Wood Briquettes

Wood briquettes are usually made of compressed sawdust and wood chips. When extreme pressure and heat are applied, wood releases a natural binder called lignin which combines wood chips and sawdust together.

The process involves a volume reduction up to 90%. The final product is a solid structure with improved heating efficiency.

Compared to standard fire-logs wood briquettes are densified and contain only 8%-10% moisture, which means they produce more heat by volume, less smoke and minimal amount of ashes.

10 kg of wood briquettes generally produce the same amount of heat as of 20-30 kilograms of standard firewood.
Wood Briquettes could have different shapes
Wood Briquettes packaging options
Wood briquettes applications

Wood briquettes could have different applications:

- TRADITIONAL WOOD STOVES
- FIREPLACES
- AUTOMATIC WOOD BRIQUETTES STOVES
- WOOD BOILERS
- BARBEQUE
- INDUSTRIAL BOILERS
Wood briquettes production technologies

Wood briquettes are generally made out of three different technologies:

- HYDRAULIC BRIQUETTING PRESSES (PISTON)
- SCREW BRIQUETTING PRESSES (SCREWS)
- MECHANICAL BRIQUETTING PRESSES (PISTON)
Wood briquettes production technologies

HYDRAULIC briquetting machines operate with pressures of 800-1000 kg/cm² and low temperatures of the compression head (lower than 60°C), usually work 8 hours a day (small and average size carpentry shops), and have an output range from 30 to 300 kg/h.

The quality and the heat density of briquettes obtained with this type of presses is lower compared to the ones obtained by mechanical or screw machines.

In hydraulic briquetting presses the pressure of the piston that compresses the material through the compression head is generated by an hydraulic circuit.
Wood briquettes production technologies

SCREW briquetting machines operate with pressures of 2000-3000 kg/cm² and high temperatures (higher than 150°C). They usually work 8-16 hours a day (small and average size production plants) and have an output range from 200 to 400 kg/h.

This type of presses is used in small scale productions of briquettes.

The quality and the heat density of briquettes obtained with this type of presses is superior compared to the results achieved by hydraulic presses and mechanical briquetting presses but this technology presents much higher production and maintenance costs (due to electrical consumptions and fast wearing of the vital parts).

In screw briquetting presses the pressure is generated by a screw that compresses the material through the compression head.
Wood briquettes production technologies

MECHANICAL briquetting machines operate with a pressures of 2000-2500 kg/cm² and temperatures that are adjusted in accordance to the material that is processed (between 40°C and 250°C). They usually work 8-24 hours a day (big and average size production plants) and have an output range from 300 to 2000 kg/h.

This type of presses is used in the large scale production of briquettes or in plants where the waste to be briquetted exceeds 300kg/h.

The quality and the heat value of briquettes obtained with this type of presses is superior compared to the results achieved by hydraulic presses.

In mechanical briquetting presses the pressure of the piston that compresses the material through the compression head is strictly generated by a kinetic mechanical system.
Mechanical briquetting presses

Video of a Di Più Brik MB100 Mechanical Briquetting press
Mechanical briquetting presses

MECHANICAL briquetting machines can produce briquettes or pucks (industrial briquettes for big boilers and power stations) out of the fines (wood powders) which are generated during the handling and transportation of wood pellets in pellets plants, in power plants or in port facilities where pellets are filled into vessels or discharged out of them.
## Wood briquettes production technologies

<table>
<thead>
<tr>
<th></th>
<th>PRODUCTION</th>
<th>MAX DENSITY OF THE BRIQUETTES</th>
<th>MAINTENANCE FREQUENCY</th>
<th>ELECTRICAL CONSUMPTION PER TON</th>
<th>MAINTENANCE COSTS / TON IN PROCESSING CLEAN WOOD</th>
<th>AVERAGE LIFE OF THE MACHINE</th>
<th>INVESTMENT TO PRODUCE 1 TON / HOUR OF WOOD BRIQUETTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SCREW MACHINES</strong></td>
<td>Standard 200-400 kg/h</td>
<td>1,2-1,4 kg/dm³</td>
<td>High</td>
<td>about 110 KW</td>
<td>&gt; 10 Euro/ton</td>
<td>5 YEARS</td>
<td>about 100.000,00 Euro</td>
</tr>
<tr>
<td><strong>HYDRAULIC</strong></td>
<td>Standard from 30 to 300 kg/h</td>
<td>0,8-1 kg/dm³</td>
<td>Low</td>
<td>about 75 KW</td>
<td>3-3,5 Euro/ton</td>
<td>5-10 YEARS</td>
<td>about 150.000,00 Euro</td>
</tr>
<tr>
<td><strong>MECHANICAL</strong></td>
<td>Standard from 300 to 2000 kg/h</td>
<td>1,1-1,3 kg/dm³</td>
<td>Low</td>
<td>about 35 KW</td>
<td>1-1,5 Euro/ton</td>
<td>20-30 YEARS</td>
<td>about 150.000,00 Euro</td>
</tr>
</tbody>
</table>

Mechanical briquetting machines is the most costs effective technology to transform wood sawdust and wood chips into high density wood briquettes.

