The rapid growth of pulses.

In each issue, Bühler invites a leading industry figure to comment on the key trends and issues in their sector. In this edition, Hüseyin Arslan, President of the Global Pulse Confederation, discusses the rapid growth of the pulse industry and the expanding demand for this nutritious food group.

Demand for pulses has never been greater. Globally, we produce more than 72 million tonnes, composed of many different varieties, and this doesn't look likely to decline, any time soon. Indeed, as the global population grows, the demand for protein will increase, with shortages forecast, so we are constantly searching for new protein sources and pulses provide a credible option.

In previous years, consumption has largely been dominated by the Middle Eastern, Asian and North African populations but recently, interest has spiked in the western world, with consumers in North America and parts of Europe increasingly building pulses into their diets. To satisfy demand in these regions, we are also likely to see the incorporation of pulses into conventional food products such as pasta, bread, soups and snacks. However, in order to ensure these meet consumer expectations on taste, texture and appearance, without sacrificing nutritional value, the industry needs to pursue more advanced, hygienic processing technologies that can maximise value from the crop and create new ways for pulses to be consumed.

Campaigns such as the United Nations’ International Year of the Pulses 2016, which aims to raise the awareness of the benefits pulses provide for health, food security and world climate, are doing a great job in creating opportunities to encourage collaboration throughout the food chain.

Pulse processors will be under greater pressure to provide added-value products and, thankfully, organisations such as Bühler are leading the way. It was the company’s optical sorting technology that revolutionized the pulse business, enabling its evolution into large scale industrial production, and today it is responsible for some of the most progressive developments in the industry. Pulse processing is a diverse and complex business, however, Bühler is able to bridge the gaps in the value chain, by helping processors adopt hygienic, profitable and sustainable methods.

At this rate of progress, we will see the pulse sector soar and be part of the answer to the societal problems emerging from the world’s need to feed its growing population. Higher production levels and more efficient technologies, combined with continued strong demand, will be positives for our industry.
PULSES.
The World Embraces Pulses.

Pulses are gaining ground: in Europe alone, more than 3500 pulse-based products have been launched since 2010 – and this continues to grow. This is good news for the environment, as these dry edible seeds of legume crops, are an extremely sustainable source of protein. To further raise awareness of pulses, which are both climate-friendly and healthy, the UN has proclaimed 2016 the “International Year of Pulses” (IYOP). Beatrice Conde-Petit, food scientist and technologist for Bühler adds: “The growing interest from the food industry in including pulses in new food formulations is opening up a vast range of processing opportunities for this valuable crop. As consumer awareness of this food group increases, the up-take of pulses within food products will grow rapidly, supported by pioneering processing technology. With many food multi-nationals already effectively working towards utilisation of pulses in their products, we look forward to the transformation 2016 and the IYOP will bring to this underused food group.” For Bühler, solutions for the cleaning, sorting, and processing of pulses, are an important market with high growth opportunities.

On a worldwide scale, some 72 million tonnes of different pulse varieties, which include peas, beans, lentils and chickpeas, are produced. Pulses are a staple food in some regions of the world and many people in developing countries owe at least 10 percent of their daily energy intake to pulses. On the Indian subcontinent pulse have always been a cornerstone ingredient of food culture, with India sitting high on the league table – growing and processing more than 17million tonnes a year, nearly a quarter of the global harvest. The Indian government actually recommends a daily consumption of 40 grams of pulses. Yet in western societies pulses are just being rediscovered – on the dinner table as well as in the fields.

Equally in the West pulses are having a huge resurgence due to their health properties. Not only do they rank highly on the satiety index, satisfying hunger for a longer period of time but nutritionally they are rich in fibre and protein, low in fat and contain high levels of minerals such as iron, zinc, and phosphorous as well as folate and other B-vitamins.

Pulses also contribute to sustainable agro-food value chains: just 150 litres of water are needed to grow a pound of pulses, whereas almost 8000 litres are needed to rear a pound of beef. When it comes to providing a growing world population with plant protein, pulses come top of the
Bühler's innovative pulses processing solutions help processors meet the changing demands of the 21st century consumer through value-added pulses products.

This protein-rich ingredient is also highly valued in gluten-free and vegan foods. Flour, made from ground pulses, is increasingly finding its way into a variety of foods such as pasta, bread, and tortillas, as well as in Textured Vegetable Proteins (TVP) for example. Snacks, both sweet and savory, are also benefitting from novel pulse applications, which boost their health appeal to consumers.

Requests for such applications had an initial spike at the beginning of the Millennium, but in the past few years they have become more frequent. In North America, more than 2000 pulse-based products were launched between 2003 and 2013 and more than 3500 in the EU alone since 2010. These food trends are set to expand further in 2016, particularly driven by greater pressure on pulse processors to provide added-value products to meet demand, created by the increasing attractiveness of pulses as healthy foods.

