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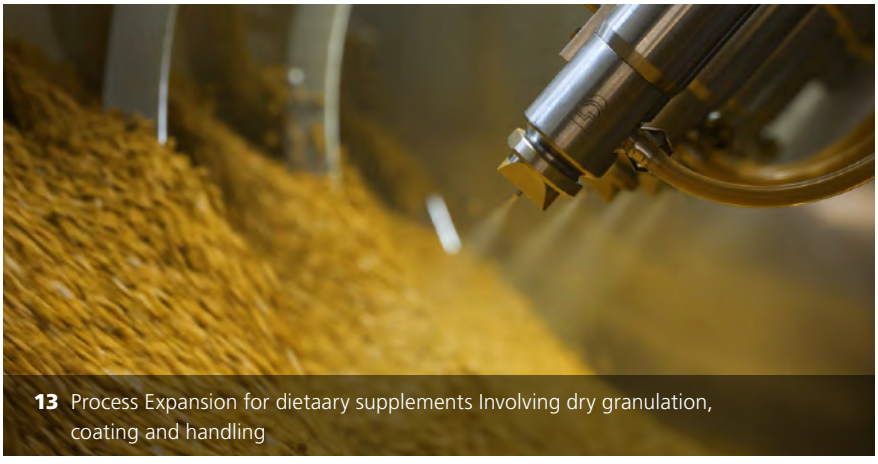

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Food Analysis and Process Engineering

The Invisible Excellence: How Analytics and Process Engineering Secure the Future of Our Food

When we hold a food product in our hands today, the end product is the result of an unprecedented symbiosis of scientific precision and cutting-edge technology. In a world characterized by global supply chains, dynamic regulatory frameworks, and a growing global population, food analysis and food process engineering face a dual role: They are both guarantors of safety and quality and the central driving forces for innovation and sustainability.

Demands on the food industry have shifted dramatically in recent years. Modern consumers no longer demand only perfect taste and freshness. They expect absolute transparency regarding origin, complete traceability, functional added value, and environmentally friendly and ethical production. These demands meet a global agricultural and food industry that must operate under the pressure of climate change, volatile commodity markets, and increasingly stringent legal limits.

In this complex environment, food analysis provides a reliable foundation. It has long since moved beyond the status of mere end-product control. Thanks to state-of-the-art methods such as high-resolution mass spectrometry (HRMS), NMR spectroscopy, and rapid molecular biological tests, it is increasingly transforming into a predictive tool. Valentin Pflüger, CEO of Mabritec AG in Basel, reports on a genome-based MALDI-TOF method for the unambiguous identification of hazards posed by the Bacillus cereus group.

Why hygienic plant design is crucial for food safety is explained by food technology expert Zhanar Sadyk from Cologne.

Food processing technology is undergoing a continuous transformation towards greater sustainability; this is also demonstrated by the contribution of the company L. B. Bohle. Sales success in the capital goods sector rarely happens overnight. Especially in regulated or quality-critical industries, customer relationships often develop over many years before a concrete project emerges.

L. B. Bohle (Ennigerloh, Germany) uses a current example from the USA to show how long-term sales efforts, technical consulting, and process-related support can develop into a comprehensive plant order. This also illustrates the importance of never losing patience. It requires courage, determination, and persistence.

Our industry thrives on interdisciplinary exchange – between laboratory and pilot plant, between research and industry. May this newsletter provide you with valuable insights, innovative solutions, and fresh perspectives for your daily work.

I wish you a rewarding and inspiring read!

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Taking Hygienic Design further:

Why hygienic plant design determines food safety

More than 5,400 food alerts were recorded by the European rapid alert system RASFF in 2025 alone – a new record high [1]. At the same time, cleaning accounts for 15 to 20 per cent of daily operating time in food production [2]. Dr Gerhard Schleining, Chair, and Dr Felix Schottroff, Co-Chair of the EHEDG* Regional Section Austria, explain in an interview why Hygienic Design today is far more than a technical detail, which misjudgements can have particularly serious consequences in practice – and why Vienna will become the industry's international meeting point in October 2026.

*Note:*European Hygienic Engineering & Design Group*

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Hygienic Design as a management strategy

Food safety is a matter for top management – not merely a declaration of intent, but as a legal and operational reality. In practice, however, there is often a considerable gap between the theoretical requirement on paper and the structurally and hygienically "correct" operation of the equipment. Dr Gerhard Schleining, Chair of the EHEDG* Regional Section Austria and authorised EHEDG trainer, sums up the connections: "Food safety is the responsibility of management and concerns hygiene – which depends substantially on cleanability. A key objective of Hygienic Design is to improve cleanability. This saves costs: on the one hand through shorter cleaning times, on the other because cleaning agents and disinfectants can also be saved."

