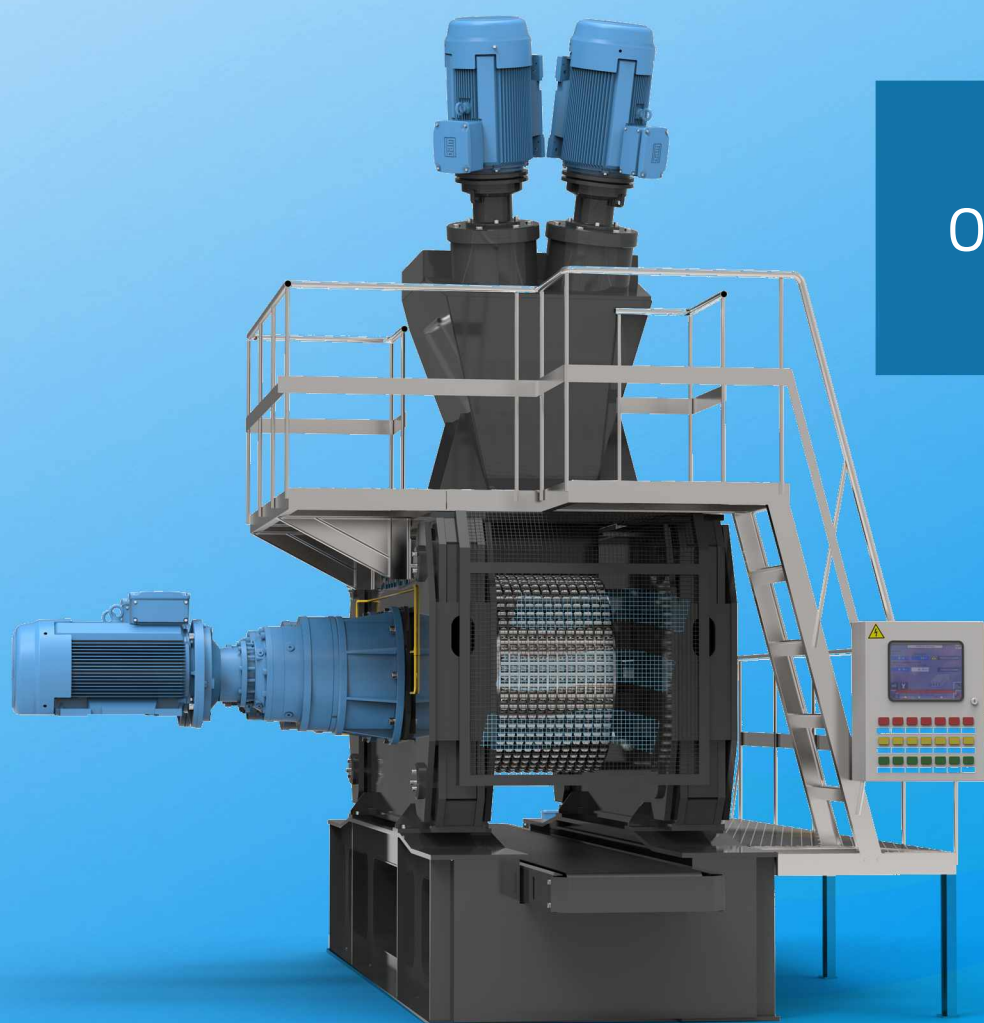


THE BRIQUETTING
OF FINE-DISPERSED
MATERIAL

BRU
BRIQUETTING
ROLLER UNIVERSAL



DSM
DOUBLE
SHAFT MIXER



INNOVATIONS IN BRIQUETTING

ECOENERGY Innovation Company has been developing and producing briquetting equipment – double-shaft mixers and BRU roller briquetting presses for fine-dispersed material briquetting since 2000. Our company has wide experience in developing technology of different material briquetting.

IC ECOENERGY roller briquetting presses' design is based on the world advanced experience and has the most power efficient design, which reduces costs for briquetting.

Roller briquetting presses and mixers can operate as a part of an automated briquetting complex.

The universality of roller briquetting presses' design enables to briquette wide range of fine-dispersed materials:

- Concentrated metal-containing slags;
- Metallurgical fluxes;
- Metal chips and powder;
- Fluorite particles;
- Coke breeze;
- Coal, peat, lignin, slates;
- Salt;
- Mineral fertilizers.