When compared to wood pelletizing in plants between 0,5 and 3 tons/hour of production, briquetting presents similar production costs /ton when customers are using hydraulic or screw presses, while a drastically cheaper production costs /ton can be achieved when using mechanical presses.

Generally speaking mechanical briquetting presses are the most convenient wood and biomass densification technology available in the market.
European market of residential wood briquettes

-The is a clear lack of information about the European market of briquettes. No deep research study was made till now.

-Briquettes production plants are typically small size ( < 3 ton/hour of production) so it is more difficult to monitor their market and sales.

-Many producers sell their product in the local market directly or through local distributors.

-In many studies wood briquettes market is associated to the traditional wood heating logs or pellets one and it is not possible split the data and give right figures to the reader.
German market of residential wood briquettes

Germany is the biggest European market of wood briquettes.

Source: Mantau 2012 – Data converted from m³ to ton - 1 m³ of wood briquettes = 0.7 ton
Austrian market of residential wood briquettes

Together with the German one, Austrian market is one of the biggest one in Europe.

Source: STATISTIK AUSTRIA, Energiestatistik: MZ Energieeinsatz der Haushalte - data converted from m³ to ton

1 m³ of wood briquettes = 0.7 ton
France is a fast growing market for residential briquettes.

Source: Production et distribution des briquettes de bois en France. - Frédéric Douard – Study 2012
Despite of a relatively small internal production the Italian market of wood briquettes is constantly growing. Most of the briquettes available in the market are imported from Romania, Slovenia, Croatia and Bosnia.
Russian market of residential wood briquettes

Russian production of wood briquettes is dedicated both for the internal market and the export one. Official Russian export data state ca. 100,000 ton were exported to Europe in 2013 (Rosstat). Most is exported from: St. Petersburg and the Leningrad region, Kirov region, Kostroma region and Moscow region.

Source: - W.L.J. Hartkamp, UN ECE Forest Products and Market Review 2012 – 2013
- W.L.J. Hartkamp, Director BiomassConsult, personal communication April 2014
Swedish market of residential and industrial wood briquettes

Swedish consumption of wood briquettes is well established since the 90’s because of the high demand coming from greenhouse and industrial plants.

Source: Institutionen för skogens produkter - The Swedish market for wood briquettes - Production and market development - Johan Karlhager
Wood Briquettes Market

- Africa exported to Europe about 40,000 ton of Pellets and Briquettes in 2008, about 50,000 ton in 2009 and about 70,000 ton in 2010
  *Source: biomass-energy.org

- Baltic Region is an important exporter of wood briquettes and pellets to Central Europe
  *Source: Country report
  Baltic States: Estonia, Latvia, Lithuania

- Russia is exporting to Europe about the 50% of its production. Very beneficial to export revenues will be the present low value of the Rubel.
  *Source: W.L.J. Hartkamp

- Ex Jugoslavia countries are exporting to Italy and Central Europe (mainly Austria and Germany) about 85,000 ton of briquettes every year.
  *Source: Petrol d.o.o. Slovenia

- Romania is exporting to Central Europe and Italy more than 100,000 ton of briquettes every year

- *Source: W.L.J. Hartkamp

*[Africa, Ex Jugoslavia, Baltic Region, Russia, Romania]*
Wood Briquettes Market

Briquetting projects are usually easier to develop and financed than pelletizing ones, especially when they are small – medium scale ones.

- Investment costs are lower
- Material preparation before briquetting is easier
- Briquettes production costs/ton – especially with mechanical briquetting machines and in plants with an output < 3ton/hour – are lower

Price level of wood briquettes in the final market is similar to wood pellets one.

Source: - www.biomasstradecentre2.eu, and http://www.carmen-ev.de/
Torrefied Wood Briquettes – a new Market

Torrefaction of wood chips can be described as a mild form of pyrolysis at temperatures typically ranging between 200 and 320 °C. During torrefaction, the biomass properties are changed to obtain a much better fuel quality for combustion and gasification applications. Torrefaction combined with densification leads to a very energy-dense fuel. Torrefied wood briquettes represent a potential big opportunity both for the industrial (big boilers and power stations) and the residential markets (as an alternative of coal briquettes).
Thank you for your attention!

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