre-treatment, filtration, oil and cake storage.
- High-quality filtered oil, extruded press cakes of improved feed value.
- High efficiency of the pressing process with parameters close to hot pressing technologies.
- Intuitive and simple control.



## Parameters

Standard parameters	Compact CP2		Compact EP1		Compact EP2	
	CP2-1	CP2-2	EP1-1	EP1-2	EP2-1	EP2-2
Throughput [kg/hr]	300	600	250	500	350 (250*)	700 (500*)
Input [kW]	43	73	49	88	64	117
Length [m]	7,5	7,5	7,5	7,5	7,5	7,5
Width [m]	7	7	7	7	7	7
Height [m]	4,5 (5**)	4,5 (5**)	4,5 (5**)	4,5 (5**)	4,5 (5**)	4,5 (5**)
Weight [kg]	4640	6580	4140	5710	5120	7650

\* throughput for soybean. \*\* Height with optional dehulling section.

Values may vary according to the technology and seed material used.



## SCREW OILSEED PRESS FL 200

- The screw press FL 200 is the core of our mid-size press shops. This press can process a wide range of hulled or unhulled oilseeds in various pressing modes.
- The presses can be assembled into lines for production of oil at a desired capacity. The press allows processing of oilseeds by both cold pressing and extrusion pressing.



### Parameters

	FL 200
Throughput [kg/hr]	160–1000
Input [kW]	11–22
Length [mm]	2120
Width [mm]	640
Height [mm]	840
Weight [kg]	800–950

Values may vary according to the technology and seed material used.

# SMALL-CAPACITY PRESSES

- Universal solution not only for the widespread oilseeds such as rapeseed and sunflower seed, but also for pressing of minor oilseeds, e.g. jatropha, coconut, hemp, mustard, poppy seed, artichoke, evening primrose, sea buckthorn and grape seeds.
- Thanks to their low spatial demands and a simple installation, the presses **UNO** and **DUO** are an ideal solution for small and mid-scale growers.



## PRESSES UNO, DUO

- These presses are usually equipped with a single-phase or three-phase electric motor that meets EU standards. However, the wiring can be customized to the requirements of a particular local market. The drive can be supplemented with a frequency converter for controlling the revolutions of the press, which facilitates optimization of the pressing parameters.





## PRESSING SET FARMER 10, FARMER 20



- This set is an ultimate solution for the production of a high-quality virgin oil.
- It contains all the necessary equipment and accessories for production of filtered oil from a wide range of oilseeds.
- The set contains: a frame, press (UNO or DUO; heating sleeve included), hopper, pump, desk filter, oil sedimentation tank, and storage tank.



### Parameters

	UNO	DUO	Farmer 10	Farmer 20
Throughput [kg/hr]	9–12	18–24	9–12	18–24
Input [kW]	1,1–1,5	2,2–3	1,6–2,2	2,7–3,5
Frequency converter	optional	optional	optional	optional
Length [mm]	870	775–780	875	700
Width [mm]	225	455	725	1140
Height [mm]	255–315	320–400	1100	1575
Weight [kg]	75–80	100–110	140–150	230–240

Values may vary according to the technology and seed material used.



# VEGETABLE OIL PROCESSING



## OIL FILTRATION

- Oil filtration is an effective way to separate out mechanical impurities from the crude freshly-pressed oil. The technology is always optimized for the capacity of the press shop.
- For low- and mid-capacity press shops we offer desk filters where each filtration step is controlled manually by the operating staff. Regeneration of the press is also carried out manually.
- Technologies for automatic filtration are offered for mid-sized and large-sized pressing plants. The entire filtration process is under the control of our smart control system FIC (Farmet Intelligent Control) and its relevant component FILTR OPTIMAL.





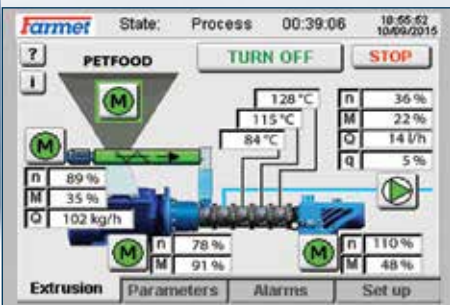
## OIL REFINING

- Oil refining is an effective way to remove unwanted impurities from vegetable oil. Oils obtained via pressing or extraction contain various unwanted particles that naturally occur in the seed material. Such substances can cause undesirable odour, colouration, surface burning, turbidity or sedimentation. These issues hamper the use of crude oil for food and technical purposes. Fortunately, these substances can be removed in the refining process.
- The refining process consists of four parts: degumming, bleaching, winterization, and deodorization. We can also deliver each particular section separately.





# EXTRUSION

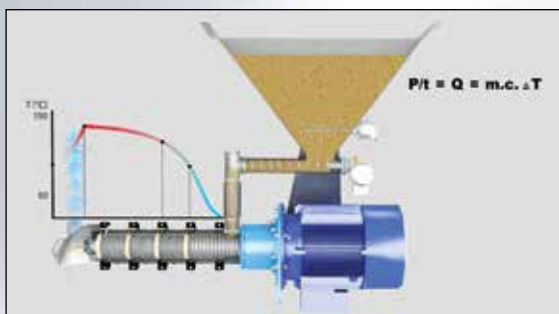


- Our line of extruders covers a wide range of production scale and purposes. Extruders can also be assembled into an extrusion line with an overall performance determined by the number and types of extruders used.
- The term EXTRUSION encompasses the processes of kneading, heating at high pressure, and squeezing the material through a die with the aim of reaching mechanical and heat treatment of the material. This method is also known as HTST (High Temperature Short Time), referring to the short exposure to hot temperatures.