Special attention should be paid to ensure that the granule size fed to the machine is smaller than 6 mm; the moisture content of the mixture should be kept in the range of 8-12%. The binder percentage in briquettes should be 3-10% on the average. A very short list of raw materials can be used for briquetting without a binder.

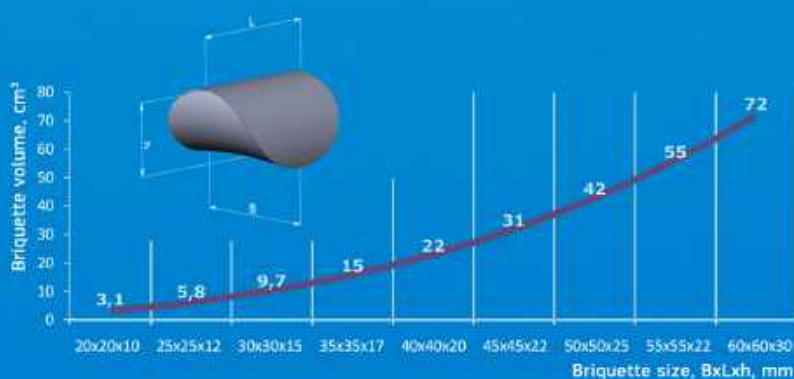
Briquetting moulds are made of constructional and alloyed steel or super alloy.

Roller briquetting presses may be completed with an extra screw press unit and a withdrawal device to prevent some kinds of briquettes from sticking within the briquetting moulds, as well as with a spare set of briquetting moulds.

The lineup of basic models allows choosing a press machine with production capacity between 1 and 25 tons per hour and a continuous mixer between 5 and 10 tons per hour.

High reliability and maintainability of our equipment make it a reliable assistant at your enterprise, which secures safety and high performance.

BRIQUETTE STANDARD FORMS



| | | | | |
|--|--|---|--|---|
|  | Briquette specific density, g/cm ³ | | Briquette specific density, kH / cm |  |
| Metallurgical dust | | Ores | 140 | Sponge iron |
|  | ≤ 4,5 | Metallurgical dust (direct reduction iron) | | |
| Dolomite | ≤ 3,6 - 4 | Sponge iron | 120 |  |
|  | ≤ 3,5 | NPK mixed fertilizers (P, water insoluble) | | Limestone |
| NPK mixed fertilizers | ≤ 3,1 | Limestone | |  |
|  | ≤ 2,3 | Dolomite | | Aluminum chips |
| Chalk | ≤ 2,2-2,4 | Aluminum chips | 100 |  |
|  | ≤ 2-2,2 | Rock salt | 80 | Rock salt |
| Peat | ≤ 1,7-1,8 | Soda | |  |
|  | ≤ 1,6-1,75 | Chalk | | Hydrated lime |
| Lignin | ≤ 1,3-1,5 | Hydrated lime | |  |
| | ≤ 2,2 | Gypsum | | Coal |
| | ≤ 2,2 | NPK mixed fertilizers (P, water soluble) | 60 | |
| | ≤ 1,6-1,7 | Ores Minerals (with binders) | | |
| | ≤ 1,1-1,2 | Sponge iron Limestone | 40 | |
| | ≤ 1,2-1,4 | Lignin | | |
| | ≤ 1,1-1,2 | Coal | 20 | |
| | ≤ 0,8-1,2 | Coke breeze | | |
| | | Peat | | |

Innovative peculiarities of IC ECOENERGY roller briquetting presses

The way of conjunction of the briquetting moulds - Separate grooved and toothed briquetting moulds

A half-closed (saddle-shaped) form is the optimum shape for achieving briquette firmness. Such cell shape enables to produce the pressure of 80 – 100 MPa on the rollers 400 mm in diameter.

No synchronization of moulds rotation is needed. The amount of material spillage is reduced. It is possible to get stick shape briquettes. Wear resistance and the overhaul period increase. There is a possibility of repeated milling of the moulds without pad welding up to 5 times.

