

AERODYNAMIC SEPARATORS



Agricultural Science and Technology Co.



SEPARATORS - WHAT THEY ARE AND WHERE THEY ARE USED

We would like to present to you the developed and manufactured by us **specialist equipment for grain cleaning and separation - the ASM brand aerodynamic separators.**

They use a patented technology for cleaning and segregating output material on the basis of specific weight by means of appropriately directed air streams. ASM separators are used for efficient grain cleaning and calibration. They can work with any material (cereal grains, grass grains, legumes and oil plants), irrespective of its moisture content.



APPLICATION



agriculture and seed

during the cleaning and separation of seeds for sowing material it is possible to select the most biologically valuable seeds, which translates into **an increase in yields of up to 40%!**



storage

the pre-cleaning and cleaning mode **allows the grain to be prepared for storage** (improved phytosanitary properties) and the post-drying function allows the **humidity of the grain to be reduced** to ensure the right conditions for storage



food industry

various modes of separator operation allow **effective cleaning of different types of raw materials** for mills, groat mills, feed factories, oil mills, distilleries, breweries

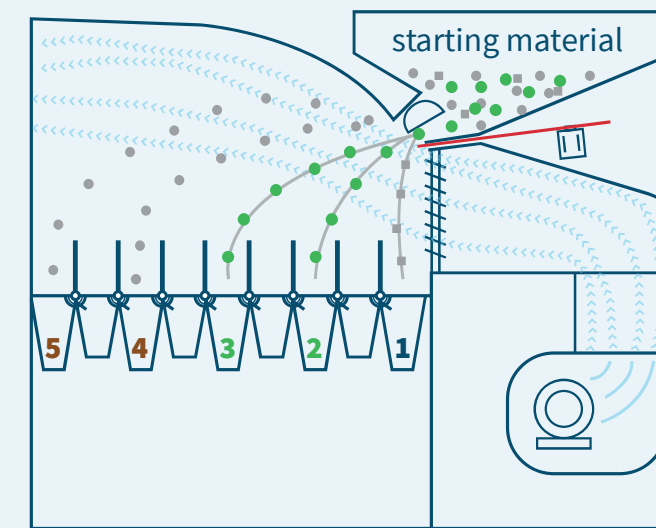
METHOD OF OPERATION

The separator divides the raw material according to its specific weight. **Separation takes place using air streams and divides the material into fractions** (from the heaviest to the lightest).

This makes it possible both **to clean the raw material of impurities and to sort it into various types of material** (e.g. seed, consumer grain, feed grain, waste).

Moreover, thanks to the difference in weight, the separator **separates infected material and removes pests**.

Seed calibration basing on specific weight

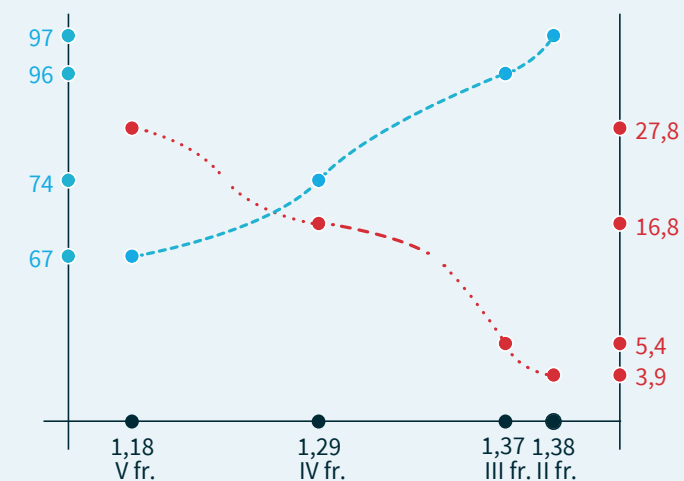


The ASM aerodynamic separator separates any material of a certain density with a high accuracy of +/- 3%.

More precisely - heavy seeds reach 2-3 fractions, and light, thin and damaged up to 4-5 fractions.

The contaminants are separated in 1 fraction (eg. stones) or using a cyclone (dust).

Seed separation and removal of infected material*



ASM separators are also used at the pre-treatment stage to reduce the risk of seed infection.