### In feed industry, extrusion technology is used for two main purposes:

- **Improving feed quality** by mechanical and heat processing in the extruder.
- **Shaping of feed** by squeezing the material through a die (into granules or pellets).





## Implementing extrusion has the following advantages:

- **Mechanical grinding.** The feed attains fine structure that is convenient for digestion. During the expansion at the outlet of the extruder, inner structure of the material is disrupted, which increases its surface area and aids transport of nutrition in the digestive system.
- **Transformation (denaturation) of proteins.** Short-term exposure to temperatures above 100 °C with concurrent pressure inside the extruder causes effective transformation (denaturation) of proteins, which increases the energetic value of the feed.
- **Substantial reduction of anti-nutritional substances and natural toxins.** Extrusion is effective at degrading many anti-nutritional substances. For example, the extrusion of soybeans leads to a significant reduction of urease activity. Another convenient advantage, for the nutrition of monogastric animals, is the reduction of trypsin inhibitors in the feed.
- **Sterilization.** Conditions inside the extruder (heat and pressure) kill bacteria, mould, and other unwanted organisms and pests. Extrusion thus stops the production of mycotoxins, which leads to a longer storage life.
- **Gelatinization of starch.** Starch is both a common and important feature of feed. During extrusion complex saccharides are degraded into simpler, which makes the feed easier to digest.
- **Homogenization and shaping.** During extrusion, all constituents of the feed are mixed. Squeezing through a die of a particular profile can shape feed particles into different shapes (applicable, for instance, for pet food). Successful shaping and retention of the final form is only possible with extrudate that contains enough connective substances (most commonly starch).

## Parameters

	FE 100	FE 250	FE 500	FE 1000	FE 4000
Throughput [kg/hr]	80–140	200–350	400–700	800–1400	3000–5600
Input w/o options [kW]	15	22	55	110	370
Length [mm]	1935	2300	2270	2300	3600
Width [mm]	1015	1290	1390	1815	2500
Height [mm]	1765	1765	1362	1400	2300
Weight [kg]	435	770	1360	1500	3000

Values may vary according to the technology and material used.



# SOYBEAN EXTRUSION

- Soybean extrusion gives you an excellent feed component with a reduced content of anti-nutritional substances and a higher content of by-pass protein.
- Soybean is valued especially for its high protein content. During extrusion these proteins are denatured, which improves their digestibility for all categories of livestock.



	Raw soybean	Extruded soybean	Extruded and pressed soybean	Extracted soybean meal
Moisture	12 %	7 %	5 %	12 %
Fat	21 %	21 %	7 %	2 %
Urease activity	2–10 pH	0,02–0,3 pH	0,02–0,3 pH	0,02–0,3 pH
Trypsin inhibitor	75–115 mg/g	2–5 mg/g	2–5 mg/g	2–5 mg/g
Protein	40	40	43–45	40–48

Soybean – transformation of protein fractions in ruminants (according to the Cornell system)

Fraction	Before extrusion	After extrusion	
A	2 %	2,1 %	Nitrogen of non-protein origin
B1	85 %	19,4 %	Completely degraded in the rumen
B2	10 %	76,8 %	Slowly degraded in the rumen; portions proceed to the small intestine
B3	2 %	0,4 %	Not degraded in the rumen; completely proceeds into the small intestine
C	1 %	1,3 %	Non-degradable nitrogen-containing substances

# COMPOUND FEED PRODUCTION PLANTS

■ Plants for production of compound feed are technologically advanced equipment developed in a range of variants according to the production capacity and requirements on the final product.



■ Our compound feed production plants are convenient for mid-sized producers.

Basic ingredients for compound feed are stored in silos (or lie freely on floor space from where they are mechanically supplied into weighing machines). Additional ingredients (premixes) are bagged.

■ Small compound feed production plants are offered either with an self-suction hammer mill (MVKS-s), or with a vertical hammer-mill (MVKS-v).

■ The design of the appropriate facility is based on the complexity of the compound feed and the layout of ingredient and product storage.



## Parameters

Main equipment used	Unit	MVKS - s	MVKS - v	VKS
Vertical upright mixer	pcs	1	1	-
Horizontal mixer	pcs	-	-	1
Hammer mill	pcs	1	1	1
Roof height w/o options	m	6	7	10
Area w/o options	m <sup>2</sup>	12	15	45
Total installed input (usage rate 80 %, w/o options)	kW	15 / 20 / 23	16 / 19 / 23 / 27	72
Technology parameters	Unit	MVKS - s	MVKS - v	VKS
Maximum throughput	t/hr	0,5 / 1 / 1,5	0,5 / 1 / 1,5 / 2	2,5-5
Mixing precision		1 :10 000	1 :10 000	1 :100 000



# REFERENCES





Austria  
Belarus  
Canada  
Colombia  
Croatia  
Czech Republic  
Denmark  
Egypt  
Estonia  
France  
Germany  
Great Britain  
Greece  
Hungary  
Ireland  
Italy  
Kazakhstan  
Latvia  
Lithuania  
Malaysia  
Moldavia  
Morocco  
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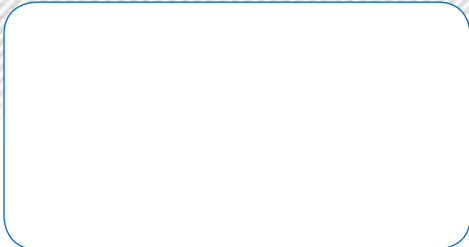
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*Business representative of Farmet a.s.*



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