2|2012

INNOVATIV

ACHEMA 2012

BØHLE

Dear Readers,

the world's largest trade fair for chemical instrumentation – the ACHEMA 2012 – is over. Visitors from all over the world had a chance to see the innovative strength of (German) mechanical engineering for themselves! The suppliers for the pharmaceutical industry were accommodated in Hall 3 – a new hall with optimum climate comfort. The move to this new hall demonstrates that the long, close cooperation between VDMA and trade fair management was worth it. Many visitors were very delighted by the air-conditioning in this hall, especially in view of the hot summer temperatures. As head of the respective VDMA working group, I am delighted to have personally been able to request and implement this development. I would like to take this opportunity to express my thanks to all associate companies that supported me. We were able to make the Frankfurt trade fair even more interesting for our customers! The growth rate of pharmaceutical customers also reflects this successful development!

Yours sincerely,
Lorenz Bohle

Magic moments for new machines

ACHEMA review

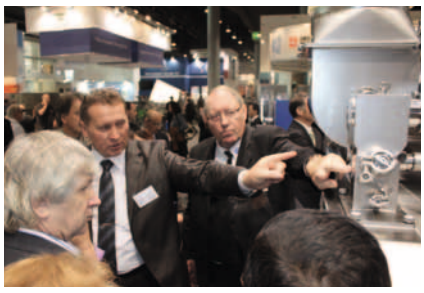
L.B. Bohle GmbH enchanted over 160,000 visitors at the ACHEMA trade fair with a world premiere. The innovative dry granulator BRC 100 was a real crowd puller and attracted visitors from all over to the trade fair.

Large numbers of visitors acquainted themselves with the innovation and made appointments for the first trials at the service centre at the Ennigerloh headquarters. The machine closes the final gap in granulation processing. "Until now, for a dry granulation process, components from other suppliers had to be integrated into the production process", explains CEO Lorenz Bohle. "We are now able to offer customers all solutions from a single source".

The other exhibits were also very well received by the trade professionals. In addition to the BRC 100, many visitors had a close look at the BTC 100 coater and the Bohle Fluid Bed System BFS 240, both absolute bestsellers.

The charming performances by Daniel Dück were a further highlight at the trade fair stand which was newly-designed by the Hamburg-based MAV. The magic tricks of the 17-year old industrial mechanic trainee fascinated trade fair visitors, guaranteeing a crowded Bohle stand during each performance.

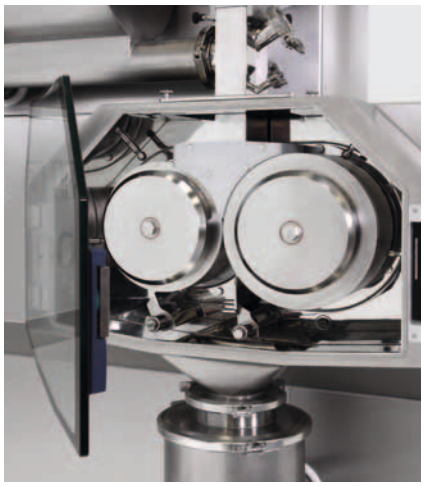
At the end of an intensive trade fair week Lorenz Bohle spoke of "a very successful trade fair, whose overall impressions confirm our positive future prospects".




BØHLE
BRC 100

Continuous production, easy handling and small space requirements

Easy handling, continuous production and small space requirements are the typical features of the L.B. Bohle machines. With the dry granulator BRC 100, the development department presented a world premiere at the ACHEMA 2012 in Frankfurt, revealing its typical Bohle genes.



In the BRC, free-flowing powder mixtures are processed into granules. The requirement in the pharmaceutical industry is to process a granule with defined density or porosity for immediate tableting thereafter. The powder is fed via a dosing unit, compacted between two rollers with gaps ranging from 1 to 6 mm and discharged as scabs. The force on the rollers, as well as the gap width are monitored by sensors. This way optimum process parameters are always ensured. A chopper unit is located beneath the compaction rollers, which processes scabs into smaller granulate particles. The unit consists of a conical sieve with exchangeable sieve units for processing different particle sizes.

