

The value of a complete technological finishing process

完整技术精加工工艺的价值

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In recent years the ceramic tile market has received a big boost from the production of large-size tiles and panels, which are now available in a range of thicknesses and sizes up to 1600x3200 mm and beyond.

BMR has responded to the newly emerging needs of the sector with a wide and consolidated range of highly competitive machines and products. The growing number of Italian and international installations (more than 50 BMR lines for large size tiles are in operation worldwide) reflects the company's position as a leading player amongst suppliers of technology for honing, treating, cutting and squaring/chamfering of ceramic surfaces. To achieve this important result, the company has focused on developing not just innovative and efficient machines but a complete end-of-line finishing process that takes all factors into account, creating solutions tailored to the customer's specific manufacturing needs. The BMR technological process can be divided into 4 main stages:

- pre-grinding
- honing/polishing/treatment
- cutting of submultiples
- squaring/chamfering.

The first step consists of **pre-grinding** using one or two squaring modules to prepare the surface prior to the honing stage. The next step is **honing** itself, a surface abrasion process that serves to create finishes with various gloss levels on glazed or porcelain surfaces. This process plays a crucial role in the development of the finished product and its aesthetic quality, and also contributes to the definition of the digital decoration process. The finished result of honing is determined by several dif-

近年来，大规格瓷砖和板材的生产大大地推进了瓷砖市场的发展，目前这些瓷砖和板材的厚度范围很广，规格可达1600x3200 (mm) 以上。

BMR公司通过提供广泛而统一的、具有高竞争力的设备和产品，对新兴的行业需求作出了回应。在意大利以及在国际地区安装的设备数量的增长（BMR公司在全球有超过50条大规格瓷砖生产线正在运行），反映出BMR公司作为陶瓷表面技术供应商领先企业的重要地位，包括哑抛、后期处理、切割和磨边/倒角技术。为了实现这一重要成果，BMR公司不仅致力于开发具有创新性且高效的设备，还致力于开发将所有因素考虑在内的、完整的终端精加工工艺，从而为客户的特殊制造需求定制解决方案。

BMR工艺流程可以分为4个主要阶段：

- 预磨边
- 哑抛/抛光/后期处理
- 倍数切割
- 磨边/倒角。

第一步为**预磨边**，使用一个或两个正方形模型进行表面的加工，为下一阶段的哑抛做准备。下一步是进行哑抛，这是一种表面“磨损”工艺，用于在釉面砖或瓷质砖上创造光泽度不同的表面。这个过程对于成品的开发和美学质量起着至关重要的作用，也为定义数码装饰工艺做出贡献。哑抛的装饰效果由几种不同因素决定（摆动速度、皮带速度、抛光粉的颗粒大小和抛光头的压力），这些因素由操作人员根据釉料和使用的数材料进行控制，对于大规格



ferent factors (swing speed, belt speed, tool grit size and head pressure), which are controlled by the operator according to the glazes and applied digital materials, especially in the case of large size tiles where tool efficiency must be optimised.

Resin and diamond abrasive **tool technology** has evolved in step with the development of honed ceramic products, increasing the flexibility of the process and allowing it to adapt more effectively to production requirements and the desired gloss level. After honing it is essential to perform **treatment**, the first stage of which involves using a roller to apply a protective acid pickling solution to prevent the formation of matt stains in the event of prolonged contact with acid pH substances.

In collaboration with specialist companies, **BMR** has exploited its unique expertise in the field of tools, glazes and raw materials to **develop three treatment lines** that use acid pickling and pore-filling products to guarantee optimal cleaning and gloss. These differ according to the texture of the ceramic surface, which can be divided up between polished full-body and honed/glazed porcelain: **TopCoat**, which maintains the product's original gloss level; **TopFinishing**, which increases the gloss level; **SuperShine**, a thermomechanical treatment carried out on the dry, clean tile which significantly increases the product's glossiness.

The **BMR** process ends with **score-and-snap and squaring operations**, which can be carried out using either wet or dry technology, the latter having the qualities of energy saving and low environmental impact. The **Trasla Dry** and **Dry Cut** dry cutting technologies are differentiated according to whether cutting is transversal (**Trasla Dry**) or longitudinal (**Dry Cut**). Both operations are followed by tile snapping.

Squadra Dry and **Top Squadra Dry** are the two dry solutions for squaring, which are suitably sized for large size tiles. In addition to the benefits of dry technology (plant simplification, longer lifetime of parts and consequently of the line, improved working environment), **BMR** has recently added another advantage that is particularly significant for ceramic companies. It has been shown that it is **possible to recycle the large volumes of dry grinding residues and reuse them as a raw material in the body formulation stage**.

Research conducted in collaboration with the Chemistry and Geology Department of the University of Modena and Reggio Emilia has determined the chemistry, particle size distribution and technological properties of the powders produced using dry squaring techniques, highlighting the vital role of the type of tools installed on the machine. X

瓷砖来说,就必须优化工具的使用效率。树脂和金刚石研磨工具技术随着哑抛陶瓷产品的发展而逐步演变,增加了工艺的灵活性,并使其能够更有效地适应生产要求及所需的光泽度。哑抛之后,必须进行后期处理,第一阶段是使用辊棒施加保护性酸洗溶液,以防止长时接触酸性pH物质时形成哑光的污渍。

BMR与专业公司合作,利用其在工具、釉料和原材料领域的独特专长**开发了三条后期处理线**,使用酸洗和空隙填充产品来保证最佳的清洁和亮度。这些工序因瓷砖表面纹理不同而有所不同,可以根据通体抛光和瓷质哑抛/釉面进行分类:**TopCoat**,用于保持产品原有的亮度;**TopFinishing**,用于增加产品亮度;**SuperShine**是通过在干燥、干净的瓷砖上进行热处理,达到显著提高产品亮度的效果。**BMR**的最后一道工艺是**刻痕折断和磨边操作**,能够使用湿法或干法技术,后者具有节能和降低环境影响的特点。**Trasla Dry**和**Dry Cut**干法切割技术根据是横向切割(**Trasla Dry**)和纵向纵向(**Dry Cut**)进行区分。这两个操作结束之后进行瓷砖分割。

Squadra Dry和**Top Squadra Dry**是适用于大规格瓷砖的两种干磨解决方案。除了具有干法技术(工厂简化、零部件和生产线寿命更长、工作环境更好)的优点以外,**BMR**最近又新增一项对陶瓷企业来说特别重要的优势。研究表明,即**有望回收大量的干磨残留物,并将它们在坯体制备阶段重新用作原材料**。与摩德纳-雷焦·艾米里亚大学的化学和地质系合作进行的研究已经确定了干磨工艺所产生粉末的化学性质、粒径分布和工艺性能,表明了安装在设备上的工具类型的重要作用。X

