



## Practical experience with an innovative concept for continuous centrifugals

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### abstract

As one of the world's leading manufacturers of centrifugals, BMA is setting a new industrial standard with its K3300 continuous centrifugal in terms of economic efficiency, performance and ease of operation. The new compact square design requires little space and is clearly arranged. Innovative ideas such as the two-stage basket with patented outlet openings in the basket shell and the new product distributor ensure high throughputs, while allowing excellent technological results. After successfully testing two pilot machines in the cane and beet sugar sectors, the new K3300 continuous centrifugal was put on the market in May 2009. The great interest in this new centrifugal type exceeded all expectations. This paper describes some innovative design features of the K3300 centrifugal. Furthermore, the first results obtained from processing B product in a beet sugar factory are presented. This shows that the new continuous centrifugal is able to achieve high product quality with a high throughput. With reference to case studies in France and Guatemala, benefits (e.g. increased throughput) secured from installing the K3300 centrifugal are highlighted.

Keywords: **B product, continuous centrifugals**

#### Experiencia práctica con un concepto innovador en centrifugas continuas

BMA, uno de los líderes mundiales en la fabricación de centrifugas está estableciendo un nuevo estándar industrial con su centrifuga K3300 en lo que hace a eficiencia económica, desempeño y facilidad de operación. El nuevo diseño, compacto y cuadrado, requiere sólo un espacio pequeño y está organizado muy claramente. Ideas innovadoras como el cesto de dos etapas con aberturas de salida en el armazón, patentadas, y el nuevo distribuidor de producto aseguran altos rendimientos y al mismo tiempo ofrecen excelentes resultados tecnológicos. La centrifuga continua K3300 fue puesta en el mercado en mayo de 2009 después de que dos máquinas piloto fueran probadas exitosamente en la industria del azúcar de caña y de remolacha. El gran interés en este nuevo tipo de centrifugas excedió todas las expectativas. Este trabajo describe algunos de los elementos innovadores del diseño de la centrifuga K3300. Se presentan también, los primeros resultados obtenidos en el procesamiento del producto B en una fábrica de azúcar de remolacha. Dichos resultados muestran que la nueva centrifuga continua es capaz de lograr una alta calidad de producto junto con un alto rendimiento. Tomando como referencia ejemplos de estudios realizados en Francia y Guatemala, se destacan los beneficios a obtener con la instalación de la centrifuga K3300, tal como un aumento en el rendimiento.

#### Experiência prática com um conceito inovador para centrifugas contínuas

Como um dos principais fabricantes do mundo de centrifugas, a BMA está estabelecendo um novo padrão industrial com a sua centrifuga contínua K3300 em termos de eficiência econômica, desempenho e facilidade de operação. O projeto quadrado e compacto exige pouco espaço e é bem organizado. Idéias inovadoras, como a cesta de dois estágios, com aberturas de saída patenteadas na carcaça da cesta e o novo distribuidor de produtos garantem altos rendimentos, permitindo excelentes resultados tecnológicos. Depois de testes bem-sucedidos de duas máquinas piloto realizados na indústria do açúcar de cana e beterraba, a nova centrifuga contínua K3300 foi colocada no mercado em maio de 2009. O grande interesse neste novo tipo de centrifuga superou todas as expectativas. Este artigo descrever algumas características do projeto inovador da centrifuga K3300. Além disso, os primeiros resultados obtidos em relação a transformação de produto B em uma fábrica de açúcar de beterraba, serão apresentados. Resultados estes que mostram que a nova centrifuga contínua é capaz de atingir alta qualidade do produto com um alto rendimento. São destacados os benefícios (ou seja, aumento de rendimento) alcançados com a instalação da centrifuga K3300 em estudos de caso na França e na Guatemala.

### Introduction

Continuous centrifugals are in great demand in the sugar industry due to their smooth running and ease of operation. With the K2300 centrifugal, BMA has been very successful in recent years all over the world. For the continuous improvement of its products, BMA has committed itself to improve this technically high standard further. The new K3300 centrifugal combines innovative solutions for an improved performance with those for an enhanced ease of operation. It has immediately been readily accepted in the cane and beet sugar sectors. The resulting great challenge to commission numerous new machines for the start of the 2010 campaign was successfully mastered by BMA.