"While developing the project, we questioned customers very precisely about the ways to meet their requirements," said Thorsten Wesselmann, engineer and Head of Mechanical Construction at L. B. Bohle. "Easy control, easy cleaning and less corners, screws and edges," were consistently requested. Especially the control of the pressing force via standard hydraulic systems constitutes a great problem, if the process needs to comply with "hygienic design". "Our electro-mechanical approach solves the problem," according to Wesselmann. With the Bohle BRC 100, frequent axis adjustment as with traditional roller compactors is unnecessary. The axes are dimensioned to be mechanically stable and have a special bearing method, so that elastic deformation is prevented. This eliminates the need for complete axis control. Moreover, the BRC 100 is low maintenance. Even when the machine is cleaned, only a few screws must be removed in the compactor room. "We only needed one year from the initial idea to the finished machine," said Lorenz Bohle in praise of his development team. "We are now able to offer our customers machines and processes for all stages of the granulation process with our new BRC 100 – and that in consistent, proven Bohle quality".

The response of experts and customer interest at the ACHEMA were correspondingly positive. Therefore, the sale launch of the new machine generation will be in the autumn of 2012.

Dr. Dejan Djuric, Manager Scientific Operations

BRC 100 – the new dry granulator

Dr. Dejan Djuric

Introduction

Continuous dry granulation has been an established process in the pharmaceutical industry for decades. It is not only applied for moisture- and temperature-sensitive materials, but also for large volume or herbal products, respectively. In comparison with classical wet granulation techniques, a sophisticated drying system is not necessary. This avoids large investments for production equipment and space, and it requires only low manufacturing costs.

Furthermore the fast roller compaction process is also applicable for high material throughputs. This enables the production of different products and product batch sizes with one single machine [1]. The market already offers various dry granulators, which can be described by the arrangement of the two compaction rollers. They can be mounted horizontally, vertically or on an incline.

Depending on the supplier, the rollers differ in width, diameter and surface properties. Furthermore roller compactors are distinguished between fixed-gap and moveable-gap compactors, whereas the moveable roller compactors are state of the art. Only this processing type assures homogeneous ribbon porosity at constant compaction pressure. The granulation step where the ribbons are transferred into final granules is usually integrated in the roller compactor equipment and is performed in one or two steps [2, 3]. With this in mind, L.B. Bohle developed a new dry granulator with an electromechanical roller drive and massive roller shafts. Minimal time is needed to achieve a steady state during process start-up, and parallel gap is assured during the whole production time. The integrated PID loop control minimizes the gap deviations

during processing and enables constant granule porosities.

The granulation step is achieved using a conical sieve (Bohle Turbo Sieve 200, L.B. Bohle), which gently transforms the ribbons into final granules even at high material throughputs. Due to different sieve setups, the desired particle size distribution can be obtained. The aim of the following study is to show and prove the functionality of this sophisticated new dry granulator.

Materials & Methods

A powder mixture (1:1 ratio) consisting of lactose (Granulac 200, Meggle, Germany) and microcrystalline cellulose (Avicel PH 101, FMC, USA) was used for roller compaction. For lubrication, 0.5 % magnesium stearate (Pharma VEG, Baerlocher, Germany) was added.

The excipients were pre-mixed in a bin blender (PM 600, L.B. Bohle). The homogeneous blend was then roller compacted (BRC 100, L.B. Bohle) at different compaction forces and different sieve setups.