*applicable to wheat, the starting material consisted in 19% of infected seeds

Legend:

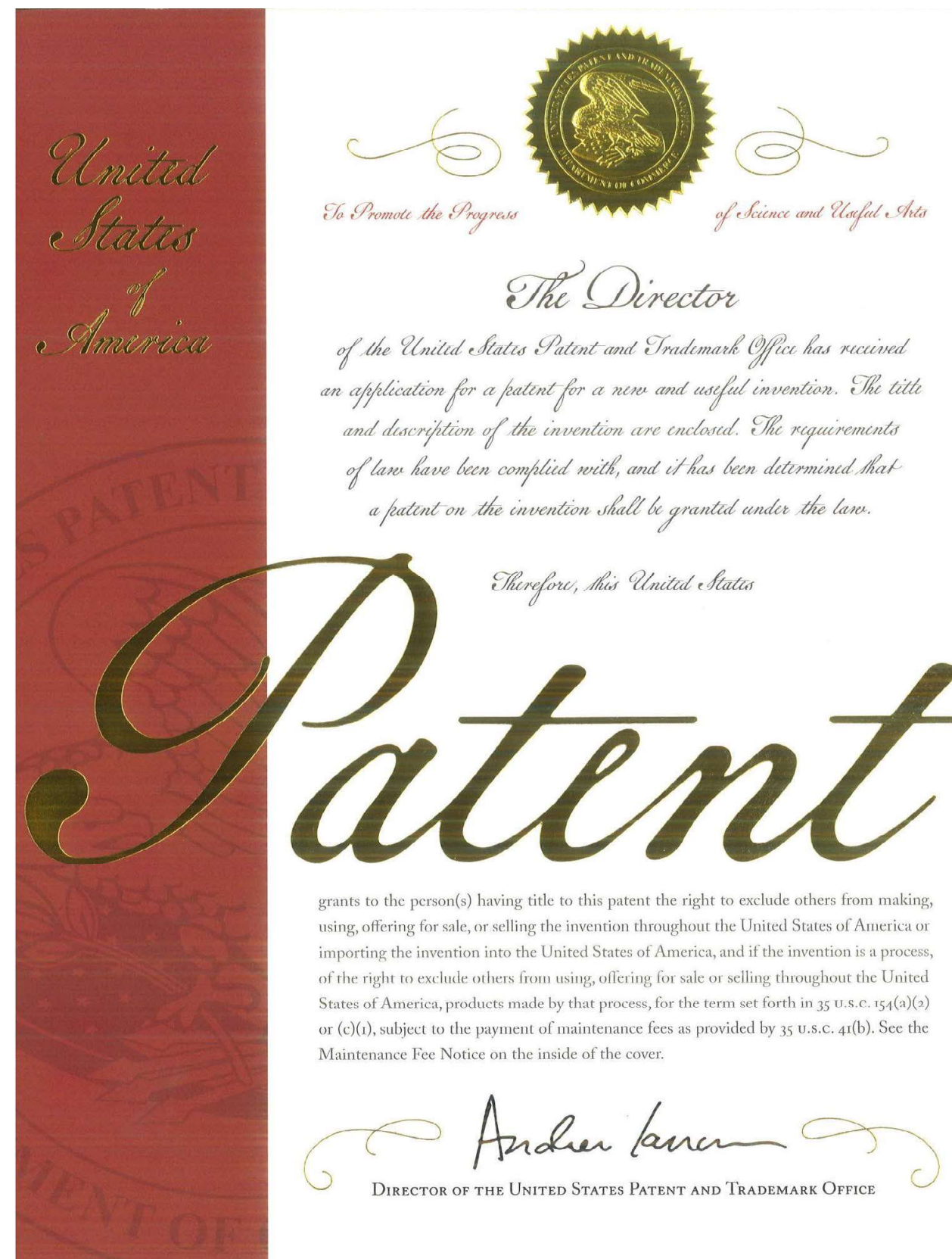
- Specific gravity
- Total infectioning
- Germinating ability



PATENTS

The method of grain separation was described in the **patent application PCT/UA2016/000030, publication number WO2016195615.**

On its basis we have obtained the patent protection in the **USA and China** (the procedure in the EU is in progress).