Bühler bridges the gap
For Bühler, the cleaning, sorting, and processing of pulses is an important growth market. Pulse processing within Bühler’s Pulses, Spices & Sesame division has generated a business volume in excess of CHF 200 million – the Indian market has been especially vibrant. “In the past, pulse processing, particularly in North America, was often restricted to cleaning and then exporting”, explains Surojit Basu, Global Product Manager at Bühler. Also, the rice and grain technologies that have been commonly employed for pulse hulling have not met the quality and quantity requirements of modern, large scale EU and US pulse processors. The processing requirements for all the different pulse varieties are very diverse and complex but Bühler is bridging these gaps in the value chain – helping processors around the globe to adopt complete post-harvest stabilization, cleaning, dehulling, sorting, grinding, and further processing to produce extruded snacks, gluten-free pasta or cereal bars, to generate greater value from pulses.

To do this, Bühler’s global pulse experts are designing technology to suit different regional processing needs, including customized processes, plant capacities and equipment compliant with global operational safety standards. One such example is Bühler’s dedicated pulse hulling solution PULSROLL™, which removes the hull from pulses efficiently, hygienically, and cost effectively. The industry’s only certified pulse huller now enables processors in the EU and US to operate in today’s increasingly regulated and highly automated industry. Since its launch in October 2015, Bühler has already had multiple orders, highlighting how it has created the next level of quality benchmark for pulses through process excellence and cutting-edge technology across the value chain.

Bühler will continue to develop new pulse processing technologies to meet the growing demand from processors and consumers alike. Innovation focuses on delivering increased efficiency, productivity, and yields, as well as hygienic processing for maximum food safety. By being at the forefront of the pulses industry, Bühler is doing its bit to support consumer health, food security, and the environment. “From a global perspective, pulses are still under-exploited and the industry involved in the agro-food conversion of pulses plays a decisive role in increasing consumption, as part of a healthy diet worldwide,” says Nick Hay, Head of Pulses, Spices, and Sesame Seeds.

International Year of Pulses – Pulses as an environmentally sustainable source of protein.
The aim of the “International Year of Pulses” is to raise awareness of the benefits pulses provide for health, food security, and the world climate. The Food and Agriculture Organization of the United Nations (FAO) is collaborating with governments and relevant organizations to underline that pulses can form the backbone of sustainable food production. The year also creates a unique opportunity to encourage collaboration throughout the food chain to better utilize pulse-based proteins, encourage further global production of pulses, better utilize crop rotations, and address the challenges in the trade of pulses.
Fruit & Vegetables.


In June 2016, the Bühler Group announced the launch of two significant industry innovations to help frozen fruit and vegetable processors achieve the highest standards yet in food safety and hygiene. SORTEX PolarVision™, the new advanced foreign material (FM) detection technology, will make it easier for processors to meet the most stringent safety specifications demanded of them, and Bühler’s SORTEX F optical sorter, featuring multiple developments for hygienic processing.

SORTEX PolarVision™ technology - actively targets difficult-to-detect FM

The SORTEX PolarVision™ technology platform is a sophisticated FM detection system delivering outstanding results, in a wide array of frozen produce. From single products, such as peas or raspberries, to more complex vegetable mixes, it operates from one simple set-up, with a substantial sorting improvement on the difficult-to-detect defects. It works by combining two dedicated FM detection technologies – the SORTEX PolarCam™ and high definition InGaAs HD, both developed in response to industry demand for cutting-edge technology to tackle difficult-to-detect defects, including snails, dark and light plastics, wood, cardboard, cigarette ends, glass and stones. These combined technologies offer a complete FM solution that reduces the need for adjustment between products as visible cameras are not required. Dedicated FM controls improve the usability of the system, making life easier for the operator.

The launch comes at a key time when safety is high on the industry agenda. Processors face a constant challenge to detect and remove FM and keep pace with a food industry that is continuously innovating to create
often complex, value-added products that must adhere to rigorous safety standards.

Bühler’s existing technologies already offer leading-edge solutions within the processing industry, such as its unrivalled PROfile shape system for the removal of extraneous vegetable matter (EVM) and its in-house, custom built, visible cameras for detecting gross and subtle colour defects, to enhance product quality and uniformity. SORTEX PolarVision™ now takes optical sorting to the next level.

All-New SORTEX F - dedicated optical sorter based on hygienic design principles

To maximise the full potential of the SORTEX PolarVision™, Bühler has developed a dedicated sorting platform – the SORTEX F optical sorter.

Developed by in-house specialists, using current best practice and hygienic product design guidelines, it features a stainless steel frame, sloped surfaces, hygienic conduits, stainless steel air set and hydraulic grade fixings, to deliver an unrivalled solution with no tolerance for product build-up, thereby lowering the risk of contamination.

The machine also sets a new standard in ejection technology, with its Ejector+ feature, which uses 25% more force to eliminate denser contaminants. Together with SmartEject™ technology, the technology removes unwanted and hazardous materials, from fine wood shavings to heavier pieces of glass and stones.