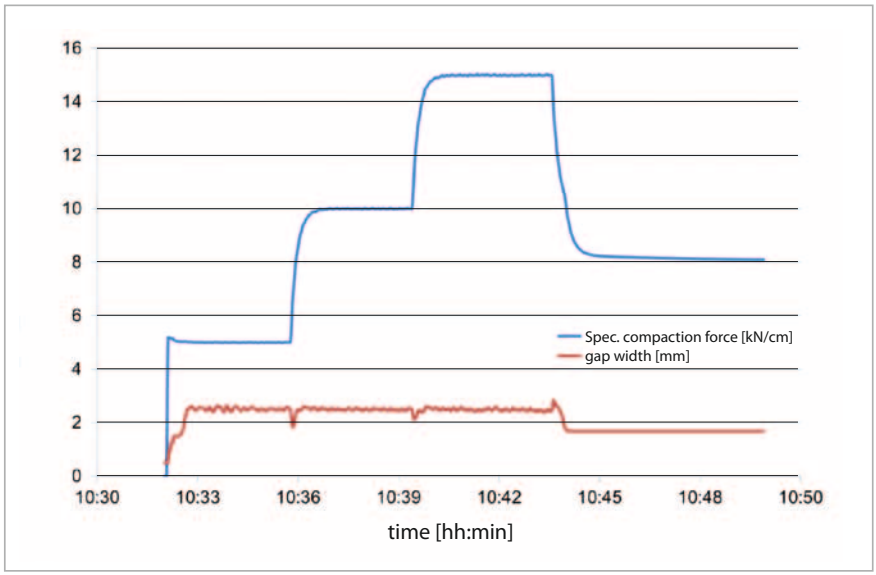


Figure 1: Gap width over time at increasing compaction force values

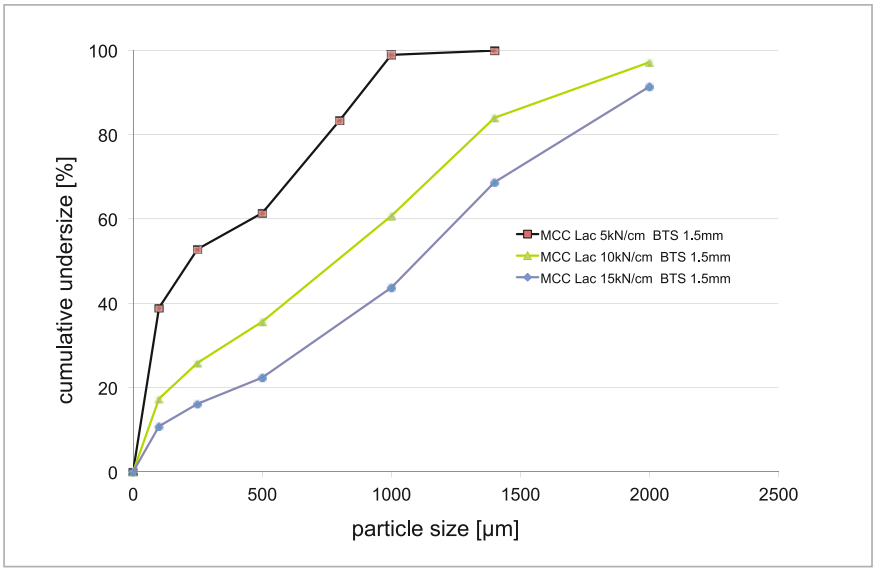


Figure 2: Compaction force impact on granule particle size

A smooth master roll and a grooved slave roll of 100 mm width were used for the compaction trials. Sampling was performed after the process start-up when steady state was reached. Final granules were manually sub sampled and analyzed in duplicate by mechanical sieving (Haver EML 200 digital, Haver&Boecker, Germany).

Compaction force

The impact of the compaction force on the final granule particle size was analyzed at 2 rpm roller speed, 300 rpm for the 1.5 mm rasp sieve and a gap width of 2.5 mm. The process began with activated PID loop control for the feeding system. Steady state was achieved within 40 seconds with a constant specific compaction force and a constant gap width (Figure 1). Thus, a minimal material loss could be detected due to the quick loop control.

During processing, the compaction force was increased step wisely whereas the next force level was quickly achieved within seconds. Deviations of the specific compaction force were below ±0.1 kN/cm and ±0.1 mm for the gap respectively. Thus, both parameters could be considered constant during the whole processing.

Granule particle size increased with higher compaction force levels [4]. After granulation through a 1.5 mm rasp sieve, the amount of fines (particle size <100 µm) ranged from 39 % for the granules compacted at 5 kN/cm down to 11 % for granules prepared at 15 kN/cm compaction force (Figure 2). Compaction at such a high force level led to a higher amount of coarse granules (larger than 2000 µm). Therefore, a smaller screen size between 1.0 and 1.5 mm is recommended in order to minimize this large granule fraction.