### Design and innovative features of the K3300

**Housing:** Thanks to the square shape and compact dimensions of the K3300, several machines can be placed directly next to each other (Figure 1). All functional elements are accommodated in the housing; the resulting space-saving and clear arrangement ensures a safe operation.

**Two-stage basket:** This innovative basket has been designed on the basis of BMA's long-term experience in the design of baskets for continuous centrifugals. State-of-the-art calculation software was used to prove its strength; comprehensive inspections during manufacture ensure its quality.

**Figure 1.** Station with two K3300 centrifugals in the beet sugar factory, Sucrerie de Toury



The key component of this new basket is the pre- separation stage, which is located in the lower part of the basket (Figure 2) and equipped with a wear-resistant wedge-wirescreen liner. In the pre-separation stage, a large part of the syrup is already separated. Moreover, the entire basket shell is equipped with an optimal number of special, patented outlet openings, which ensure quick syrup discharge from the basket. In this way, the energy efficiency is increased to an optimum value, since the syrup need not be accelerated unnecessarily. This new basket with pre-separation stage and special outlet openings thus allows

**Figure 2.** Two-stage basket of the K3300



achieving considerably increased throughput values compared to conventional executions.

Also in case of lower throughputs, this two-stage basket distinguishes itself by a clearly improved sugar purity.

**Turbo3 product distributor:** In order to increase the throughput with highly viscous magma, BMA has been offering the patented Turbo product distributor for many years. In a direct mixing process of steam with added magma, the steam condenses and heats the magma. As a result, viscosity is reduced, which helps to improve the product distribution and the separation of the mother liquor in the centrifugal. The outcome of the re-design is the new Turbo3 product distributor (Figure 3). Its optimised blades provide for an even more efficient processing and smoother distribution of the magma.

At the cane sugar factory, Ingenio La Union S.A., Guatemala, the low-raw products from different product distributors have been examined. With its Turbo3 product distributor, the new K3300 centrifugal with dry discharge achieved a throughput that was 10% higher compared to the standard distributor (Figure 4).

**Construction of the centrifugal:** The new design of the centrifugal provides a joint vibration-isolating support of the basket, the bearing assembly, the inner casing with V-belt duct and the motor. The rubber buffers are positioned outside the heat-affected zone, which makes them easily accessible for replacement without requiring a disassembly of the basket. This new design allows for an even smoother and more stable

running of the centrifugal. Moreover, a non-contacting gap sealing between the inner casing and the upper basket edge can be provided in this way, which avoids wearing seals.

**Technological results**

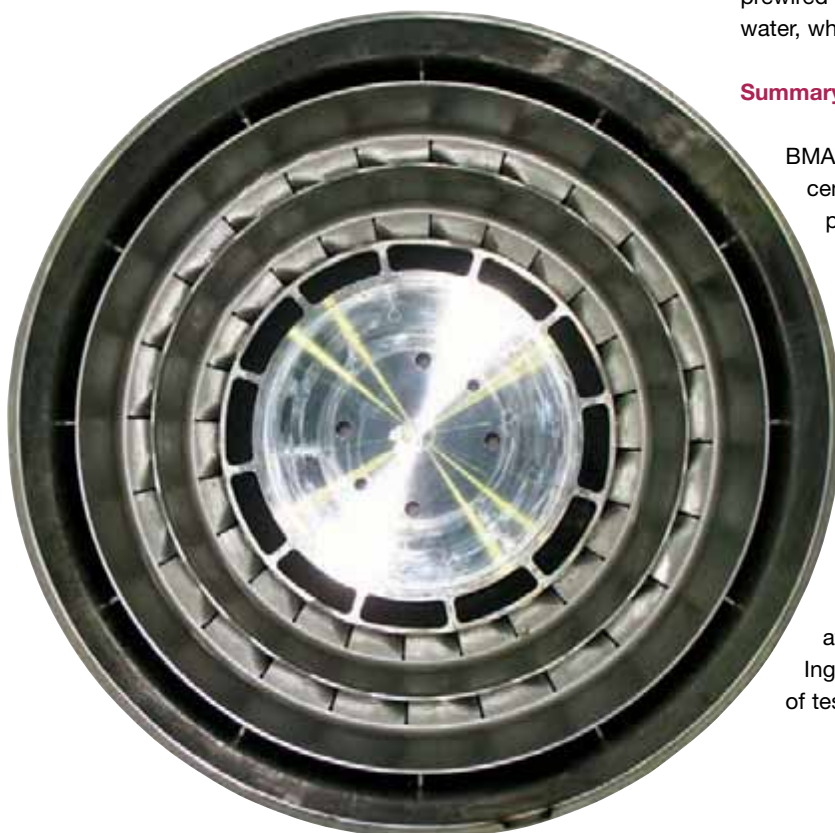
In 2010 BMA has commissioned two K3300 centrifugals with Turbo3 product distributor and mixing/melting device at the beet sugar factory Sucrerie de Toury, France. Compared to the centrifugal with dry discharge, the centrifugal type equipped with a mixing/melting device offers the advantage that conveying elements such as screw conveyors are not needed.