The way of conjunction of the briquetting moulds - Symmetrical moulds for briquettes of European standard

Electronic synchronization of moulds rotation, together with a variable-frequency controller, instead of classical synchronizing gears, simplifies the press machine construction and expands its manufacturing capability.

Setting the minimum gap between the moulds, as well as its adjustment in the course of the moulds' wearing minimizes raw material spillage.

The swivel frame of the press

The specific quantity of metal of the press machine was reduced by 20-40%. Its overall dimension on the whole reduced, too.

The swivel joints of the underframe members provide a uniform load distribution.

The frame is easy to assemble and disassemble when repairing the roller press.

The extra screw press unit provides raw material compression coefficient of more than three.



Separate drive (planetary gear motor) for every mould's roller.

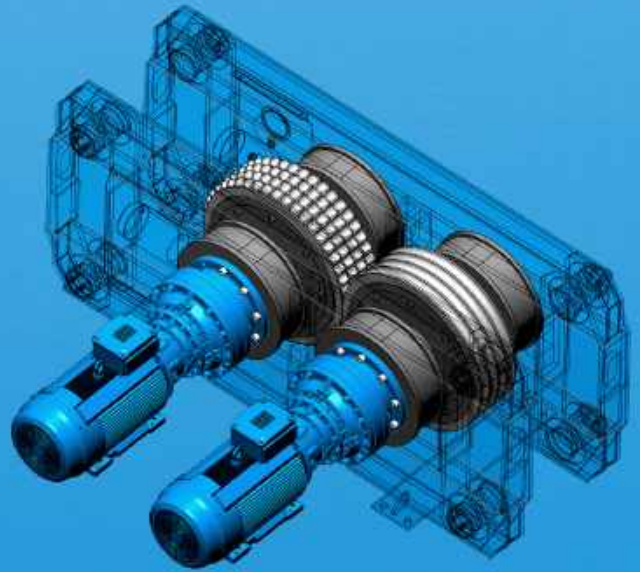
Using of high power planetary gears.

The engines' power consumption is 30% less than that of press machines with a parallel shaft gear reducer.

Both overall dimensions and specific quantity of metal of the planetary gear are less than those of the parallel-shaft reducer.

Torque transmission from the driving gear to the rollers is performed with minimal losses.

Setting and adjusting of a necessary gap between the rollers.



Variable-frequency control of the rollers' driving gears simplifies the adjustment of briquetting technology and allows the same press to briquette different raw materials.

Variable-frequency control of the screw press's driving gear allows getting maximum density of briquettes when using soft material (peat, charcoal, hydrated lime).

Self-aligning bearings compensate roll skewing when briquetting.

The moulds are changed without disassembly of the bearing units.

Autonomous hydraulic system of briquetting moulds load

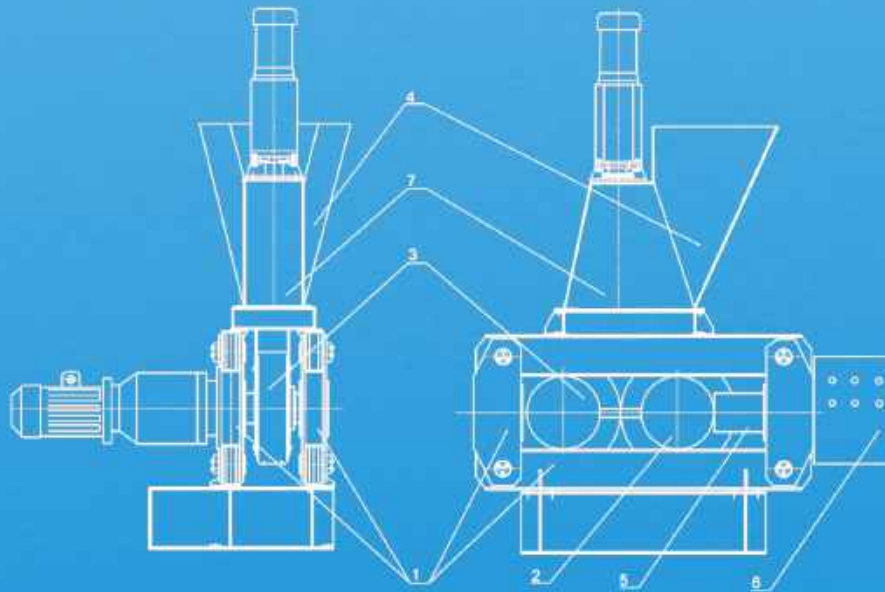
Producing and uniform distribution of the load required for briquetting.