Gap width

Material throughput during roller compaction can be increased with a larger gap width. It was reported in literature that a larger gap width at constant compaction force level leads to finer granules [4]. This effect could not be observed when compacting the powder mixture at 10 kN/cm (Figure 3). At 2 rpm roller speed and 300 rpm sieve speed (1.5 mm rasp sieve), comparable granule particle size distributions were obtained although the gap width was increased from 1.5 mm up to 3.5 mm. A homogeneous application of the compaction force over the whole roller width could be one reason for the similar granule size. Thus, material throughput could be easily increased without a change in granule properties.

Sieve setup

The applied compaction force mainly affects granule particle size. Secondly the setup of the integrated granulation unit (Bohle Turbo Sieve 200) determines the final particle size distribution. With increasing screen size, coarser granules are obtained (Figure 4).

The rasp sieves with 1.5 and 2.0 mm screen size led to similar granule particle size distributions at 300 rpm sieve speed. In comparison the 1.0 mm rasp sieve led to finer granules with higher amount of fines. Finally all three screen types led to acceptable amounts of fines due to the gentle cutting behaviour of the rasp sieve during granulation. The choice of the right screen size makes it possible to influence

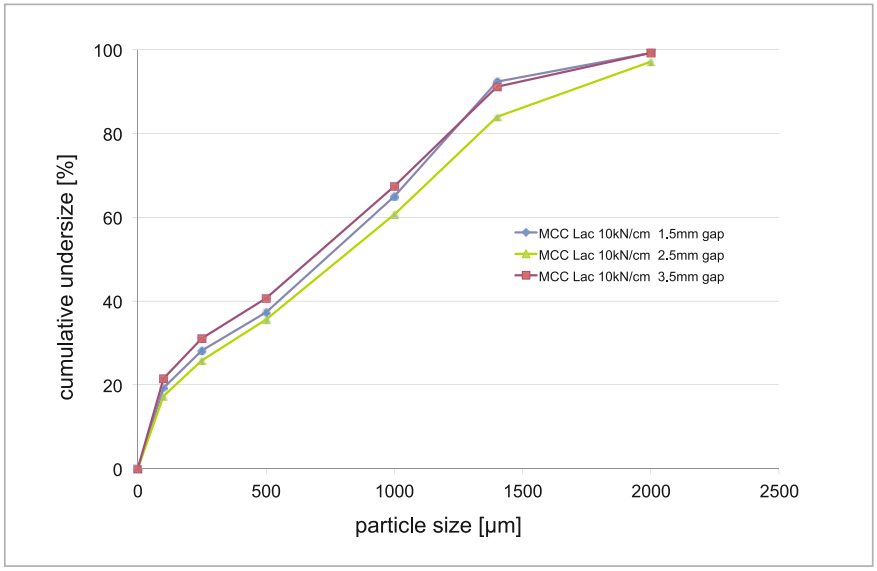


Figure 3: Influence of gap width on granule particle size

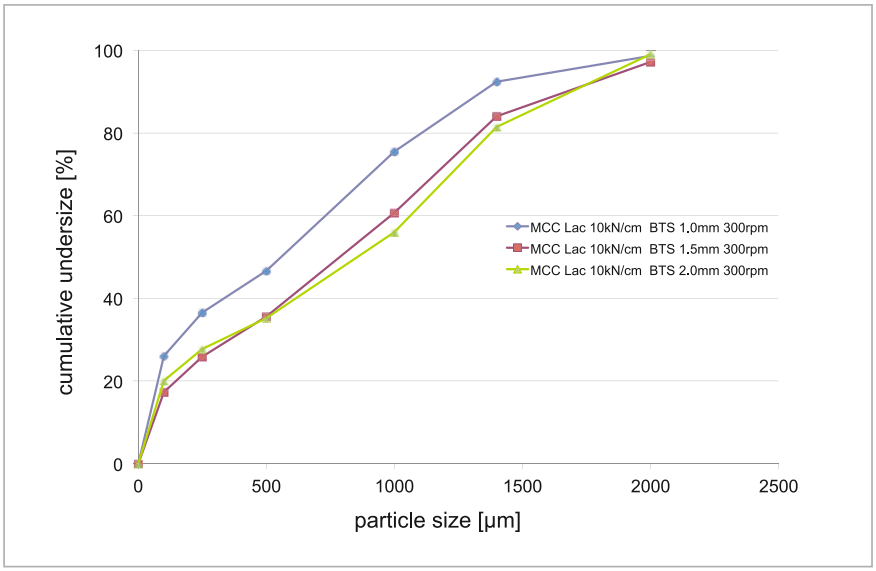


Figure 4: Impact of screen size on granule particle size distribution

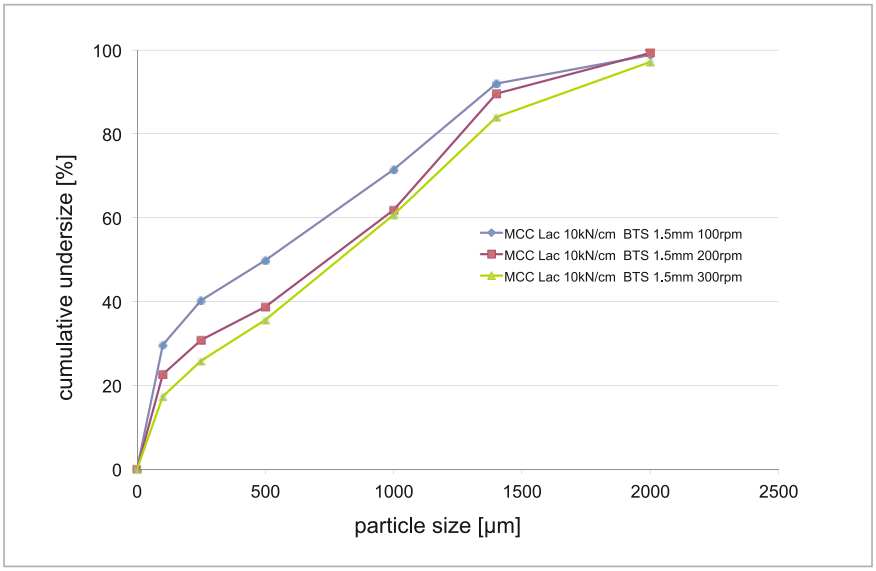


Figure 5: Interrelation between sieve speed and granule particle size distribution