Dr Felix Schottroff, authorised EHEDG trainer and assistant professor of food process engineering at BOKU University in Vienna, adds a further structural aspect: "The food industry is in many cases characterised by high turnover of often less well-trained personnel. Hygienic buildings and equipment are more expensive in most cases – but the easier cleanability pays off, and food safety is ensured even with personnel who are not perfectly trained."

Dry products: an underestimated risk category

One area to which a false sense of harmlessness is frequently attributed in practice is the processing of dry products such as powders, flours or granulates. The argument sounds plausible at first: where there is no water, no microorganisms grow. Dr Schleining, however, firmly contradicts this logic: "As a rule, no growth of microorganisms takes place in dry products – nevertheless, the raw materials are contaminated with microorganisms and, in some cases, with toxins as well. Dry products also tend to form lumps and to adhere to surfaces. This sometimes calls for occasional wet cleaning."

"Materials such as aluminium or couplings without seals are frequently used, which are acceptable for dry cleaning – but can lead to considerable problems where wet cleaning is carried out, even only occasionally," Dr Schleining explains. Design weaknesses of this kind often only become apparent during ongoing operation – at the point when they are most difficult to rectify.

Where knowledge is lacking: practical misconceptions with consequences

Misjudgements arise not only during plant planning – Dr Schleining and Dr Schottroff also encounter the same misunderstandings again and again in day-to-day operation. One of the most persistent con-

EHEDG World Congress 2026 in Vienna

EHEDG World Congress 2026 – 7 and 8 October, Vienna	
Date	7–8 October 2026
Venue	Austria Center Vienna, Vienna, Austria
Motto	"Ensuring Food Safety and Optimising Hygienic Production"
Participants	approx. 350
Speakers	45
Exhibitors	58
Sponsors & partners	28
Sectors	Food production, plant engineering, consultancy, science
Further information	www.ehedg.org/congress-2026

cerns is the scope of EHEDG certification. Dr Schleining makes it clear: "The certification of equipment by EHEDG essentially covers cleanability only – it says nothing about functionality for the process." Hygienically designed individual components are of little help if they are integrated incorrectly into production lines. Accessibility for cleaning and maintenance must also be ensured – as must the hygienic requirements for the buildings in which the equipment is operated.

The typical design weaknesses that Dr Schleining observes in practice include the incorrect integration of pumps, valves and sensors – so that self-draining is not possible or dead spaces are created – as well as faulty welding and insufficiently qualified maintenance personnel. All of them are weaknesses that can be effectively addressed through targeted training and continuing education.

Research as a driver: demand-driven cleaning and biofilms

At the interface between university research, industrial practice and the users – that is, the food industry – the next fields of development for plant and machinery construction are already emerging. Dr Schottroff names two topics with particularly direct practical relevance: "At present we are observing great interest in demand-driven cleaning in order to reduce the resource and energy requirements of these operations. In this context, professional Hygienic Design of the equipment used is essential – otherwise it is difficult to achieve corresponding savings."

Particular attention is being paid to the subject of biofilms. "Another topic is biofilms and their efficient removal – especially from product-contact surfaces. At the level of basic research, too, there are still various gaps in knowledge here, for example with regard to the adhesion and detachment behaviour of multi-species biofilms of complex composition," explains Dr Schottroff.

Set against this is a structural hurdle that Dr Schottroff addresses openly: "Unfortunately, in the food industry it is often only the budget that counts. When new equipment is purchased, the follow-up costs that a machine not designed to meet hygienic standards can entail are frequently not taken into account – in the worst case, the result is increased labour and energy input for cleaning. We try to counteract this phenomenon by regularly offering training courses and workshops on the subject."

At BOKU University in Vienna, Dr Schottroff not only conducts research in the field of Hygienic Design but also trains the next generation of food technologists there in both theory and practice. It is precisely the close integration of theoretical courses, laboratory work and practical exercises in the pilot plant that enables the successful transfer of scientific findings into industrial practice. At the same time, it creates early awareness of the importance of Hygienic Design among future specialists and managers. Complemented by Dr Schleining's many years of training work within EHEDG, this creates a model that systematically brings theory and practice together and turns Hygienic Design from abstract laws and standards into lived operational reality.