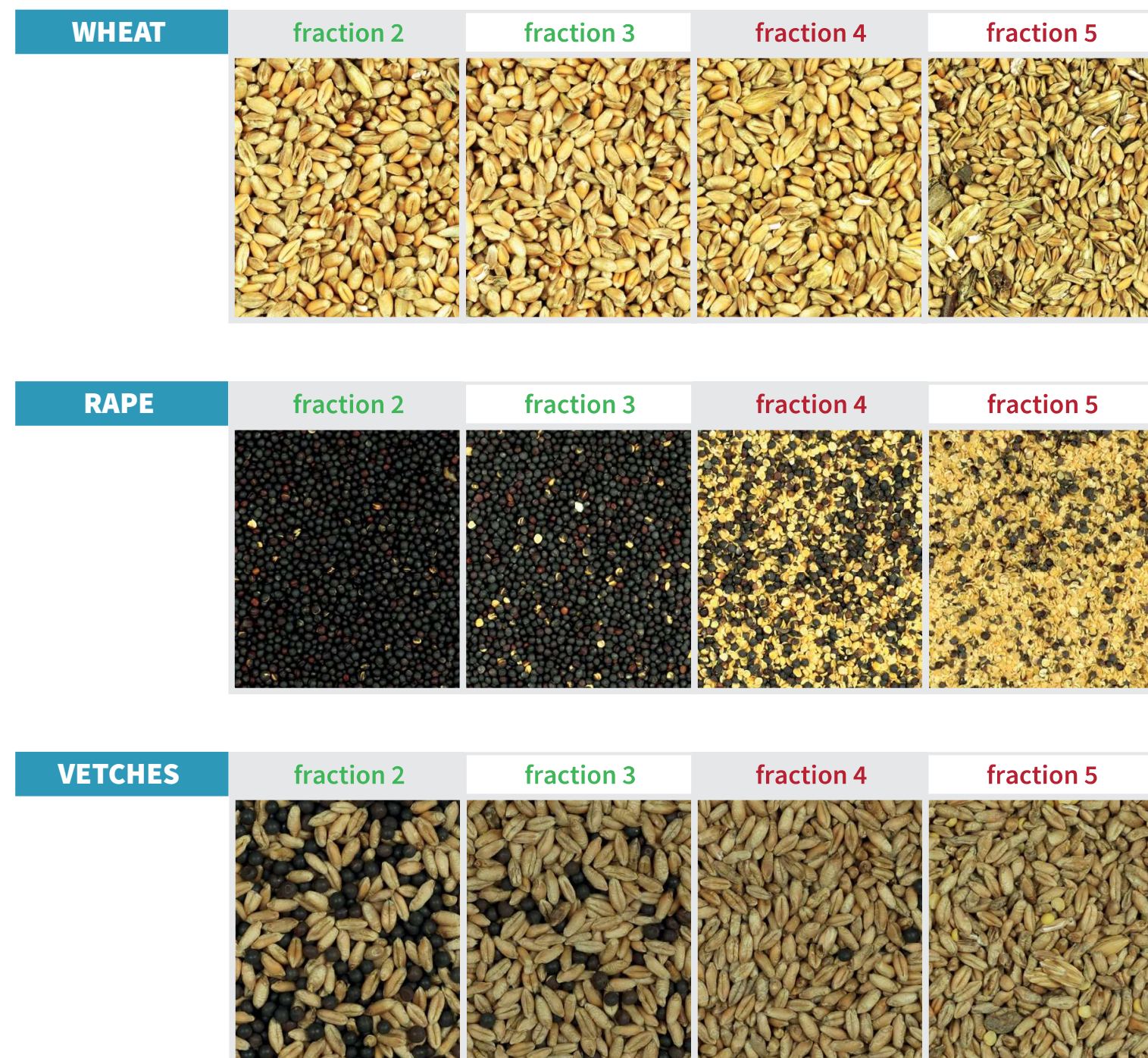


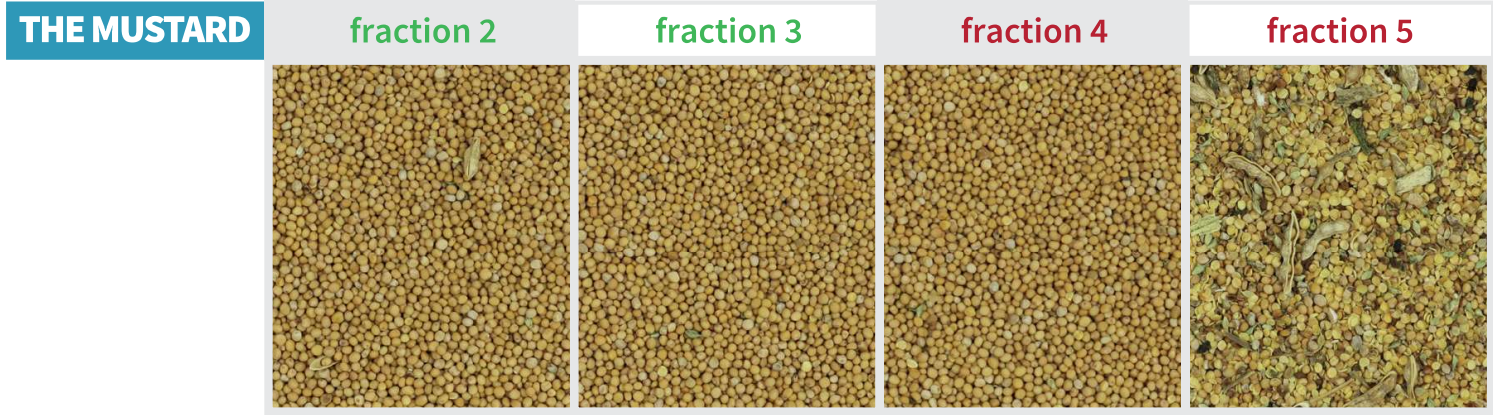
RAW MATERIAL TYPES

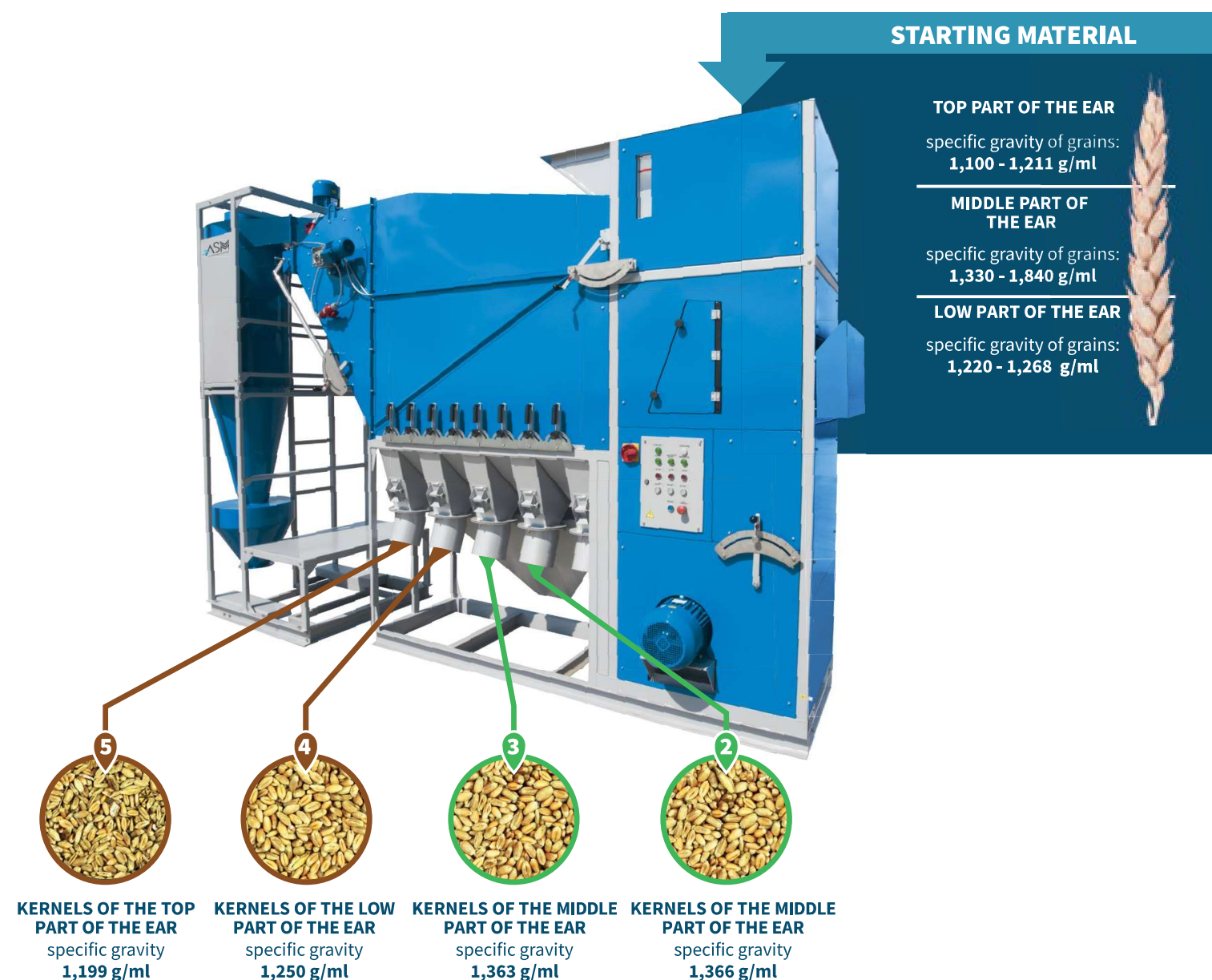
The machine works well with **all types of grain**. Starting from grass seeds, through cereals, oil plants and legumes.

