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AN EXPERT GUIDE TO MILLING TECHNOLOGY

Tony Goodwin, Managing Director of British Rema, one of the UK's leading manufacturers of milling and grinding machines, discusses the importance of matching machine to application, particularly for short material runs or small particle milling.

Specifying the best milling technology for dry powder whether for minerals, chemicals,

polymers or metals, is not as straightforward as it seems. Customers must consistently achieve the right powder characteristics to ensure product quality and process performance whilst a host of variables - material type, sensitivity to heat, particle size distribution - will all influence which milling technology will best align with the process specification.

Choosing a supplier that is open-minded, challenges any legacy processes and has the facilities to produce short run trials can often help save costs and downtime whilst improving productivity.

All milling processes are not equal in their energy demands - which is now a key consideration in this era

of high energy costs. Giving careful consideration to the amount of input energy required per kilogram of process yield is now much more important from both a cost and environmental impact perspective.

Classic pitfalls to avoid during specification

- Don't take the specification for granted: Many customers have a fixed idea based on previous projects or supplier input. A supplier should always start by asking: What does the final application truly require? Sometimes a small relaxation of the width of the particle size distribution makes a large impact on achievable throughput.





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- Don't over-specify: Sometimes industry standards are stricter than necessary, driving up processing costs. Slight parameter relaxations can enable much more efficient production, or even open up the use of entirely different milling methods that might be faster or more cost-effective.
- Don't presume the answer – test it. There is no substitute for running actual mill trials on the real material for a given application. What works in theory for one product format may fall short with another.
- Always consider how repeatable physical characteristics of the feedstock can be maintained, especially if the process material is from organic sources. Any variation in hardness, moisture content etc., will likely require milling parameters to be adjusted in order to compensate for the effects on milling performance. Some

technologies can accommodate these shifts in the physical characteristics better than others. It is easy to find that you have a system that can only process feedstock within a very narrow range.

Consider all the technology options

The most common machines for dry material milling include:

- **Air Micronisers (Jet Mills):** Ideal for producing ultra-fine powders, particularly when starting with already fine feed. These mills use extremely fast air jets to cause particle collisions and size reduction, available in opposed jet and spiral flow configurations – the latter able to handle harder materials and offer close particle size control. Jet Mills are designed for throughputs of between 0.5kg and 2 tonnes per hour. Spiral Flow Mills are designed for throughputs of between 1kg and 100kgs per hour.
- **Rotary Impact Mills:** Sometimes called beater or hammer mills, these use high-speed rotors to impact particles against liners and themselves. They are suitable for materials up to 3 on the Mohs hardness scale and effective for medium-coarse to fine grades (beater & pin mills at the finer end, hammer mills at coarser grades) including
- finished product of 500 microns and below. Rotary impact mills are widely used for reducing particle size in the chemicals, food, metal powders, minerals and plastics industries.
- **Classifier Mills:** These hybrid machines are a combination of impact rotor and precise classifier wheel for applications requiring tightly controlled particle size distributions. Classifier mills can also handle products with complex melting or softening points due to options for chilled or secondary air injection. They are used for throughputs of between 1kg and 6 tonnes per hour.
- **Ball mills and other tumbling mills (tube mills, rod mills and batch mills):** Used for robust, coarse or fine grinding across a range of mineral applications, especially where longer retention times or heavy-duty size reduction are required. Often used in cases where the feedstock is extremely abrasive – a limitation other milling technologies struggle to overcome.

Ancillary Services

It is always worth considering a manufacturer that has an in-house laboratory with expert lab technicians to complement core milling with classification, mixing, blending and drying solutions for pilot laboratory work (or even fully outsourced production). For



new products and trial runs, the service is priceless and ensures the customer can focus on his current business, whilst leaving new product developments trials to specialists.

More than just a machine

It sounds obvious, but for the best possible outcome it's important to choose a supplier who offers more than just the machine. Customer service and aftercare are givens perhaps, but the important on-going support for customers is not to be underestimated and a must to ensure efficiency and productivity. Suppliers that offer proactive servicing, with a knowledgeable parts team (and plenty of stock), engineers that can deliver scheduled maintenance or emergency repairs and a training team that can support in-house technicians will facilitate mill uptime not costly downtime.

It's often preferential from a production perspective to have the selected milling technology installed and commissioned as quickly as possible given pressures to return on the investment quickly; often this results in no time, budget or desire for the supplier to optimise the process. Just a few extra kilos processed per hour or a reduction of a few kilowatts of input power per kilo of production will shorten the return on investment and will continue to deliver savings for the



entire life of the asset...don't miss the opportunity to optimise your process.

The final word

Selecting milling technology is not simple. Carefully consider which technology is right for your business and engage with manufacturers that can deliver whole solutions and who aren't afraid to challenge the status quo, who will recommend solutions based on their long-term experience in manufacturing and contract processing – one that understands the complexities. A supplier that works until the best solution is found.



About the author

Tony has been MD of British Rema for approaching three years. Engineer by trade, he has previously worked in the powder technology and valve technology sectors, bringing experience that fits all the competencies of the British Rema brand.

Equipment selector guide

This information gives an indication of the particle sizes that may be achieved from the equipment.

Since materials and feedstocks vary considerably, this is only intended as a guide.