SORTEX PolarVision™ is available on the SORTEX F and as an upgrade option for processors, currently operating Bühler’s SORTEX E1D optical sorter.

Bühler R&D specialist Ben Deefholts explains how the leading-edge technology was developed: “Based on our understanding of the issues processors were facing with existing technologies, in detecting a cross-section of FM, we put together an in-house research project to analyse spectral data from a wide range of vegetable material, typical FM and samples of other FM that customers were finding difficult to detect using existing technology. We used the results of the research to create a combination of cameras and optics, including a revised InGaAs HD technology and a new IR camera with active background.

“F&V processors often run many different products down a packing line in one day, so they need to be able to switch easily between them. This means they normally need generic FM removal, with additional specific programmes for colour defects or EVM based on shape. The SORTEX E and SORTEX F with PolarVision makes adjustment of the sorter much more intuitive and will better suit the busy life of the packing line.”

Stephen Jacobs, Global Product Manager at Bühler, added: “We are very excited by the development of this new technology. We believe SORTEX PolarVision™ is the first – and only – system on the market which can deliver such superior FM detection, across multiple products, with complete ease. Combine this with the SORTEX F platform, and you have a revolutionary solution which addresses two of the biggest issues in the food industry today – safety and hygiene.”
Historically, removing same-colour polymer material from rPET flakes, such as clear PVC from clear PET, has been challenging for recyclers, as they cannot be visibly distinguished at such high processing speeds, without losing a lot of valuable flakes. Adding to this complexity, rPET flakes can be minute, so you need a sophisticated technology that not only detects ‘invisible’ polymers at high processing capacities, but also very small flakes.

Bühler’s SORTEX E PolyVision™ has been exclusively designed to overcome this problem. It features a brand new, patent-pending lighting system, which enhances detection of thinner polymer contaminants, as well as high-precision ejectors that remove delicate flakes, with little or no loss of good product. It can also be used as a three-in-one sorter or combined with existing SORTEX technologies, in a fully integrated sorting station, making it one of the most flexible optical sorters available to the recycling industry today.

Unveiling the SORTEX E PolyVision™ at the IFAT trade show in Munich, Bernhard Gabauer, Segment Development Manager for Plastics at The Bühler Group said: “Polymer contaminants that are the same colour as rPET flakes, such as Polypropylene (PP), Polyethylene (PE) and Polyvinyl chloride (PVC), are difficult to detect using conventional sorting solutions that typically rely on either transparent or reflective sorting. But with the SORTEX E PolyVision™ both methods are used simultaneously, enabling polymers to be identified by their unique chemical composition and removed with a much higher efficiency - reducing the contamination to below
industry standards of 50 parts per million. This is the reason that the SORTEX E PolyVision™ is able to deliver the purest, cleanest recyclate for high-end uses, with minimum loss of good flakes.”

Gabauer added: “The Bühler Group has already built an unrivalled reputation for having the most advanced colour sorters in the industry and it is the only company to offer a fully integrated sorting station. So the launch of the SORTEX E PolyVision™ completes our rPET sorting portfolio and positions us as the leading supplier and technology partner for colour, foreign material and polymer removal.”

Also speaking at the IFAT press reception was Matthias Erdmannsdoerfer, President of National Recovery Technologies (NRT), Nashville, USA. He explained how the launch is another landmark in the one-stop solution partnership between Buhler Sortex Ltd and US-based National Recovery Technologies (NRT), launched last year, that offers plastics recyclers a complete solution for plastic bottle and flake sorting.

“With two specialist technology leaders joining forces, we are able to combine the best of both bottle and flake sorting technologies in our fields, to ensure there is no compromise on performance, at any stage of the PET recycling line – enabling our customers to maximise their recovery and profitability. They will also be tapping into over 100 years of combined sorting expertise, with access to proven technologies and engineering expertise as well as extensive customer service and support networks.”

Explaining the greater efficiencies achieved by accurately removing contaminants, Casper W.G.M. van den Dungen, Managing director of Signode Industrial Group LLC branch Poly Recycling said: “Advancements in SORTEX sorting technology have enabled us to not only improve our quality but reduce our waste by an incredible 77 percent per annum. This means we can deliver a further 19 full trucks of higher quality product to satisfy our customers.”

The SORTEX E PolyVision™ will now enable recyclers to provide rPET flakes for high-end specifications, such as for the packaging industry and reinforced components for the automobile industry, where the emphasis is on achieving the lowest contamination, measured in parts per million.
Nuts.

Revolutionary SORTEX E BioVision™ gains significant traction in Europe and USA.

The Bühler Group is helping leading nut producers to reduce contamination and meet exacting customer and export specifications with its new technology.

The SORTEX E BioVision™ is a single piece of equipment that does the job of two conventional machines – sorting for defects and foreign material simultaneously, allowing for one simple set up and unprecedented removal of hazardous, rotten or diseased nuts.

The pioneering optical sorter, launched by Bühler in 2015, has now been installed within various companies, including Moldovan specialist nut grower and processor Monicol, and Californian walnut processor Andersen Nut Co.