It makes it possible to **clean highly contaminated raw material, as well as material with a high level of humidity**. It perfectly works with the material both before and after drying.

In addition, the cleaning process itself **reduces the humidity of the raw material** by separating green impurities.







DIVISION INTO FACTIONS

During operation, the separator divides the source material into 5 fractions:

Fraction I – heavy impurities

Fraction II and III – best-growing grain

Fraction IV – fine grain, half-grains

Fraction V – light impurities

Cyclone – dust, dirt

Depending on the quality of the raw material and the user's needs, we can regulate the quality and quantity of the material going into the individual fractions. We can also combine individual fractions with each other (e.g. waste from fractions I and V, good material from fractions II-IV, etc.).

MODES OF OPERATION

Depending on the needs, the machine can operate in different modes with different capacities:

- **high efficiency pre-cleaning**

which removes the extreme fractions (heavy and light impurities) and will **enable the raw material to be divided before storage** (e.g. into consumer grain and fodder grain). This will prepare the raw material for storage and/or drying

- **medium-efficiency fine cleaning**

(using material from fractions II-IV after pre-cleaning), allowing for **removal of impurities and precise division of raw material into fractions** depending on its intended use

- **separation (calibration) with low efficiency**

(using material from fractions II-III after pre-cleaning) allows the **division of material into fractions with an accuracy of +/- 3% in terms of grain weight** in a single fraction. It can be used in the seed production or packaging of raw material

With this capability, the aerodynamic separator can independently replace the **pre-cleaning winnower and the sieve cleaning plant** and provide a shorter processing line.



CLEANING EFFECTS

The separator copes perfectly with different types of raw material.

Examples of pre-cleaning:

WHEAT						
RAW MATERIAL	Fraction 1	Fraction 2	Fraction 3	Fraction 4	Fraction 5	Cyclone
100%	0,42%	16,39%	59,24%	20,38%	3,15%	0,42%
WEIGHT OF 1000 SEEDS (GRAMS)						
33,20	-	39,08	34,42	28,00	18,72	-
TO RAW MATERIAL	-	117,7%	103,7%	84,3%	56,4%	-

RYE						
RAW MATERIAL	Fraction 1	Fraction 2	Fraction 3	Fraction 4	Fraction 5	Cyclone
100%	0,62%	38,97%	48,45%	10,72%	1,03%	0,21%
WEIGHT OF 1000 SEEDS (GRAMS)						
33,62	-	35,68	34,44	29,48	21,00	-
TO RAW MATERIAL	-	106,1%	102,4%	87,7%	62,5%	-



CLEANING EFFECTS

BARLEY						
RAW MATERIAL	Fraction 1	Fraction 2	Fraction 3	Fraction 4	Fraction 5	Cyclone
100%	0,36%	19,13%	21,31%	33,15%	25,50%	0,55%
WEIGHT OF 1000 SEEDS (GRAMS)						
47,42	-	52,80	49,62	42,38	39,08	-
TO RAW MATERIAL	-	111,3%	104,6%	89,4%	82,4%	-

OAT						
RAW MATERIAL	Fraction 1	Fraction 2	Fraction 3	Fraction 4	Fraction 5	Cyclone
100%	0,75%	36,91%	30,42%	18,45%	12,97%	0,50%
WEIGHT OF 1000 SEEDS (GRAMS)						
33,62	-	41,26	43,40	31,38	23,88	-
TO RAW MATERIAL	-	110,4%	116,2%	84,0%	63,9%	-