the final granule particle size distribution. A further possibility to vary the sieve setup is the alteration of the sieve rotor speed. In contrast to classical rotating sieve systems conical sieves offer a high material throughput already at low sieve speed values. To evaluate the sieve speed impact on final granule size, compaction was performed at 10 kN/cm specific compaction force, 2 rpm roller speed and increasing sieve speed values for one screen size (1.5 mm rasp sieve). With higher sieve speed the amount of fines decreased (Figure 5).

This can be explained by the fact that, with higher rotor speed, the ribbons need less time to pass the screen. Less friction occurs during granulation and leads to lower amount of fines. Therefore, altering the sieve speed is another possibility to adjust the desired particle size distribution of the final granules. .

Conclusion

The case study proves the functionality of the new BRC 100 roller compactor. It was possible to precisely produce a representative placebo granule formulation with negligible material waste during the process start-up. Furthermore, it shows that a suitable sieve setup offers the possibility to achieve a desired granule size by altering screen size and sieve speed.

[1] Miller RW. Advances in pharmaceutical roller compactor feed system designs. Pharmaceutical Technology 1994, 18, 154-162.
[2] Kleinebudde P. Roll compaction/dry granulation: pharmaceutical applications, European Journal of Pharmaceutics and Biopharmaceutics 2004, 58, 317-326.
[3] Teng Y, Qiu Z., Wen H., Systematical approach of formulation and process development using roller compaction, European Journal of Pharmaceutics and Biopharmaceutics 2009, 73, 219-229.
[4] Serno P., Kleinebudde P, Knop K. Granulieren, apv- basics, Editio Cantor Verlag 2007.