At Toury, the separated sugar is mixed with thick juice in the centrifugal (with a dry substance content of 66 – 68% and a purity of 93%) and partially melted. Complete melting takes place in a downstream melting tank. BMA had the chance to determine further performance data of the K3300 for B product processing. B product with a purity of 87 – 88% and a temperature ranging between 62 and 68°C could be very well separated in the two-stage basket. Through optimisation of the speed and the use of a water nozzle assembly equipped with stainless steel nozzles, the results could clearly be improved once more: A throughput of 46 mt/h with a sugar purity of 98 – 99% could be achieved.

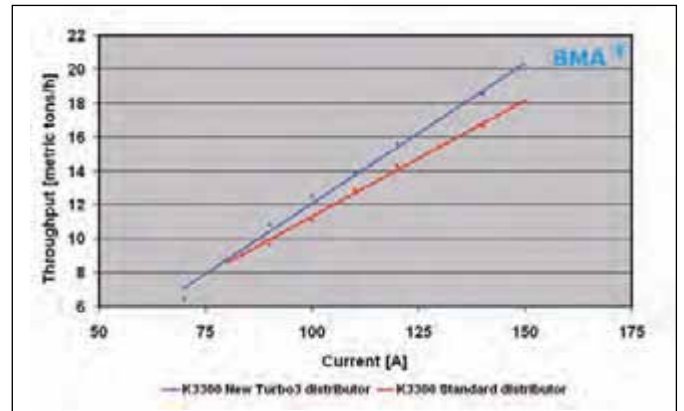
**Economic efficiency**

The availability of the centrifugal could be improved by reducing the number of wearing parts and designing individual components for a longer service life.

**Figure 3.** Turbo3 product distributor



**Figure 4.** Turbo3 product distributor comparison



The wedge-wire screen liner installed in the pre-separation stage is particularly wear-resistant. At Ingenio La Union S.A., Guatemala, it has been in use for more than 20 months. Based on the experience from other applications, BMA assumes a service life of several years for this wedge-wire screen liner. Since the major part of the syrup is separated in the pre-separation stage, the screens in the upper basket stage are also subjected to lower wear. The new way of fixing the screen with clamping rings inside the K3300 basket makes further auxiliary means redundant. When the basket has stopped, the screens can be exchanged within 30 minutes.

The degree of automation of the centrifugal can be extended up to a flow control of all media and fully automatic operation. High process stability is ensured by further safety and monitoring functions such as a vibration sensor and a V-belt tension-monitoring device. The K3300 centrifugal is supplied electrically prewired and provided with central connections for steam and water, which minimises the time needed for assembly.

**Summary**

BMA's high expectations of this new continuous K3300 centrifugal have been exceeded by the results obtained in practical operation. This BMA centrifugal is setting the benchmark in terms of operational reliability, process stability and economic efficiency.

The results from B product processing in a beet sugar factory demonstrate that the K3300 continuous centrifugal meets the requirements for high throughputs with simultaneously high product quality.

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