When a big uncrushable object happens to get into the briquetting zone then the emergency depressurization system is initiated, which prevents the moulds from wedging and breaking.

The hydro system is installed in the press machine's frame as a monoblock and is easily dismantled when disassembling the press machine.

Roller briquetting press

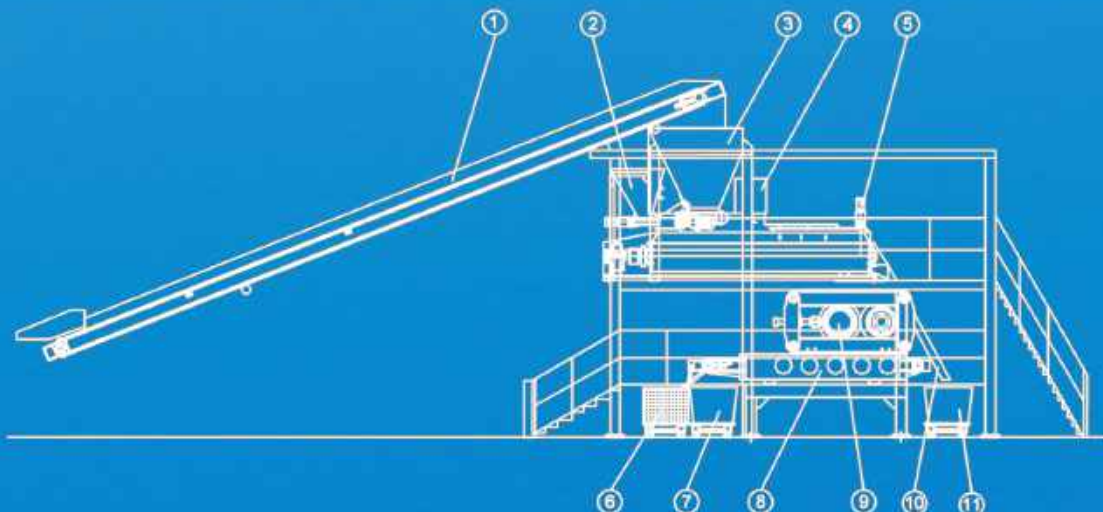
Kitting list for each unit



On the diagram:

- 1 – the swivel frame, 2 – the toothed roller in assembly with the gear motor
- 3 – the grooved roller in assembly with the gear motor, 4 – the receiving bin
- 5 – the hydraulic damper, 6 – electric panel, 7 – the screw press in assembly with the gear motor

The rotation rate of the rollers, as well as the presence of the variable-frequency controller of drive motors, is agreed separately.

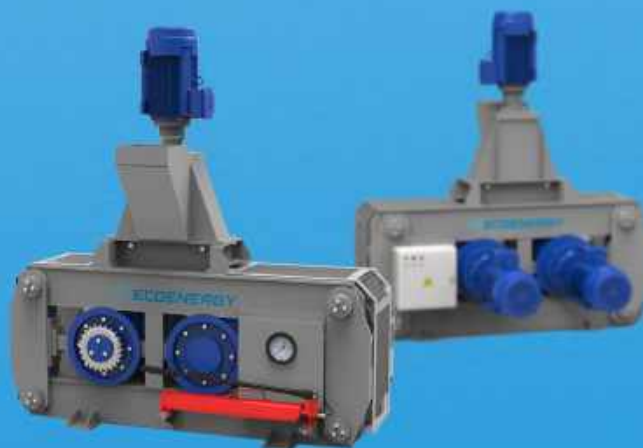


On the diagram:

- 1 – the feeding conveyor, 2 – the weigh belt feeder for extra batch, 3 – the weigh belt feeder for basic batch
- 4 – the liquid binder preparation unit, 5 – the screw press, 6 – the mesh cart for finished briquettes
- 7 – the container dolly for spillage collection (it can be changed for a receiving container), 8 – the briquettes' conveyor belt, 9 – the BRU roller briquetting press
- 10 – the discharge chute for emergency batch dumping
- 11 – the container for emergency batch dumping (can be changed for a receiving container)

The BRU universal roller briquetting press

The models of roller briquetting presses of BRU series are developed for producing fuel briquettes of coal and charcoal, peat, lignin, oil coke etc.



