

Italy/Germany

# REVERSE-STO Technology

No more limits to tableware decoration.

## Introduction

Iso-pressed tableware decorated directly in the press can be produced in any shape with various colours, e.g. red, orange, yellow, for firing up to 1 400°C in oxidizing or reducing atmospheres. The REVERSE-STO technology was invented and patented by the Italian company **EMME-ENNE**. The colours were developed by company **BLEY/D**. This new and unique package opens up potential for a technological and economic breakthrough especially for the vitreous china and porcelain industry.

## Direct Decoration in the Press

Emme-Enne Impianti per Ceramica e Automazioni is a company established and developed to focus on high-tech research especially in the tableware sector, although in recent years it has also worked successfully in the production of ceramic tiles and glass. In the course of many years of work, it developed the technical aspects of its automation systems. It designs machines to customer specifications, delivering its customers an optimum solution for their application. Systems are available for the entire production chain, with varying levels of automation depending on the specific layout and type of production at the customer facility. They cover preparation through shaping and bisque handling; from glazing to decoration including automatic direct and indirect screen printing machines for 1...5 and more colours, threading machines, (special effects machines) to automatic handling, and finally, service support to ensure optimum machine performance. The goal is always the same: supplying customers with an optimum system to guarantee high-quality products combined with a substantial reduction in production costs.

In an analysis of the production system of one manufacturer some time ago, we recognized the severe problems associated with a production strategy based purely on a reduction of the costs of production and refrac-

tories as opposed to adopting a technology-based strategy to enhance competitiveness. Of course, automation has been a considerable help to tableware manufacturers worldwide, enabling them to produce higher quality products while minimizing their labour requirement. Automation research meant investing in highly advanced technology, allowing amortization of the initial costs based on a good sales plan. On the other hand, it is obvious that even the most advanced technology is helpless against the great flood of imports from the developing countries where the exploitation of unfair working conditions leads to a low-cost production base, making it difficult for rival manufacturers to compete. The initial reaction of most Western manufacturers were drastic cuts in their production costs. This is the reason why they adopted just-in-time production to whitewares technology in order to cut their stocks and be more flexible in meeting changing market needs. Then having realized that this was not going to reverse the downward trend, they took the opposite course and began buying and investing in the same countries that are putting the entire European production system under pressure. The immediate consequence of this turnaround has been the slow but inexorable weakening

of European production operations and the economic crisis on the European market. Quality = high costs? When two products cost the same, but their quality is different, which product do we all go for?

The Emme-Enne answer to this question is the REVERSE-STO Technology. The REVERSE-STO Technology is designed for granulate pressing (either isostatic or non-isostatic pressing) and enables the in-press decoration of the ceramic products. Thanks to a special patent, the decoration itself is applied to the product while in the press mould. Any kind of decoration can be directly transferred to any plate surface, irrespective of the shape of the plate. The mould has the usual productive cycle, resulting in a product that is completely decorated and immediately workable. The REVERSE-STO system machine does not require any modification of the press at all and has been designed to fit in with every type of press available on the market. Apart from the press, the REVERSE-STO system consists of an automatic flat screen printing machine (usually supplied by Emme-Enne) complete with an automatic transfer moving and positioning system which works on the "flat stands", as a special component of the patent itself. The different screen-printing heads create the image step by step, i.e. colour by

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**Fig. 1**  
Launch of the new  
technology at the  
CERAMITEC FORUM  
Speaker: Ingo  
Müller-Meuche



**Fig. 2**  
CERAMITEC  
presentation of  
BLEY GmbH

colour. The feed and discharge sections of the automatic screen printing machine are connected to the inlet and outlet undercarriages controlled in the inlet section by a 8-position compensator. The inlet and outlet sections have no effect on the normal operation of the press.

The REVERSE-STO system was tested for 6 months and, after that, operated for a period of 12 months. During this phase, it worked in a continuous production cycle on a semi-automatic prototype. It is worth pointing out that over the 18 months of non-stop operation, none of the items decorated with the REVERSE-STO system were rejected. That is because the decoration transfer system, which is the chief element in the REVERSE-STO Technology patent, works so efficiently. The great advantage of using the REVERSE-STO Technology is reflected in the quality of the product; it is possible to obtain a high-quality underglaze decoration.

The REVERSE-STO Technology also enables a 45 % reduction in production costs, depending on the different methods of production. It permits a substantial reduction in energy costs as the system eliminates one or two kilns: this is a major benefit both in economic and ecological terms. The excellent cooperation

with our partners in this project, such as Bley GmbH/D, has widened the possibilities of the REVERSE-STO Technology since it has enabled the use of a complete range of underglaze colours for firing from 1 100 to 1 400°C. The valuable collaboration with the *Ceramco Zschimmer-Schwarz Group* (for the colours preparation) and *Poligraph* (for the screens preparation) has helped the REVERSE-STO Technology system achieve its main goal: a unique and absolutely competitive quality product.

## Colours up to 1 400°C

Bley GmbH is a leading company specializing in engineering and sales for the ceramics industry. It is located in Marktredwitz/D, at the heart of the German tableware industry.

Bley has enhanced the potential for the application of the REVERSE-STO system with its development of ceramic colours for firing up to 1 400°C in an oxidizing or reducing atmosphere. This new colour range includes red, orange, yellow and green.

This new and unique combination provides the vitreous china and porcelain industry with an opportunity for a real technological and economic breakthrough.

All colours can be mixed with each other. All intermediate colours can be produced quickly and stored. To meet the requirements of REVERSE-STO, the colours are suitable for underglaze decoration. Both single and double-firing are possible.

This means a potential of more than 70%, because all isostatic pressed articles can be decorated with REVERSE-STO technology. Underglaze decoration results in two major advantages of REVERSE-STO technology: 100 % dishwasher-proof decoration and no heavy metal emission. The values for these two important aspects are equal to those of white, undecorated tableware.



**Fig. 4** Also the production of non-round shapes is possible

Beside these impressive technical reasons, underglaze decoration results in a more attractive and glossy appearance of the colours. This is combined with an extremely high intensity of the colours, giving a completely new look to vitreous china and porcelain tableware.

The REVERSE-STO technology can easily be integrated into an existing tableware production line. The characteristics of the colours also make them suitable for hand painting and spraying. In-glaze decoration is also possible. Articles can therefore be decorated with different techniques. Last but not least, coloured glazes are possible.

The colours were developed to meet the needs of active industrial production. This applies particularly to the firing conditions. The colours can be adjusted to meet to the specific needs and operating conditions of potential clients. This is most important because colours are generally sensitive to any variations in the production process.

The partnership EMME ENNE - BLEY is a logical consequence of the technologies developed. Together, the two companies present a new and complete package not previously available to the market and especially suited to the vitreous china and porcelain industry.

To sum up, the many advantages of REVERSE-STO include:

- unlimited variety of decoration (including simultaneous integration of other decoration techniques)
- reduction of energy consumption (especially if single firing is realized)
- significantly faster material flow (resulting in reduced stock levels both in terms of volume and value)
- dramatic cost reduction (with higher quality possible).

**Fig. 3 a, b**  
Decorated pressed  
plate and fired finished  
plate