EHEDG World Congress 2026 in Vienna

EHEDG combines work on guidelines with a quality of networking that is unrivalled in the industry. Dr Schleining describes it

Practical misconceptions in Hygienic Design and their operational consequences

Common practical misconceptions	Hygienic reality	Possible operational consequences
"Dry means hygienically uncritical"	Dust and product residues can transfer microorganisms or allergens	Contamination risks, product recalls
"Smooth surfaces are sufficient"	Geometry, transitions and dead spaces are decisive	Cleaning problems, product residues
"Cleaning compensates for design defects"	Design weaknesses often cannot be cleaned completely	Higher cleaning effort, downtime
"Hygienic Design concerns operators only"	Design and dimensioning determine subsequent cleanability	Complaints, reputational and liability risks

as follows: "EHEDG is a platform where it really does work for competitors, too, to sit down together at one table, exchange best practices and make the guidelines developed generally available." For machine builders, this means direct access to established practical solutions – and an early warning system for forthcoming regulatory and technical requirements.

The highlight is the congress on 7 and 8 October 2026 in Vienna. Dr Schleining names the thematic priorities: "The EHEDG World Congress 2026 will focus on increasing productivity, sustainability and the subject of biofilms, as well as a round table on the role of auditing in verifying the effectiveness of Hygienic Design as a preventive programme."

Hygienic Design is not a static set of rules – it is a discipline that continues to develop in ongoing dialogue between industry, research and education. The congress in Vienna in 2026 brings precisely these players together. For everyone who wants to play an active part in shaping this dialogue, the EHEDG World Congress is the right place to be.

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Dr. Gerhard Schleining, Chair of the EHEDG Regional Section Austria, authorised EHEDG trainer and member of the EHEDG Training and Education working group. Focus: education and knowledge transfer in the fields of food quality, food safety management and Hygienic Design.

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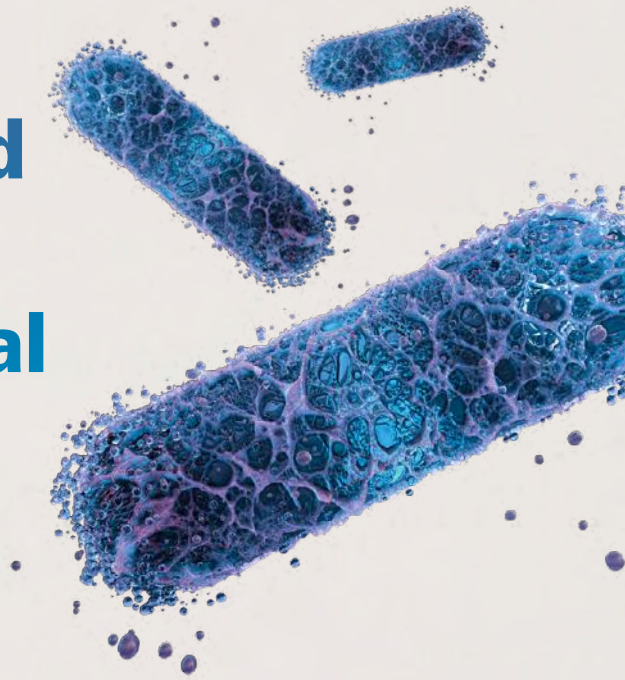

Genome-guided MALDI-TOF offers clear identification of Bacillus cereus group dangers

Author: **Valentin Pflüger**, CEO Mabritec AG, valentin.pflueger@mabritec.com

Earlier this year, a number of companies were forced to recall potentially dangerous baby formula. The presence of a toxin called cereulide was suspected and later proven to be present in the formula. The recall cost those companies a lot of money and severely damaged their reputation for quality. But how did that happen? Apparently, the EU-mandated Hazard Analysis and Critical Control Point (HACCP) food safety management program does not properly consider the risk of cereluide contamination in fatty or oily food ingredients.

The Bacillus cereus bacteria group

Cereulide is a member of the Bacillus cereus bacteria group. This group has major societal relevance because it unites within one highly related bacterial complex: 1. frequent food-poisoning agents, 2. an important biothreat organism and 3. globally used biocontrol strains.

A massive recall of tainted baby formula took place in January 2026. The formula had been tested according to current food safety regulations and found to be in compliance with them. Nonetheless, the testing failed to reveal a toxin which was a member of the Bacillus cereus bacteria group. That's because standard testing was simply not precise enough. The good news is that a new, much more precise method had already been developed by a company in Switzerland.