Monicol, which exports to 17 countries including Eastern and Western Europe and the United States, both harvests its own walnut kernels and acts as a pre-processor by cracking and pre-cleaning walnuts before they are sold on to processors and manufacturers. It approached Bühler for a solution that could remove not only hazardous material, mainly shell, but also foreign material such as sticks and stones, as well as dark colour defects – the most common defect in walnuts.

The Monicol installation followed extensive trials to test the SORTEX E BioVision’s efficacy and accuracy. Moldova is one of the top 10 walnut producers globally and the third largest supplier of shelled walnuts to the European Union, due to its rich soil and temperate climate of warm summers and mild winters. In 2015/2016 Moldova’s production is expected to hit 40,000 metric tonnes of in-shell walnuts.

Dumitru Vicol, CEO of Monicol said: “The trials were conducted on product with input contamination ranging from 10% to 34%, achieving accept quality of 99%. On trials of input contamination at 15%, the accept quality rose to 99.9%, with no shell found per 1kg. A typical customer requirement allows for one piece of shell in every 10kg, so we were very happy with these results. The SORTEX E BioVision™ is helping our business to grow by achieving greater trust in our products and therefore customer satisfaction. We’re expecting it to play a major part in the on-going efficiency and profitability of our business in the..."
coming months and years."

Andersen Nut Co. meanwhile was contending with sorters that were operating at low capacity, with lengthy processing times, which in turn meant high production costs. It was sorting walnuts to remove shell, discoloured nuts and rancid products, which often meant between six and eight passes through equipment before product could be passed to the hand-picking tables. Bühler established laboratory demonstrations followed by on-site demonstrations with results so impressive – sorting with just a couple of passes rather than several, that Andersen ordered the SORTEX E BioVision™ within the same month.

Said Andersen Nut Co’s Dan Andersen: “The SORTEX E BioVision™ proved to achieve the same levels of quality and better yields in just two to four passes, which achieved higher volumes. It was also able to target all defects effectively. What’s more, production volume increased because the machine was able to handle higher capacity.

The SORTEX E BioVision™ is also capable of removing hazardous material up to 50 percent smaller than previously possible and it does so in a single sort for many varieties of nuts - including walnuts, almonds, pecans, pistachios and hazelnuts. This solution, which is unique to Bühler, not only minimises losses of good nuts, it also ensures greater accuracy in detecting foreign material while reducing processing time.

Fundamental to the SORTEX E BioVision™ is Bühler’s proprietary high definition BioVision™ detection technology. It analyses the spectral and spatial difference between walnut meat and shell to distinguish subtle differences between a vast range of shell varieties and walnut meat. It is able to detect both textured and smooth shells of varying sizes. Without this technology, a much higher volume of the nut meat may be lost due to false rejections. BioVision™ technology achieves this with a very simple machine set up.

Faisal Baig, Global Product Manager for Optical Sorting at Bühler, adds: “Sorting walnuts can be challenging for conventional sorters, particularly if the product batch contains shell, septa and dark kernels that all need removing at the same time. Designed with a special optical configuration, BioVision™ is able to perform both sorts simultaneously and can easily handle different varieties and grades of walnuts – in-shell and shelled, including sizes ranging from halves to double-diced and colours ranging from extra light to amber. In addition to removing even the smallest pieces of shell and septa, the SORTEX E BioVision™ with dedicated colour cameras and PROfile technology, can remove discoloured, shrivelled, rotten, insect-damaged and butterball walnuts.”

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Rice.
Bühler impresses Thai rice processors with next-generation SORTEX® sorting technology.

Two of Thailand’s top rice processors have voiced their praise for the SORTEX S UltraVision™ – stressing the advantages the new equipment has brought to their businesses.

Riceland International
Riceland International is one of Thailand’s top three exporters of parboiled rice, which consistently sells around 400,000 tonnes of rice into the open market. The family-run company has been involved in rice trading for four generations, starting in the early 1900s and it now owns and operates two rice mills producing parboiled rice. It bought seven SORTEX S UltraVision™ sorters in 2014.

Riceland International’s president CEO Vichai Sriprasert, who is also the former president of the Thai Rice Exporters Association, says: “As Thai rice exporters, we place very exacting standards on our product quality and expect the same high standards of the machines we use to achieve this.

“With the SORTEX S UltraVision™ from Bühler, we found a state-of-the-art optical sorter to match our demands. It offers high capacity, with outstanding sorting capabilities, which provides us with the reliability we require.

“This, combined with the excellent service provided by Bühler, makes investment in the SORTEX S UltraVision™ a compelling choice,” he adds.

The Bühler Group has sold more than 100 SORTEX S UltraVision™ optical sorters in Thailand since its launch in late 2014. This ground-breaking optical sorter, part of Bühler’s wider range of UltraLine high capacity energy-efficient rice milling technology, has been welcomed by exporters and processors of premium rice including white, fragrant and parboiled - for its new sorting capabilities.
The Sangfah Group
The Sangfah Group, specialists for over 25 years in Thai parboiled and white rice milling, is another key Thai rice processor that has invested in a total of eight Bühler SORTEX S UltraVision™ optical sorters.