The BRU universal roller briquetting press



The models of roller briquetting presses of BRU series specialize in producing briquettes for ferrous and non-ferrous metallurgy of metal containing scrap, iron ore concentrates, metallurgical fines and slug, lime, chalk etc.

Key specifications

| Parameter denomination | BRU-1 | BRU-2 | BRU-3 | BRU-5 | BRU-10 | BRU-20 | BRU-50 |
|--|-------|-------|-------|-------|--------|--------|--------|
| The roller's diameter | 500 | 570 | 580 | 580 | 830 | 968 | 1120 |
| The roller's width | 144 | 175 | 311 | 311 | 588 | 588 | 400 |
| Torque (total on the driving gear) | 2,5 | 15,5 | 20 | 35 | 57,66 | 86 | 320 |
| The rollers' rotational speed | 9 | 6,5 | 7,14 | 8,5 | 6 | 12 | 7 |
| Maximal effort | 20 | 100 | 30 | 100 | 150 | 200 | 400 |
| The roller's driving power | 4,4 | 11 | 29,5 | 44 | 60 | 90 | 220 |
| The screw press's power (variable-frequency control) | 5,5 | - | 7,5 | - | - | - | - |
| The roller press's overall dimensions, length, width, height | 1491 | 1847 | 1812 | 1497 | 2836 | 4660 | 4000 |
| | 1375 | 1629 | 1900 | 1945 | 2295 | 2700 | 2900 |
| | 1900 | 1235 | 2549 | 930 | 1586 | 1600 | 1800 |
| The roller press's weight | 1,45 | 3,03 | 3,95 | 5,01 | 12 | 15 | 18 |
| Production capacity (TPH) no more than | 2 | 2,5 | 5,4 | 10 | 10 | 15-20 | 25-50 |

TWO-SHAFT MIXER

The two-shaft mixer of DSM series developed by “IC ECOENERGY” is a part of a line for briquetting bulk solids and oriented to two- and three-component mixture of briquetted batch with uniform mixing up to 5/95. The mixer is completed with weigh batching devices, as well as with a unit for preparing and feeding of a liquid binder.

The prepared mixture is fed to the double-shaft roller briquetting press by the screw feeder. Variable –frequency control of the feeding devices and driving gears is performed through the integrated controller of the briquetting unit, which is connected with the roller press’s control on the basis of the integrated program.



The double-shaft mixer DSM-5



The double-shaft mixer DSM-10

The key specifications

| Parameter denomination | Dimension standard | |
|---|--------------------|--------|
| | DSM-5 | DSM-10 |
| Production capacity, m ³ /h | 5 | 10 |
| Shaft speed, min ⁻¹ | 60 | 60 |
| Propeller diameter, mm | 350 | 600 |
| Distance between the axes of the blade shafts, mm | 320 | 500 |
| Installed capacity kWh | 11 | 18,5 |
| Total mass, kg | 1500 | 2100 |
| Overall dimensions, length mm, | 3800 | 3200 |
| width mm, | 800 | 1180 |
| height mm | 640 | 1350 |

BRIQUETTING MOBILE COMPLEX (MBP)

MBP – mobile briquetting plant integrated in a container. The plant is intended for getting fuel briquettes with binding additives and is used for:

processing of fine coal processing waste;

agglomeration of raw coal into suitable fuel, which contains basic coal filler of different quality with all the necessary features;

ecological advancement in coal mining regions at the expense of processing coal wastes in the place of their dumping;

coal strip mines and mines, traffic centers, transport nodal points, coal fuel depots, transfer platforms etc.