Food-relevant risks of key species of the Bacillus cereus bacteria group

Species	Typical ecology & traits	Main food-related risks
B. cereus s.s.	Ubiquitous in soil, raw materials, processing environments; mesophilic; many strains carry the mild enterotoxins (Nhe, Hbl, CytK).	Classical diarrheal food poisoning; spores survive cooking, germinate during cooling/nonconform storage; cereulide in starchy foods can cause vomiting and, rarely, severe complications.
B. thuringiensis	Insect-pathogenic; used widely as a biopesticide; very close to B. cereus genomically; two subclades; strains of clade 1 harbor the same enterotoxin genes (Nhe, Hbl, CytK2) and mid-level cytotoxicity as B. cereus s.s.	Biopesticide spores can contaminate vegetables and salads; some strains from food show cytotoxicity comparable to outbreak B. cereus, so residues may occasionally cause B. cereus-like illness.
B. cytotoxicus	Thermotolerant species, able to grow up to about 50–52 °C; produces highly cytotoxic enterotoxin CytK-1; associated with vegetable dishes and dehydrated plant products.	Linked to severe and sometimes fatal diarrheal outbreaks; heat-tolerant spores and growth at elevated temperatures challenge standard heat treatments for ready meals and soups.
B. paranthracis	Recently described species closely related to B. cereus and B. anthracis; the species harbors all currently characterized chromosomally related, cereulide-producing (ces-positive) emetic strains.	Cereulide-producing strains can trigger abrupt, profuse vomiting within hours of ingesting highly contaminated, temperature-abused foods. In cases with very high toxin loads, cereulide's mitochondrial toxicity has been linked to acute liver failure, kidney injury and rare fatal outcomes in otherwise healthy individuals.
B. anthracis	Zoonotic pathogen causing anthrax; typically associated with infected animals and their products; spores extremely resilient in the environment.	Foodborne anthrax is rare and usually linked to heavily contaminated meat or traditional products; risk in modern food chains is considered very low but requires clear distinction from other group members when suspected.

On the public-health side, B. cereus sensu stricto and close relatives are among the most common causes of bacterial foodborne disease, while B. anthracis causes anthrax and remains central to biosecurity concerns. Meanwhile, B. thuringiensis strains are extensively deployed as "biological" insecticides in agriculture, directly supporting food production. In addition, Bacillus cereus group species form very resistant spores, which makes them omnipresent and therefore detectable in the majority of all food products.

Traditional testing

Most routine food laboratories see the Bacillus cereus group every day, but current standard methods of testing usually stop at a blurred, group-level identification, even though the underlying species range from typical food-poisoning strains to biopesticide residues and rare high-risk lineages. Quantitative criteria (colony forming units: CFU) for the Bacillus cereus group in ready-to-eat (RTE) foods typically classify < 10^3 CFU/g as acceptable, ≈ 10^3 – 10^4 CFU/g as borderline and ≥ 10^4 – 10^5 CFU/g as unsatisfactory or potentially hazardous, based on assumed cell densities required for toxinogenesis [1].

Unfortunately, these limits are scientifically unsatisfactory because they neither discriminate emetic (ces-positive) from non-emetic strains nor account for strain-specific enterotoxin profiles and matrix-/temperature-dependent toxin production kinetics. That means that the actual hazard is only weakly predicted by total CFU alone.

Improvements have been available, but …

Whole-genome sequencing is essentially the only method that can, in one step, unambiguously place Bacillus cereus group isolates into genomospecies resolved clonal relationships and comprehensively inventory virulence and resistance genes: No combination of phenotypic tests or single/low-plex PCRs can fully achieve that. However, that approach is still not widely used in routine food and clinical laboratories for the simple reason that it requires substantial capital investment, bioinformatics infrastructure and expertise, standardized pipelines and added turnaround time and cost.

Meanwhile, standard Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry (MALDI-TOF MS) – widely used in routine microbiology – speeds up the identification process but uses pattern-based matching against clinical-centric libraries that only partially cover the Bacillus cereus group.

The background to discovery

Mabritec AG is a company located in the Basel area of Switzerland, specializing in the identification of microorganisms and the characterization of biological systems using MALDI-TOF mass spectrometry. It currently offers the largest MALDI-TOF database for bacteria in the world – MabritecCentral [2] – and it was during the building of this database a few years ago that something else began to develop.

Using a new MALDI-8020 (among others), Mabritec discovered that separating the Bacillus cereus group based on ribosomal protein masses using MALDI-TOF MS in-silico is possible. Genome-guided MALDI-TOF MS had not previously been thought possible using commercially available applications for bacterial identification. Now, however, it was.