Sangfah Group Managing Director, Kosin Jhongputthanasombut, says the SORTEX S UltraVision™ offers superior and more efficient sorting, particularly of black grain, spot, purple and yellow grains, plus it is more cost-efficient, saves space and is cheaper to maintain than some alternative equipment.

And he adds: “We can also easily adjust the machine ourselves using the touchscreen and we’re impressed by its accuracy in that it rejects a much lower number of good grains – this is particularly important when sorting parboiled rice that tends to have a much higher number of different defects to sort than white rice.”

Indeed, the SORTEX S UltraVision™ is widely regarded as the most technologically advanced, highest capacity optical sorter currently available for rice today. It includes ground-breaking pre-set modes that automatically learn the characteristics of any new grain that enters the machine, which means it can sort for different defect types simultaneously, such as chalky and pale yellows, without compromising the quality or yield. Furthermore balanced and stable performance, ensures optimum sorting is maintained all-day, every-day.

Prior to the release of the SORTEX S UltraVision™, simultaneous sorting of colour defects and chalky defects from white rice resulted in a big drop in sorting capacity if yields were to be maintained. The SORTEX S UltraVision™ can not only cope with far higher capacity per chute for the same yield, but can also handle a simultaneous colour and chalky sort without loss of capacity or yield. This double performance boost is yet another reason why the SORTEX S UltraVision™ has quickly established itself as the preferred choice for maximising revenue.

It is efficient to run because it uses less compressed air – firing air more accurately using Crosshair Targeting™ at the centre of the grain, which allows for a higher reject concentration and less need for re-sorting. There’s also the added bonus that the sorter needs little or no operator attention once the parameters are set.

Other benefits that the SORTEX S UltraVision™ provide:

- Intelligent Automation ensures the sorter operates at its optimum level, without the need for manual intervention
- The optical box windows are easy to access, meaning they can be regularly cleaned in seconds. No other sorter offers this level of access
- Textured LED Lighting™ in conjunction with multi-chromatic ‘Ultra’ cameras detect defects almost imperceptible to the human eye
- The capacity of two or more machines with the footprint of just one, when simultaneously performing a colour and chalky sort.
- SORTEX AnywarePro™ software gives customers remote access to sorter performance data, which includes system data and fault alerts, for full traceability and maximum uptime.
- Access to locally based experienced, qualified engineers who can resolve issues on the ground or over the telephone.

The creation of the SORTEX S UltraVision™ demonstrates Bühler’s continued leadership in optical sorting technology and rice processing solutions. Bühler is committed to working in partnership with its customers to deliver the best return on investment through product innovation.

SORTEX S UltraVision™ in Riceland, Thailand.
Grain.

Staying in control of mycotoxins despite unpredictable contamination patterns.

Mycotoxins are secondary metabolites produced by mould fungi and are an emerging threat for animal and human health.

Aflatoxin, deoxynivalenol (DON), Zearalenone (ZEA) and ergot alkaloids probably create the most commercial concern - commonly affecting corn, wheat, rye, barley, oats and spelt. The highly-toxic Aflatoxin is particularly problematic in corn as just a few highly contaminated kernels have the potential to make an entire lot unsafe for further use, even if the vast majority of grains are not affected.

Mycotoxins predominantly occur in concentrations that do not result in acute clinical symptoms of toxicosis, however, livestock may still show signs of elevated mycotoxin exposure, such as impaired growth, immunosuppression, and overall reduced performance.

Therefore, even when maximum permitted levels have not been set, it is advisable to follow guidance levels for feed (for instance, 8 parts per million (ppm) for DON in cereals and cereal products in the EU) from both an ethical and economical viewpoint.

Co-occurrence of mycotoxins – an emerging threat

Analysis shows that it is highly likely that affected product is contaminated with multiple mycotoxins, simultaneously. For example, a combination of the Fusarium toxins DON and ZEA, or a mix of Aflatoxin B1 and Fumonisins, may be present in corn lots.

This phenomenon is called co-occurrence and some combinations, such as Aflatoxins B1 and Fumonisins are particularly worrying because there is evidence of a synergistic interaction of the two substances, intensifying the adverse health effects [2].

Co-occurrence can be explained by two biological mechanisms: Firstly, some fungal species are able to produce different mycotoxins at the same time, such as Fusarium species producing deoxynivalenol and zearalenone.
Secondly, an affected product is likely to be infected by different species of fungi. Additionally, in compound feed, each component of the mixture can further exacerbate the problem by introducing different mycotoxins.

Researchers are now working to better understand the implications of co-occurrence on human and animal health.

**Early intervention is critical**

While good agricultural and post-harvest practice significantly reduces the risk of grain contamination, other factors, such as extreme weather, can cause plant stress, making the crop more susceptible to fungal infections.