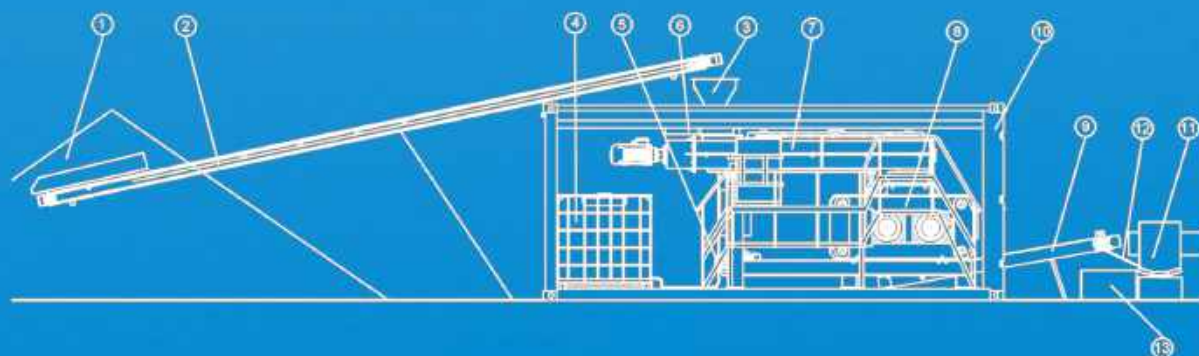


Coal mixture with particles 0-6 mm in diameter is fed into the hopper of the plant. The moisture content of the mixture should be kept in the range of 6-12%. The inclusion of single granules (up to 10mm) is permitted, but their maximum amount should not exceed 5% of the total mass.

The compression strength of the briquettes is 3-6 MPa. In accordance with ГОСТ (State Standard) 21289-75, which determines the standard for impact resistance, after a briquette's being released from a height of 2 m, the amount of fines should not exceed 15%. The density and mass of briquettes are always uniform.

The plant is mobile and integrated in a standard 12 feet container (6x2, 6x2.4 m), it has a compact design. It is supplied as a ready-to-use system and is placed on a solid even surface without a foundation. The equipment has both manual and automatic control. Information on current operating parameters is displayed on the monitor.

Diagram of briquetting plant in a container



The briquetting plant is installed in a container (11), briquetting material (1) is fed into the receiving hopper (3) by the belt feeder (2), dosed by the continuous batcher (6) and directed into the double-shaft mixer (7). At the same time, binder is fed by the dosing screw from the bin (4) into the mixer (7), there the mixture is homogenized to dryness, when necessary, water is added by the doser (5) into the middle part of the mixer. Then the mixture is compressed by the screw press (8) and fed into the roller press (9). The pressed briquettes are fed through the sieving machine by the belt feeder (10) to the take-away conveyer (12). Fines and spillage are collected in the box (14) and turned back for remoulding. The finished briquettes are dried in mesh containers and after achieving sufficient strength delivered to customers.

The primary equipment specifications

| No | Equipment denomination | Specification | Weight, kg | Overall dimension, mm |
|----|--|---|------------|--------------------------|
| 2 | Belt feeder | B=600mm L=5000mm Q=16m ³ /H N=3kWt | 600 | 600-400-6000 |
| 3 | Receiving bin | V=2m ³ | 850 | 1200-2000-2000 |
| 4 | Plastic container for liquid additives | V=1m ³ | 100 | 1000-1000-1000 |
| 5 | Liquid feeder | Productivity 0,3m ³ /H, N=0,7 kWt | 100 | 1200-590-400 |
| 6 | Dosing belt conveyor | B=600mm L=1500mm Q=3m ³ /H N=0.7 kWt | 660 | 600-400-200 |
| 7 | Double-shaft mixer | V=3,2 m ³ N=6 kWt n=60 rpm | 2110 | 2800-700- 650 |
| 8 | The BRU-2 briquetting roller press | Productivity 2,57m ³ /H, N=14 kWt | 3030 | 1847x1629x1235 |
| 9 | Belt feeder | B=600mm L=4000mm Q=16m ³ /H N=2.2 kWt | 560 | 600-400-6000 |
| 10 | 12 foot container | | 2580 | 6000-2600-2400 |
| 11 | Belt feeder | B=600mm L=8000mm Q=16m ³ /H N=3 kWt | 660 | 600-400-8000 |
| 12 | Sieving machine | screen size 10-10mm | 12 | 600x400x300 |
| 13 | Low quality briquette | 10-20% | | * for further processing |



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