Diving deep into the concept of genome-guided MALDI-TOF MS

Here is a look into the technical aspects of developing this new method for clearly identifying and quantifying Bacillus cereus group presence in samples.

The MabritecCentral database contains in silico predicted masses of mainly ribosomal proteins from > 440,000 public WGS datasets, curated taxonom-

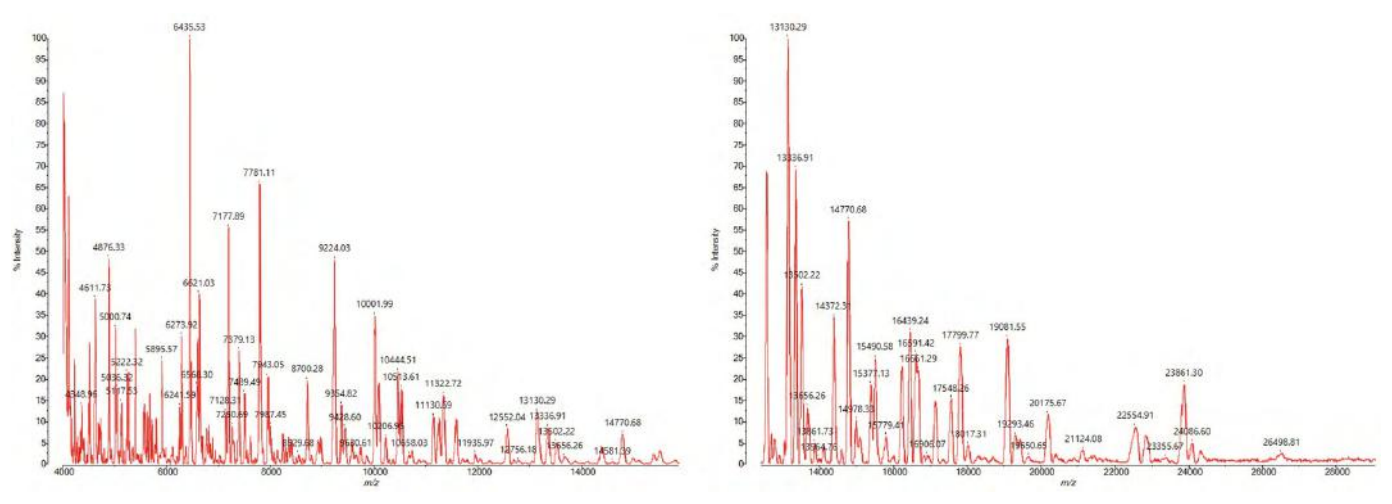

Figure 1: Spectrum of B. paranthracis MB8, mass range 4–30 kDa, acquired on a MALDI-8030 EasyCare: Sample was prepared by bead beating with sinapic acid as matrix.

ically and validated against experimental MALDI-TOF spectra. Mabritec identified 3,024 Bacillus cereus group genomes covering all 28 currently known species. The toxin genes (Nhe, Hbl, CytK, EntFM, ces and the virulence plasmids pXO1 and pXO2) were extracted for all strains. As described in the literature, a strong correlation between phylogenetic species and toxin content could thereby be confirmed. This is especially pronounced for the emetic toxin cereulide, exclusively found in B. paranthracis strains. Interestingly, even isolates from cluster 2 of B. thuringiensis are carriers of the mild toxins. Also, the anthrax-causing virulence plasmids are exclusively found in a subcluster of B. anthracis. CytK1, the highly cytotoxic variant of cytotoxin K, is only found in B. cytotoxicus.

In silico analysis of 32 ribosomal subunit proteins in the 4–30 kDa mass range showed that all species formed distinct clusters that are potentially distinguishable by MALDI-TOF MS. From the in silico prediction, important discriminatory ribosomal proteins were identified in the 15–25 kDa mass range, which are barely detectable using standard smear preparation and CHCA matrix. By using sinapic acid as the matrix together with an adapted acquisition method (adjusted laser power, detector voltage and peak picking), ribosomal proteins in the 4–28 kDa mass range can be detected (Figure 1).

A further challenge in developing the method was controlling spore formation in order to maintain high spectral quality. Spore formation is known to adversely affect spectral quality because small acid-soluble proteins (SASP) from the spore core can dominate the spectrum and suppress ribosomal marker peaks, particularly in the higher mass range. These limitations could be addressed by two measures. First, a short incubation period of 4–6 hours was applied to generate vegetative cells while keeping spore formation to a minimum. Second, a sample preparation protocol without acid extraction was established, incorporating physical disruption of cells with 0.1 mm glass beads to minimize spore detection. These adjustments allow to high-quality spectra of Bacillus cereus group strains.