Therefore, irrespective of the variability of the contamination profiles, it is business-critical that processors are able to rely on the performance of existing cleaning lines to be efficient and reduce toxin levels while removing only the minimum of good product. They also need to be confident that grain lots comply with commercial specifications and legal maximum levels of toxins.

Some regions have been hit severely in successive years, resulting in stockpiles of corn lots unfit for human or animal consumption. In response, processors have implemented advanced grain cleaning processes to prevent any initial contamination from spreading further by removing the small percentage of hazardous grains early in the value chain - not only in mills but also at grain elevator/reception facilities and warehouses.

**Effectively managing the natural variability of fungal infections**

In 2012 Bühler worked with producers in Italy to successfully demonstrate that dedicated mycotoxin cleaning lines can effectively reduce aflatoxin B1 levels in contaminated corn lots – consistently below the European maximum level for feed of 20 parts per billion (ppb) [1].

Two years later the mycotoxin problem hit the same region again; this time shifting from aflatoxins, produced by Aspergillus species, to DON, produced by Fusarium species.

Although less toxic than aflatoxins, producers were on alert not to exceed maximum permitted levels of DON in product intended for food and to ensure they complied with commercial specifications and guidance levels for use in animal feed.

**Processing expertise built on engineering excellence makes the difference**

Reliable measurement of a mycotoxin concentration at ppb and ppm requires a statistically representative sample of the product, sample preparation, e.g. by grinding and extraction, followed by chemical analysis using test kits or laboratory-based methods, such as high performance liquid chromatography (HPLC).

Clearly, this approach is simply not viable for a grain flow of many tons per hour. However, by identifying the key physical indicators of the presence of fungal contamination, and removing kernels with these indicators by cleaning and optical sorting, it is possible to significantly reduce mycotoxin concentration.

But first, a central question to address is whether this approach remains valid even when multiple mycotoxins are present and the indicating properties change, due to varying contamination profiles.

Figure 1 shows new findings from Bühler’s latest research in association with the Institute of Sciences of Food Production ISPA, Bari, Italy, at an Italian grain reception facility. It confirms the results previously obtained for aflatoxin B1, for the mycotoxins, DON, ZEA, and Fumonisins B1 and B2, which co-occurred at different levels in the investigated corn lots.
Figure 1: Mycotoxin concentrations of input corn (base level of 100% for DON, ZEA, and FB1+FB2) and the relative concentrations in the corn fractions which were removed by the sequential processing steps and for the cleaned corn. The reduction performance is case specific and may vary for different types of contamination. The sampling was in accordance with the EU Commission Regulation No 401/2006. Mycotoxin analysis was carried out using HPLC.

The study proves:

• Broken kernels tend to foster higher contamination with levels ranging from 250-400% of the respective mycotoxin, relative to the input concentration. This means separation by size is an essential first step in lowering mycotoxin levels.

• Light product and dust from affected lots typically contains high levels of mycotoxins - this study highlighted increased concentrations of up to 1200% of ZEA. Integrated or separate air aspiration systems can reduce this significantly, while further separation of lower-density grains, with noted levels of up to 180-370% for the three different mycotoxins, decreases concentration to even lower levels.

• Colour defects are strongly associated with mycotoxin contamination. An advanced optical sorter targets colour defects effectively and with minimal removal of good product. In the current study relative levels of 272% and 529% have been measured in the rejected product for DON and ZEA, respectively.

The study concluded that the mycotoxin concentration of the cleaned product was reduced to 12-31% of the initial concentration and revealed that all removed material had high concentrations of all three monitored mycotoxins. SORTEX optical sorting demonstrated outstanding selectivity in the removal of contaminated whole kernels.

It is this in-depth understanding of the key indicators of fungal contamination that has allowed Bühler experts to design standard flow sheets for mycotoxin reduction lines for different grains and contaminations.

As the contamination profile and thus the indicators for a fungal infection may vary, it is essential to have a solid line of defence in place, which sequentially targets all relevant indicators of mycotoxins.

Bühler mycotoxin reduction lines will help to ensure a consistent and safe output quality, despite challenges imposed by natural variability and emerging hazards, enabling continued business success for grain processors. Several customer installations, at both grain reception facilities and mills, are already proving successful and demonstrating that return on investment can be achieved in less than a year.
Technology.

SORTEX® AnywarePro™ - real-time monitoring for optimised sorting and traceability.

Bühler has unveiled a sophisticated, new remote monitoring system that gives customers access to online system data, allowing them to keep track of the performance of their optical sorters via a PC, laptop, tablet or smartphone. SORTEX AnywarePro™ brings current digital trends to optical sorting and sets a new benchmark in innovation and equipment capabilities.

Processors need accurate information fast, whenever and wherever they are in the world. Information such as machine performance, alerts to faults and everyday sorting data are valued by operators. Data can be used to optimise a plant’s performance and maximise profitability.