SWEETCORN						
RAW MATERIAL	Fraction 1	Fraction 2	Fraction 3	Fraction 4	Fraction 5	Cyclone
WEIGHT OF 1000 SEEDS (GRAMS)						
291,08	330,10	328,88	314,08	263,10	154,06	-
TO RAW MATERIAL	113,4%	113,0%	107,9%	90,4%	52,9%	-



EFFECTS OF THOROUGH CLEANING

WHEAT		
	Raw material	Fraction 2
PURITY	97,4%	99,6%
GERMINATION CAPACITY	87%	87%
GERMINATION ENERGY	71%	83%

RYE		
	Raw material	Fraction 2
PURITY	98,5%	99,6%
GERMINATION CAPACITY	90%	96%
GERMINATION ENERGY	89%	96%

BARLEY		
	Raw material	Fraction 2
PURITY	92,2%	96,6%
GERMINATION CAPACITY	92%	92%
GERMINATION ENERGY	85%	90%

OAT		
	Raw material	Fraction 2
PURITY	96,1%	98,7%
GERMINATION CAPACITY	86%	89%
GERMINATION ENERGY	66%	89%



SEPARATION

WHITE MUSTARD SEED				
	Raw material	II	III	IV
Purity	97,5%	99,5%	98,8%	88,9%
Organic pollutants	0,6%	0,2%	0,7%	8,4%
Weeds	1,5%	0,0%	0,1%	1,2%
Abnormal crops	0,4%	0,3%	0,4%	1,5%
Total	100%	100%	100%	100%

QUINTUS WHEAT		
	Raw material	II
Purity	76,6%	96,5%
Organic pollutants	23,0%	3,5%
Weeds	0,2%	0,0%
Abnormal crops	0,2%	0,0%
Total	100%	100%

OIL RADISH					
	Raw material	II	III	IV	V
Purity	96,3%	98,6%	96,5%	84,8%	55,5%
Organic pollutants	2,0%	1,2%	3,1%	10,3%	11,3%
Weeds	1,5%	0,0%	0,3%	4,8%	33,0%
Abnormal crops	0,2%	0,2%	0,1%	0,1%	0,2%
Total	100%	100%	100%	100%	100%



BENEFITS IN CASH – PRE-CLEANING

Pre-cleaning performed immediately after harvesting allows to:

- remove impurities, thus **reducing the amount of material for drying - approx. by 5%**
- **reduce the moisture content of the raw material before drying by approx. 2%** (for wheat)

This translates into the savings as specified below:

WHEAT		
	Raw material	After cleaning
Weight	1000 kg	950 kg
Moisture	18%	16%
Cost of drying	8,00 €	3,80 €
Savings for 1 tonne		4,20 €
Savings for 1000 tonnes		4 200 €

It has been assumed that lowering the moisture content of 1t of grain by 1% (1 t/%) requires the use of approx. 2 litres of fuel oil (the cost of electricity and labour has not been taken into account).

- **raw material** – 1 tonne * 4 t/% * 2 litres * 1,00 € = **8,00 €**
- **material after cleaning** – 0.95 tonne * 2 t/% * 2 litres * 1,00 € = **3,80 €**

CORN		
	Raw material	After cleaning
Weight	1000 kg	900 kg
Moisture	30%	26%
Cost of drying	32,00 €	21,60 €
Savings for 1 tonne		10,40 €
Savings for 1000 tonnes		10 400 €

In the case of corn, pre-cleaning allows for greater moisture reduction (on average fractions II and III have a moisture content lower by 4 to 6% compared to the raw material).
This translates into a higher amount of green waste.

Cost of drying:

- **raw material** – 1 tonne * 16 t/% * 2 litres * 1,00 € = **32,00 €**
- **material after cleaning** – 0.9 tonne * 12 t/% * 2 litres * 1,00 € = **21,60 €**

SAVINGS - SEEDS

Separation allows to select the best material for sowing, with similar germination capacity.

For example, in the case of non-separated **wheat** with a germination capacity of 96% after 14 days, the germination capacity after 7 days was 80%.

For separated seeds, these values were 96% and 92%, respectively. This translates into an **uniform grain maturation process** during the harvesting period.