This new Bacillus cereus group module was validated with 124 genome sequenced reference strains covering all currently known species. All analyses were performed on an AXIMA Confidence and an 8030 EasyCare MALDI TOF MS. We reached a sensitivity of 98.4% and a specificity of 99.9%. In addition, we could show (in the framework of a small study with 16 clinical isolates) the correct identification of all strains. In addition to the species identification, for 5 strains identified as B. anthracis, we predicted the isolates fall into a B. anthracis ribosomal sublineage profile not harboring the virulence plasmids pXO1 and pXO2. This prediction was confirmed by whole genome sequencing [3].

On top of the species level identification of all Bacillus cereus group species, we wanted to investigate a potential direct detection of Bacillus cereus group toxins by MALDI-TOF MS. We could establish a direct detection of the emetic toxin cereulide directly from cultures or food

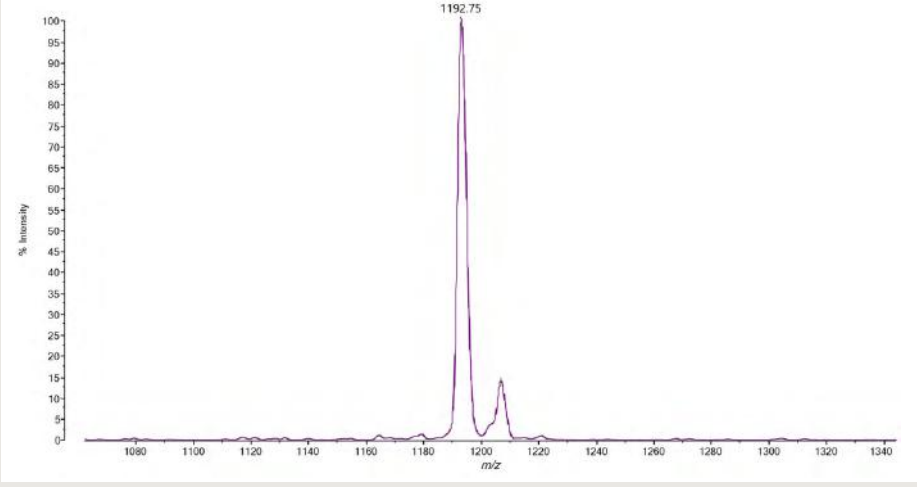

Figure 2: Detection of cereulide m/z 1,191 (potassium adduct) directly from cultured strain MB8. The spectra were acquired without matrix in LDI in the mass range 700–5,000 Da on a MALDI-8020 EasyCare.

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products by MALDI-TOF MS [4]. We found that B. paranthracis strains producing the emetic toxin can be analyzed by directly smearing a small amount of culture material onto a MALDI target and running it in LDI mode without matrix addition, within the mass range of 700–1,500 Da. The cereulide is detected at m/z 1191[M + K]+ (Figure 2). This rapid and straightforward assay represents an efficient and reliable approach to confirm cereulide secretion in suspected toxin-producing Bacillus cereus group strains.

We further investigated the feasibility of detecting cereulide directly in food samples. For the cereulide test, 1 g of homogenized food (e.g. rice, milk-rice, ravioli, mashed potatoes, etc.) is mixed with 1 mL of 75% (v/v) ethanol in a 2 mL tube, vortexed 1 minute, then centrifuged at 6,000 × g for 10 min. After centrifugation, 1 µL of the clear supernatant is spotted in duplicate onto the stainless-steel target, air-dried at room temperature and overlayed with 1 µL CHCA matrix. Cereulide is highly hydrophobic and strongly associates with food components, so extraction efficiency is dependent on the type of food analyzed. Recovery from starchy foods (e.g. rice) is usually higher than from fatty, protein-rich or complex composite dishes where cereulide partitions into lipid phases or binds to proteins. The limits of detection can vary in a range from 30 ng/mL to 30pg. For every sample tested, we run a dilution series of cereulide spikes for LOD definition. In practice, for risk assessment one may assume that any cereulide level capable of causing typical emetic food poisoning (reported in the low-µg/g range in outbreaks) will be clearly detectable by this LDI workflow in responsive matrices.