"Sorcerer's apprentice" Daniel Dück attracts an international audience

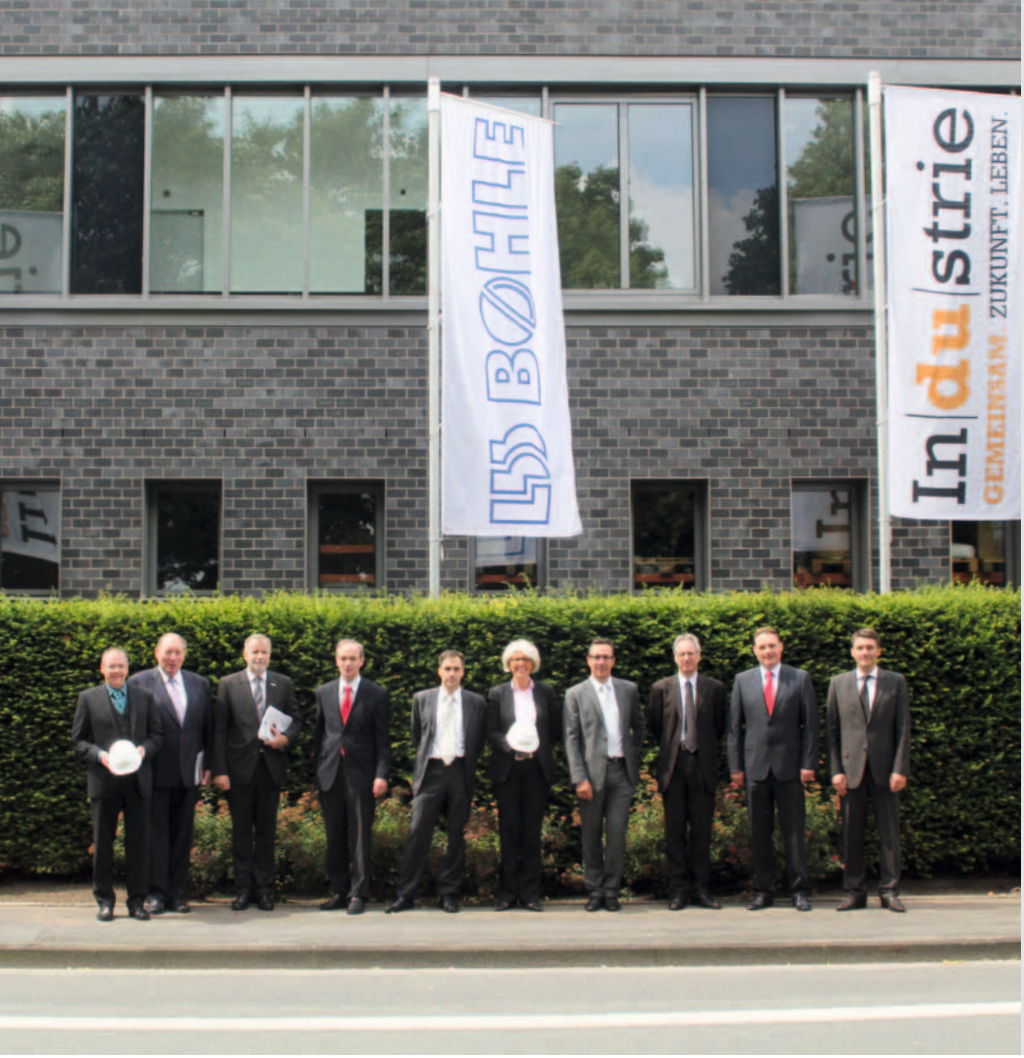
"My name is Daniel…" These words were heard many times throughout the day, as Daniel Dück welcomed the international trade professionals, at the start of his little show for the world premiere of the dry granulator BRC 100 at the ACHEMA. The industrial mechanic trainee attracted a lot of attention at the leading Frankfurt-based trade fair as he presented Bohle's state-of-the-art technology as part of a clever magic show: Between the rather sober machines of the competitors, the "Sorcerer's apprentice" caused a table to hover thanks to the power of the granulate, and transformed the latest product reports into a blank brochure. As the highlight of the show, he conjured up a miniature of the BRC 100.