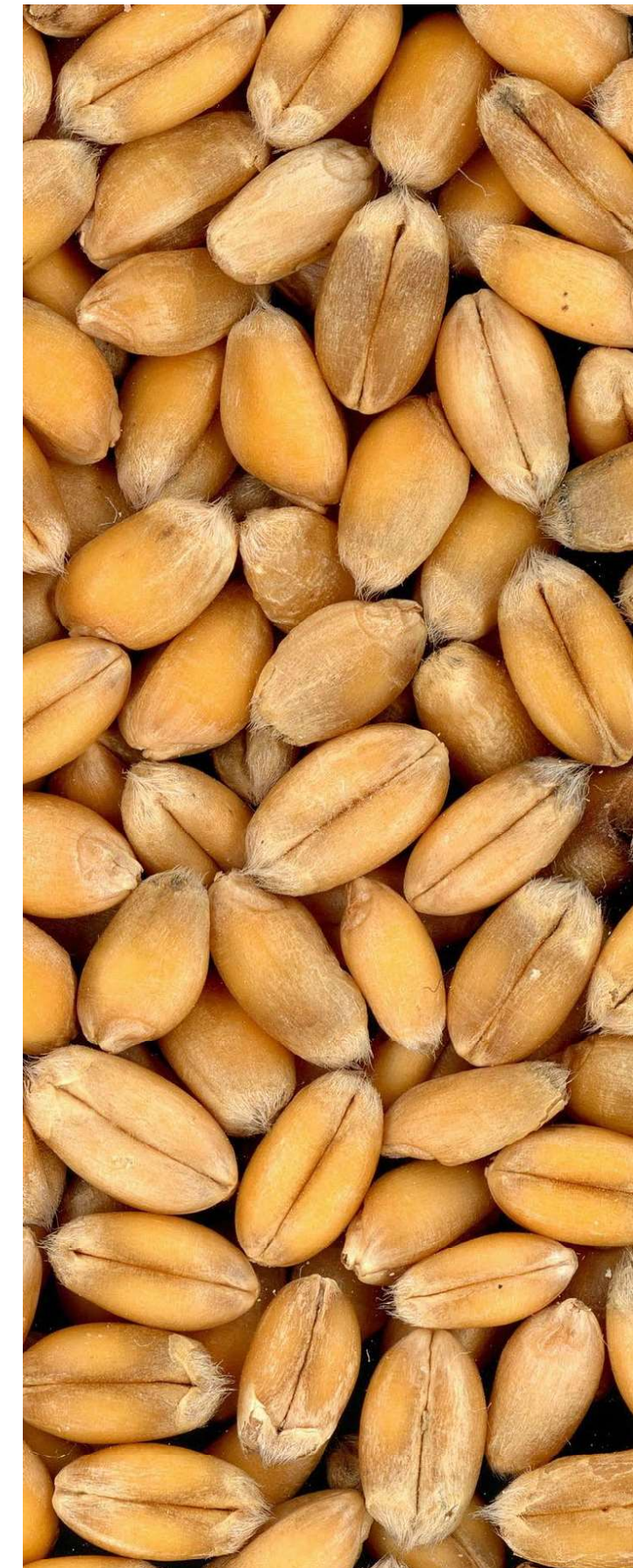
In the case of standard seeds, at harvest time about 80% of grain was ripe and ready to be harvested, while the remaining 20% consisted of unripe or overripe ears.

The separation process in this example allowed to **achieve approx. 92% of uniform, ripe ears**. This translated directly into a **12% increase in yield** and allowed to **avoid natural contamination of the field with spilled grains**.



The table below shows the savings achieved with the grain separation process in the analysed example

WHEAT	Standard grain	Grain after separation
Yield per 1 ha (average for Poland)	5 000 kg	5 600 kg
Average price of 1 tonne in the 2021 according to Statistics Poland (GUS)	200 €	200 €
Revenue from 1 ha	1 000 €	1 120 €
Average profit for 1 ha		120 €
For 100 ha		12 000 €





With our separator for pre-cleaning the harvested grain before drying, selection of material before sale and the production of seed for your own use, you can get a **return on your investment after just 1 year!**





AVAILABLE MODELS

We sell the models with different cleaning capacities
from 2 to 100 tons per hour!