When science benefits consumers, laboratories and companies

Combining genome-based references for identifying toxin producers with rapid and cost-effective MALDI-TOF MS analysis – in contrast to expensive genome sequencing – has now resulted in a new and advantageous ability to routinely differentiate all Bacillus cereus group species and their potential virulence in food. For the first time, all species can be identified under routine conditions using MALDI-TOF MS and assigned a toxin profile using a genome-based database. Depending on the findings and the matrix/product, critical food products can thus be proactively removed from circulation.

This new method can be used in the food, pharmaceutical and cosmetics industries along the entire production chain, from raw materials through production/processing to the final product. It allows quality managers to better interpret the frequently detected Bacillus cereus group, improve food safety and better protect consumers. The method is already routinely used in the Mabritec laboratory where more than 1,600 Bacillus cereus group isolates originating from food and industrial samples have been identified.

Good tools help good people make things better

Genome-guided MALDI-TOF MS enables reliable species-level resolution within the Bacillus cereus group and links isolates to characteristic toxin and virulence profiles that remain invisible to conventional CFU-based and routine identification approaches. The work of the scientists at Mabritec demonstrates that rapid MALDI/LDI-based detection of cereulide from cultures and suitable food matrices is technically feasible, sufficiently sensitive and compatible with routine workflows, thereby strengthening risk assessment and surveillance for emetic Bacillus cereus group strains. Using Shimadzu equipment, a clever Swiss company came up with a new way to better protect the health of consumers, which also saves companies from costly and embarrassing product recalls.

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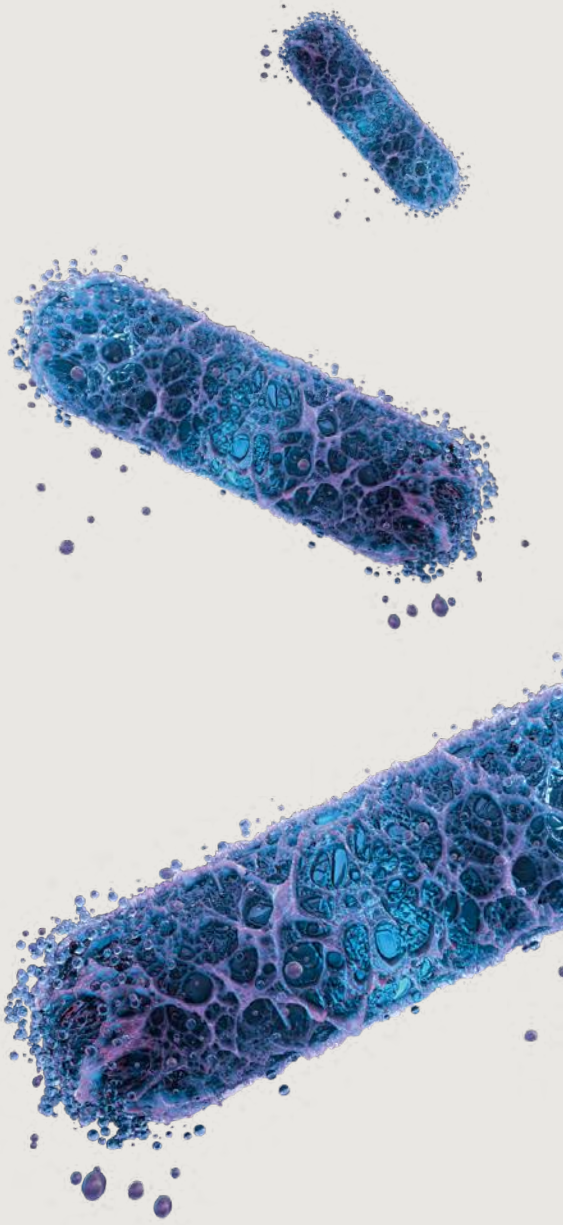

Major project in the US

Process Expansion for Dietary Supplements Involving Dry Granulation, Coating and Handling

In the capital goods sector, sales successes rarely happen overnight. This is particularly true in regulated or quality-critical industries, where customer relationships often develop over many years before resulting in a concrete project. L.B. Bohle (Ennigerloh, Germany) uses the following example from the US to illustrate how long-term sales efforts, technical consultancy and process-related support can result in a comprehensive plant order.

As part of a site expansion, a North American manufacturer of dietary supplements modernised a production area to manufacture a wide variety of products in significantly larger batches. The goal was to increase production capacity significantly without compromising product quality, process reliability or reproducibility. At the same time, the company was looking for a supplier of equipment that could provide integrated solutions covering multiple process steps, as well as individual units.