"The boy is not only an expert of his trade, he's also very creative and has conceived the entire show himself", said CEO Lorenz Bohle in praise of his trainee, who is in the second apprenticeship year. Moreover, his performance in English was very professional. "Our guests were enthralled".

The mix of innovation and proven quality, L. B. Bohle Maschinen + Verfahren GmbH Germany's recipe for success, also reflected the leitmotif of the ACHEMA trade fair.

In addition to the premiere of the BRC 100, L. B. Bohle presented two bestsellers at ACHEMA 2012: the fluid bed system BFS 240 and the BTC 100 coater. "We have added a few new details to our bestsellers," explained Bohle. Permanent optimisation guarantees that L.B. Bohle will remain the technological leader in the pharmaceutical industry even in future, because "our coaters ensure the fastest cycle times, with the highest quality," said Bohle.

And Daniel Dück really enjoyed performing on the international stage: "It's totally cool to have been given such a chance". When he was only six years old, his mother gave him his first magic kit. And hard practice has paid off. He has not yet made up his mind whether he will later work in Bohle production or follow the call of the stage after his apprenticeship. But one thing is certain for the 17-year old: "I will definitely complete my training".



Facts:

In addition to L.B. Bohle Maschinen + Verfahren GmbH the following companies are taking part in the campaign:

- B-Logistik GmbH
- Condor Werke Gbr. Frede GmbH
- Geba Kunststoffcompounds GmbH
- Heidelberg Cement AG
- Hans-J. Kemper GmbH
- Rottendorf Pharma GmbH
- Schrader Verfahrenstechnik Süd GmbH

Together for the region – L.B. Bohle takes part in the image campaign for the industry

Together with seven further companies from Ennigerloh, L.B. Bohle has committed itself to the IHK campaign "Industry – Together. Future. Life". The aim is to enhance the image of industry in the public eye and to create transparency. Since mid-July, the Ennigerloh-based industrial association has also taken part in the campaign. At the campaign launch on 26 July 2012, CEO Lorenz Bohle welcomed in particular the mayor of Ennigerloh, Berthold Lülf, as well as Petra Michalczak-Hülsmann of gfw and Wieland Pieper (IHK) plus several company representatives at the service centre premises. In addition to the official presentation of the flag, additional campaign plans were on the agenda. The entrepreneurs agreed that a friendlier perception of industry must be promoted and that above all the public should be informed in detail about the individual companies. Their role as trainers, employers, sports and cultural sponsors and, most importantly, as tax payers should be the focus of these efforts. In order to underscore the local character of the campaign, the industrial association expanded the IHK slogan to: "Our pledge to Ennigerloh – the industrial association". In this way, the commitment for the "Drubbelstadt" is emphasised.

The local newspaper "Die Glocke" has signalled its support of the commitment of the Ennigerloh-based companies with a special report presenting the individual businesses.

Overall, these companies employ approximately 2,000 regular employees and over 100 trainees. On a 400,000 square metre production area, the industrial association generated sales amounting to around 300 million Euros. Together the companies contribute a share of 28 % to the trade tax in Ennigerloh.

How time flies…

Almost 20 years, or in other words 63 VMA (Bohle Vagumator), 42 GMA systems (Bohle Granumator), and 105 single pot granulators, lie between these two photos.
Michael Andre found the photo from 1991 of the first large VMA 300 in his archive. Reason enough to retake the team photo in front of the VMA 600, demonstrating company solidarity and a shared corporate history.