SEPARATOR ASM-70i (WITH REGULATOR ENGINE SPEED)

EFFICIENCY preliminary cleaning - **up to 7 t/h**
proper cleaning - **up to 5 t/h**
calibration (separation) - **up to 2 t/h**

PARAMETERS length - **2.490 mm**
width - **735 mm**
high - **1.830 mm**
weight - **260 kg**
power - **2,45 kW**





SEPARATOR ASM-71i (WITH REGULATOR ENGINE SPEED)

EFFICIENCY preliminary cleaning - **up to 7 t/h**
proper cleaning - **up to 5 t/h**
calibration (separation) - **up to 2 t/h**

PARAMETERS length - **2.800 mm**
width - **735 mm**
high - **1.830 mm**
weight - **370 kg**
power - **3,00 kW**





SEPARATOR ASM-100i (WITH REGULATOR ENGINE SPEED)

EFFICIENCY preliminary cleaning - **up to 20 t/h**
proper cleaning - **up to 10 t/h**
calibration (separation) - **up to 5 t/h**

PARAMETERS length - **3.540 mm**
width - **1.010 mm**
high - **2.185 mm**
weight - **560 kg**
power - **7,87 kW**





SEPARATOR ASM-101

EFFICIENCY

preliminary cleaning - **up to 20 t/h**
proper cleaning - **up to 10 t/h**
calibration (separation) - **up to 5 t/h**

PARAMETERS

length - **4.165 mm**
width - **1.140 mm**
high - **2.545 mm**
weight - **830 kg**
power - **9,74 kW**





SEPARATOR ASM-301

EFFICIENCY

preliminary cleaning - **up to 50 t/h**
proper cleaning - **up to 30 t/h**
calibration (separation) - **up to 15 t/h**

PARAMETERS

length - **4.650 mm**
width - **1.463 mm**
high - **3.335 mm**
weight - **1.390 kg**
power - **15,55 kW**





SEPARATOR ASM-601i (WITH REGULATOR ENGINE SPEED)

EFFICIENCY preliminary cleaning - **up to 100 t/h**
proper cleaning - **up to 60 t/h**
calibration (separation) - **up to 30 t/h**

PARAMETERS length - **4.548 mm**
width - **3.635 mm**
high - **3.422 mm**
weight - **3.600 kg**
power - **31,96 kW**





PRODUCTION

Production of our equipment is carried out using the CNC technology ensuring the **high precision manufacturing and reliability of operation.**

We cooperate with the leading Polish companies in the field of agricultural machinery manufacturers:

- **SIPMA S.A.** with its registered office in Lublin
- **Metal-Fach Sp. z o.o.** with its registered office in Sokółka
- **KOJA** with its registered office in Stawiski

At the same time, **we are constantly working on the development of our products and carry out research and development work in this area**, in cooperation with the high-level specialists from such units as:

- **Institute of Innovation and Technology of the Bialystok University of Technology Ltd.**
- **R&D Centre Inventor Sp. z o.o.** with its registered office in Lublin.



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 **METAL-FACH®**

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www.koja.com.pl

 **R&D Centre
INVENTOR**

 **Institut
Innowacji i Technologii**
Politechniki Białostockiej Sp. z o.o.



CONTACT DETAILS

ASM TECHNOLOGY Sp. z o.o.
Agricultural Science and Technology Co.

POLAND

Registered office:
Lublin, ul. Koralowa 17/37

Sales department:
Białystok, ul. Szatwiowa 1
tel. +48 85 652 55 73

www.asmtechnology.eu
asm@asmtechnology.eu

TAX IDENTIFICATION NUMBER NIP 9512388466
STATISTICAL IDENTIFICATION NUMBER REGON 360754243
NATIONAL COURT REGISTER KRS 0000542228





DISTRIBUTION

CZECH REPUBLIC

Ovčárecká 1452, 280 02 Kolín,
Czech Republic

Tel.: +420 727 804 072

Fax: +420 774 957 590

E-mail: contact@asmtrade.eu

www.asmtechnology.eu

LITHUANIA

UAB „Margučiai”
Margučių g. 3, Margučių k.,
Miežiškių sen., Panevėžio raj., LT-38100

Tel.: +370 45 555 777

E-mail: info@marguciai.lt

www.marguciai.lt

GERMANY

eutec agraranlagen GmbH
Tolkewitzer Straße 90, 01279 Dresden

Tel.: +49 351 250963-40

Fax. +49 351 250963-49

E-Mail: info@eutec.info

www.eutec.info

SOUTH AFRICA

Facet Engineering Pty Ltd
7 Nell-Mapuis Street,
Chamdor, Krugersdorp 1754

Tel.: +27 (0)11 769 1168

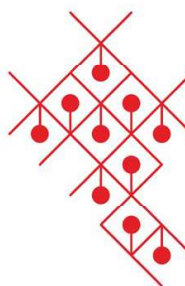
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