

New print head technology for 3D structures in ceramics

Durst Rockjet Technology

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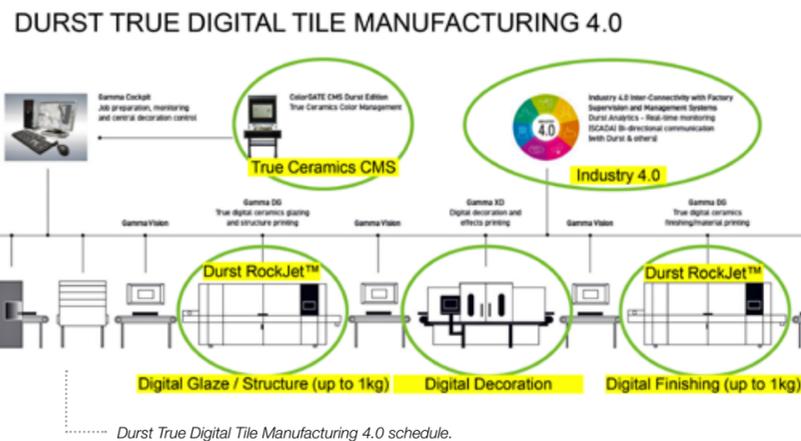


The ceramic tile printing business segment is undergoing major developments in terms of digitalization. Tile manufacturers have been keen on introducing digitalization into their glazing lines for some time in order to make their entire production processes more flexible and cost-effective.

This includes batch optimization and reduction to optimize sales and storage with guaranteed repeatability, as well as new possibilities for the development of innovative products in the tile sector, with a limitless number of lifelike structures to create a perfect match with the intended décor.

Need for more sophisticated technology

There is still a need for appropriate digital technology to print structures that are created and fully synchronized with the relevant decors. This would make it possible to control the entire production process digitally without exchanging or adjusting mechanical parts when changing products, regardless of batch size. Durst has been working on this kind of development and is set to digitalize this as yet missing, traditional part of tile production.

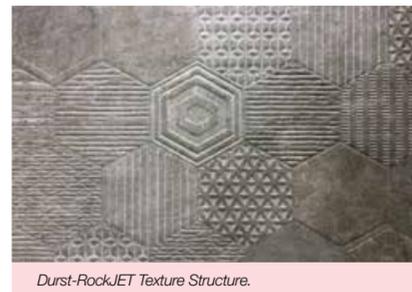


Durst-RockJET Wood Structure.

To digitally create structures in perfect match with the intended décor has been a long-held ambition for tile manufacturers. This technology facilitates the creation of more lifelike imitations of wood, stone and marble, giving products added value. It will also make it possible to develop and produce new, unique and innovative designs with visually captivating and tactile effects – something that has been missing so far.

True Digital Tile Manufacturing

The future of what could be referred to as a True Digital Tile Manufacturing process encompasses the following key digital production stages:



Durst-RockJET Texture Structure.

- Flexible, variable-size, variable-thickness slab and tile pressing equipment used in combination with a flat mould, full digital control and production of the desired tile size. This technology has already been in use for several years.
- The Durst Gamma DG Single Pass Digital glaze printing system with patented Durst RockJET™ print heads for the digital printing of variable structures on tiles using ceramic glazes with particle sizes >45 micron and high viscosities. This system is currently undergoing final field tests at two well-known Italian tile manufacturers.
- The Durst Gamma XD Single Pass Digital



Durst-RockJET Stone Structure.



Durst-RockJET Graphic Structure.



Durst GammaDG RockJET Multiple Structure Printing Tests on same media.

Decor Printer with standard piezo print heads to print graphics with pigmented ceramic inks perfectly matching and synchronized to the variable structures printed with the Gamma DG. This allows manufacturers to create new innovative products with a naturalness that has not been achievable until now using traditional production technologies, something that can be particularly significant when working with wood or stone decors.

- The Durst-ColorGATE CMS true ceramic colour management system, designed and optimized for the specific conditions and requirements of the tile industry. This system offers flexibility, long-term repeatability and significantly reduced downtimes during product changes and the ongoing reprinting of product collections over time.
- The Durst Gamma DG Single Pass Digital Glaze Printing System for the digital finishing by wet application of special materials to create specific aesthetic and functional effects.

What is currently available?

Current commercial piezo print heads are designed to handle inks with particle sizes below 1 micron. Some large drop print heads can go as high as 2 microns whilst maintaining reliable jetting behaviour. However, jetting fluids with even larger particles (>3 microns) with the limitation to have these inks formulated with relatively low viscosities - required by these types of piezo print heads – can affect reliability because of the sedimentation behaviour associated with larger particle sizes. Essentially, the current design of piezo print heads cannot be scaled up to work with large particle sizes in combination with the required much higher viscosities to keep such 'heavy' particles in suspension, and to hold up printed structures on media.

This part of the ceramic tile production process is consequently still based on traditional methods due to the non-availability of appropriate print head technology designed for jetting fluids with large particle sizes (> 45 microns) and high viscosities.

Development project

In order to digitize this significant section of the ceramic tile business Durst initiated a development project several years ago, after revolutionizing ceramic tile decoration by introducing the first single pass digital printer, the Gamma 60. The aim was to develop and manufacture this kind of revolutionary print head for dimensional printing (digital structures) for water based ceramic glazes with large particle sizes (> 45 microns) and high viscosities that were not available previously.

Innovative and considered the next major revolution in ceramics, Durst currently has two (2) Gamma DG single pass printers with this print head technology in operation.

Durst Digital Structure Printing

Durst True Digital Glazing technology for the printing of ceramic glazes is seen as the next and even more important revolution in the tile sector after digital decoration. At the heart of this innovative production process is the RockJET™ print head technology developed and built by Durst specifically for the Durst Gamma DG. It is the first high performance single-pass printer for the digital glazing/printing of structures onto flat ceramic tiles, instead of creating extremely limited and repetitive structures that don't follow the decoration by means of press moulds. Water-based ceramic glazes with large particles (> 45 microns), high

viscosity and application rates of up to 1kg/m² make it possible to produce even distinctly emphasized structures. This revolutionary technology with extremely high resolution and richness of detail, delivering a high level of reliability and production flexibility in industrial applications, is quite impressive.

Modular design

The Gamma DG has a modular design and can be configured in line with the width and number of glaze printing series required by the customer, with the option of further expansion later on. In addition to the impressive print quality, the tiles can also be printed with two different glazes simultaneously, e.g. matt and gloss. Digital structure printing with the Durst Gamma DG also offers important advantages during the development and industrialization phase of new products. It is now possible to test several different structures on a single tile without either additional cost (production of different mechanical moulds) or retooling.

Advantages of digital structure printing using Durst True Digital Glazing Technology

- Development of innovative, unique products with very natural effects thanks to the digitally created non-repeating structures in perfect match with the décor (design).
- Outstanding production flexibility, especially with small batch sizes and frequent product changes, which can be automated and optimized in terms of time and costs.
- New optical and haptic effects, which emphasize the advantages and naturalness of the ceramic tile even more than other materials. This produces a visual and tactile effect that makes it difficult to distinguish from natural products, whilst having superior properties.
- Maximum production efficiency, as a basis for future on-demand tile production •

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Durst Gamma101DG Digital Glaze Printer.