From left to right:
Klaus de Bock. Peter Pelz, Norbert Ohlmeier and Michael Andre. (kneeling)

Centre of Excellence completed: Handling pooled in Sassenberg

L.B. Bohle Maschinen + Verfahren GmbH has expanded its Sassenberg location. On the 3,000 square metre premises at Daimlerring a state-of-the-art production hall has been established in addition to new office buildings. The centre of excellence for the complete handling range produces mixers, lifting columns and containers, all in the renowned quality. Thanks to the investment in the Sassenberg location, L.B. Bohle production capacities and sales have increased. A development centre for engineers and technicians supplements the upgrade. In modern offices in an area covering 300 square metres, new machines are being developed and the existing ones optimised. To this end, the dry granulator Bohle BRC 100, presented to the public in June, received its final touches in Sassenberg. The expansion of the Sassenberg location is an important part of the growth strategy and creates numerous additional workplaces for the Warendorf district.

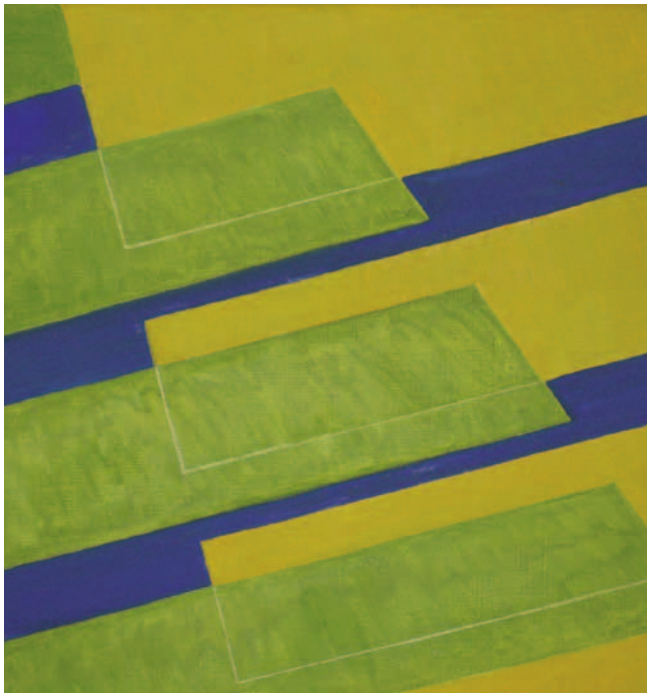
Fresh image – personal touch

A short video says more than a thousand words: For many years, L.B. Bohle Maschinen + Verfahren GmbH has presented its products and services in an image video. In June 2012, VTP-Medienproduktion completed the production of the new video in time for the ACHEMA in Frankfurt. In addition to the video shoot at the headquarters in Ennigerloh and at plant II in Sassenberg, the team also filmed at customer premises in Berlin and Brehna in Saxony-Anhalt.

The fresh, redesigned image combines customer orientation, quality expectations and performance promises of L.B. Bohle Maschinen + Verfahren GmbH under the motto: "Always better than the market".
At the Frankfurt trade fair as well as during additional presentations, visitors and customers especially praised the video's personal touch.
http://www.lbbohle.de/en/company/imagevideo

Science meets art – gallery in the Service Centre

Artist Christine Mölleck launched the series of this year's art exhibitions at the Bohle Service Centre in Ennigerloh entitled "Fields and Stripes". For years now, artists from the region have been presenting their artworks to the public there. Margret Rinke followed from March to May 2012 with her etchings and abstract landscapes. During the summer months, the Service Centre was adorned with pictures and artworks by students from the Anne-Frank School in Ennigerloh. Children and teens from different classes exhibited their works under the title "KunstSommer 2012" (ArtSummer 2012). Starting in September, Doris Galla from Sendenhorst will present her works. At the end of the year, there will be a commemorative exhibition for Heinrich-Gerhard Bücker, who died in 2008.



Lorenz Bohle bids farewell to Angelika Hirte who heads into retirement

For customers, suppliers and colleagues, she's the charming voice of L.B. Bohle GmbH. After 17 years of employment at the company, the telephone receptionist Angelika Hirte is now leaving to enjoy her well-deserved retirement. Company owner Lorenz Bohle expressed his thanks for her strong commitment and diligence with a large bouquet of flowers. We wish Ms Hirte all the best for the future and her successor, Christiane Fischer, good luck for her start at L.B. Bohle.

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