Processors globally are also under intense pressure to comply with the stringent and ever-changing safety regulations that affect the way they process foods. Total control over the performance of their sorting equipment coupled with accurate, detailed audit trails, is essential for optimum sorting performance and full traceability.

Until now, the performance of each optical sorter had to be monitored and analysed individually. Bühler’s SORTEX AnywarePro™ software collates all the relevant data, such as sorter status, machine performance, fault alerts or component lifetime indicators to significantly aid processors in making better informed plant management decisions. It can even highlight potential issues with other parts of the plant - for instance, a sudden increase in foreign material can indicate that other removal machines, such as a destoner, or magnetic separator, are no longer performing efficiently.

With the new SORTEX AnywarePro™ system from Bühler, processors can now remotely monitor their optical sorters at any time of day to access real time data from their plant and pre-empt problems which may occur. Other features include:

- Wear information with the Component Lifetime Indicator functionality
- Sorting statistics and historical data such as defects by date
- Fault logs and notifications
- An audit log
- Support from Bühler engineers around the world using built-in instant messaging
SORTEX AnywarePro™ can also reduce costs. The traceability and log functions track the sorter performance, level of defects, any changes to the sorter and which operator made them. This audit trail allows the processor to trace back and verify any issues, should negative feedback be received. This in turn helps to protect the revenue stream by pre-empting problems and potentially, significantly reducing downtime. Additionally, the new Component Lifetime Indicator functionality provides a life expectancy for component parts, giving processors advance notice to order spare parts, while the Remote Assist function enables engineers to provide remote expertise and performance monitoring, enabling them to make improvement suggestions, and performing service tasks remotely to minimise downtime.

Neil Dyer, Global Product Manager, Bühler, says: “Bühler understands that food processors are facing challenges with guidelines for food quality and especially food safety, so require the ability to closely monitor plant performance, whilst providing complete traceability. SORTEX AnywarePro’s ability to monitor sorting performance remotely, offers processors these vital checks and balances, while also enabling them to keep downtime, and therefore costs, to a minimum.”

SORTEX Anyware Pro™ is now available on the SORTEX S Ultravision™ and will soon be launched on other ranges within the Bühler optical sorting portfolio. It is an optional feature forming part of the SORTEX Total Care customer service package and contracts are available for different durations Courses are split into six, four-week modules spread over a two-year period.

AnywarePro™ allows processors to remotely monitor their optical sorter via their computer, laptop, tablet or smartphone.
Bühler launches new operating system on SORTEX™ sorters.

ProSortX™ simplifies the sorting set-up for the operator.

With ProSortX™, Bühler launches a new operating system providing a modern and user-friendly interface for its SORTEX optical sorters.

Bühler’s optical sorting solutions for the global food and non-food processing industry contain a wealth of configurable options, allowing customers to create extremely accurate sorting modes. For some, these multiple functions have been difficult to navigate and control. As part of an ongoing effort to improve its products, Bühler has conducted extensive usability tests with customers and, based on the feedback, made the operator’s interaction with the machine more intuitive. At the same time, the opportunity was taken to modernise the look and feel of the user interface. With SORTEX ProSortX™, the market leader is now launching an enhanced, touchscreen-based user interface, which makes operating the sorter much easier than before. Thanks to simplified screens and new control elements like sensitivity sliders, operators, at all levels, can easily make necessary processing adjustments.

With over 25,000 installations in over 100 countries, Bühler is the world leader in optical sorting solutions, covering a wide spectrum of food and non-food applications, including – amongst others – rice, grains, pulses, spices, seeds, nuts, fruits, vegetables and plastic. “Our optical sorters are not only designed to be best-in-class with regard to quality and performance, but they should also be easy to operate. As part of our ongoing effort to improve our products, we have conducted extensive usability tests with customers, in order to better understand how they are using their sorters and what features are among the most popular. As a result, we decided to modernise our software and have developed an enhanced, touchscreen-based user interface with new FingerTipControl™ technology”, explains Stephen Jacobs, Global Product Manager at Bühler. The redesigned software, ProSortX™ offers an
intuitive and user-friendly approach, simplifying and giving operators greater control over their sorting set-up.

SORTEX ProSortXTM enables operators and production managers to adjust a Bühler sorter, easily and effectively. "We have isolated certain key areas and created new, simplified screens that are much easier and more intuitive for operators to use", is how Duncan Shepherd, Software Team Leader at Bühler, describes the concept behind the new interface. To achieve this, the software developers have integrated additional graphics such as pictograms and new control elements like sensitivity sliders. As a result, operators can now easily identify the processing status at a single glance, and make any necessary adjustments easily and intuitively. More experienced and proficient operators, can still access the advanced set-up screens, which enable them to create more complex sorts.

Additionally, Bühler has improved the hardware with an all-new processor for powerful processing and faster navigation between screens. This helps to maximise productivity and ease of use.