The homogeneity of the blending is a key quality factor in the production of nutraceuticals. The aim is an even distribution of all components – reliable, reproducible, and GMP-compliant.

From Initial Contact to a Major Order

The first contact between the manufacturer and L.B. Bohle occurred several years ago. It began with the manufacturer expressing general interest in a BRC 100 dry granulator. Unlike wet granulation, dry granulation does not require the use of liquids. In this process, mechanical pressure is used to directly form or compress granules from powdered raw materials. Since no liquids are added, the energy- and cost-intensive drying process is eliminated. This makes dry granulation a particularly effective and economical solution, especially for moisture- or heat-sensitive raw materials.

However, as is often the case with projects in the capital goods sector, this did not immediately result in an order. It was not until years later, as part of a plant expansion, that there was a concrete need for new equipment.

'Years after the initial contact, the customer needed new equipment as part of a plant expansion,' reports Tim Remmert, L.B. Bohle's Managing Director.

The new enquiry focused particularly on large-scale production mixing and dry granulation.

Compared to conventional wet granulation processes, dry granulation requires no energy-intensive drying processes; this saves high investments in equipment and production rooms and leads to lower costs per batch.

The customer began developing a comprehensive process solution that included granulation, mixing, coating, cleaning and container systems. Initially, L.B. Bohle was selected primarily as the supplier of blending systems and containers.

However, following further discussions, the scope of the project expanded significantly. During a presentation of the entire Bohle portfolio to the customer's management team, the company's expertise in dry granulation and tablet coating was highlighted. Consequently, L.B. Bohle was selected as the preferred supplier of all process equipment.

Comprehensive plant package for multiple process steps

The contract ultimately awarded included a wide range of process and handling machines. These included:

- two BRC 100 dry granulators
- two BTC 400 tablet coaters
- two PM 2400 container blenders
- eleven HS 2000 lifting columns
- two PUR cleaning systems
- 60 containers with a volume of 2,000 litres

The project thus covered key steps in solid-state processing—from granulation, through mixing and coating, to cleaning and material handling.

"We view this major contract as a significant success because the customer is not from the pharmaceutical industry," says Remmert. The contract demonstrates that pharmaceutical-grade process and quality standards are increasingly in demand in related industries, such as the production of dietary supplements, and that the number of projects is growing rapidly.

Capacity Expansion While Maintaining High Quality Standards

The manufacturer's requirements went beyond a simple capacity expansion. They were looking for a solution that would allow them to process larger batches without compromising established quality standards. This particularly concerned the transfer of existing formulations from legacy systems to new process systems.

Test Series Demonstrate the Machines' Suitability

To verify the suitability of the planned technology prior to installation, L.B. Bohle operates test centres in Germany and the US to conduct trials and optimise processes. In the aforementioned project, the trials also served as pre-validation and aimed to establish whether the desired products could be manufactured on the new systems to a comparable standard with a higher throughput.

The results confirmed that the processes could be transferred to the new systems. It also became clear that the larger machines allow for an increase in both batch size and overall yield. Furthermore, it was demonstrated that existing personnel resources could be utilised efficiently, with a comparable number of employees now able to manage a more productive production environment.

Integration instead of siloed solutions

A key aspect of the project was the decision to carry out as many process steps as possible with a single partner. For large-scale plant expansions, this can simplify technical coordination and reduce the number of interfaces. However, this requires a machine supplier that can cover multiple core processes with compatible systems.

In this case, the scope ranged from dry granulation and container mixing to tablet coating, as well as cleaning and handling systems. For the customer, this meant greater consistency in project execution and reduced coordination efforts compared to working with a large number of individual suppliers.

Special Requirements in the Nutraceutical Sector

Unlike pharmaceutical production, manufacturers of dietary supplements often operate continuously. This increases the demands placed on equipment availability, technical support and service. Accordingly, continuous monitoring and maintenance of the installed systems are required.

Result: Expansion with growth potential

Following its commissioning, it has become clear that the new production area is meeting the capacity expansion targets set. The key success factors were larger batches, higher output and consistent product quality. There were also benefits in terms of machine utilisation and efficient workforce deployment.

From L.B. Bohle's perspective, the project is also noteworthy because it highlights the growing demand for robust, pharmaceutical-oriented process solutions beyond the traditional pharmaceutical industry. Manufacturers of dietary supplements are increasingly investing in technologies that combine high throughput with reproducible results and reliable quality standards.

Further information:
www.lbbohle.com

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