SORTEX ProSortXTM is now available as standard on all new SORTEX A and SORTEX B sorters and on the SORTEX E and SORTEX K product ranges later this year. Upgrade kits are also available for existing customers.
The Bühler Group has been recognised in two categories at the prestigious 2016 Nestlé Supplier Awards, which rewarded and celebrated its suppliers for their collaboration, service and support throughout 2015.

The nominations for Best Innovation and Supplier Quality recognised Bühler’s contribution to support Nestlé’s UK strategy to ‘delight’ customers with its high quality confectionery products, including its Fruit Pastilles, Fruit Gums, Pick & Mix and Tooty Fruity products, all made at its Fawdon plant in Newcastle upon Tyne.

The Best Innovation accolade recognised suppliers that helped differentiate Nestlé from its competitors, made a “breakthrough” collaboration and transformed Nestlé business operations by delivering operational efficiencies and bottom-line savings.

The Supplier Quality award recognised suppliers that demonstrated a “sustainable pipeline of innovation” aligned to Nestlé UK’s strategy. This includes proactively presenting innovation opportunities, challenging the status quo with a mindset and culture that puts quality first and delivering consistently excellent quality throughout 2015.

Charith Gunawardena, head of optical sorting concludes: “Everyone at Bühler is proud that we are being recognised for driving innovation and consistently ensuring best-in-class quality at Nestlé. The Bühler Group has established a strong relationship with Nestlé. We work in partnership across many product divisions helping Nestlé meet the high quality expectations of both industry customers and, ultimately, consumers.”
Employee focus.
Saliya Gunaratne, Project Leader, Bühler.

Saliya Gunaratne is a Project Leader in the R&D team, based at Bühler’s optical sorting head office in London. He graduated from University in 2006, with a degree in Mechanical Engineering and joined Bühler as a graduate Mechanical Engineer. He is involved in a wide range of projects from, the replacement of obsolete components to the development of brand new products. No matter the scale or complexity of the project, his core work centres around finding the best technical solution that will meet customer requirements. Here he talks about his involvement in the development of Bühler’s latest ground-breaking optical sorter – the SORTEX F - and why he believes it is a game-changer in the world of food hygiene.

1. What appealed to you about working for Bühler?
The role I applied for was a great match for what I had studied. When I visited Bühler for my interview, I remember seeing a sorting machine running for the first time; it was very encouraging to see how several facets of engineering had been successfully integrated together to produce an impressive machine. From my research on the company and during the interview, it became apparent that this was a world class company with great opportunities to build a career.

2. Can you tell us about some of the Bühler projects you have worked on to-date?
The first project I was involved in was the SORTEX A, where I was responsible for designing the electronics cabinet and cooling system. Since then I have run several projects, transferring technology to China and worked with our purchasing and quality teams to deliver cost efficiencies. Currently I am responsible for the delivery of the SORTEX F. The difference between working on a project and leading it is greater than I had previously thought. Leading it is certainly more challenging due to the increased responsibility but it is also incredibly rewarding because of the sense of ownership and the wider perspective I have gained on the business and the industry.

3. What experience did you bring to the SORTEX F project?
I have been fortunate to work on a variety of projects, ranging from new camera technologies to branding updates on current machines with cross-functional teams. I also spent a large proportion of my time at Bühler working with our teams in China, to transfer machines and technology, for local manufacture and export. Typically, these projects require the coordination and cooperation of other departments, such as Manufacturing, Quality and Customer Care, to ensure that the delivered product meets the local requirements. It also helps that my colleagues are a smart (and often witty) bunch of people, who have a real passion for what they do. It certainly makes it easier to manage a project, knowing that the team is fully engaged in finding the best solutions for our customer requirements.

4. What makes the SORTEX F so special?
The SORTEX F is the first and only sorting machine to integrate modern food safety requirements, exceptional performance and usability into a complete system.

5. What are the main issues affecting fruit & vegetable sorting?
Modern sorting machines have to meet the current and future demands of our customers – higher capacity and more flexibility. Not only are line capacities increasing...
but a larger variety of products are now being sorted on the same lines. To meet food safety legislation and avoid costly recalls, frozen food processors need to ensure that their end product is free of defects and foreign material. Traditional high capacity machines have a large footprint and as a consequence, their accessibility for cleaning is often compromised, thus risking contamination and the quality of the end product.

6. How does the SORTEX F help overcome these issues?

The SORTEX F does not compromise on the open design that was pioneered at Bühler and it still provides state of the art technology, high capacity and flexibility:

- Open section stainless steel framework, to allow all surfaces to be cleaned from all angles. All welds are fully seam-welded and surface finishes meet or exceed requirements.
- Access into either side of the machine to be able to clean deep into the product flow areas.
- We have developed our own range of hygienic seals and fittings to eliminate niches, crevices and areas of product build up.
- State of the art PolarVision™ technology – this is a combination of the revolutionary PolarCam which can target non-vegetable matter, regardless of its colour, and InGaAsHD cameras, which can detect smaller pieces of hazardous material at half the size of what was previously possible.
- The system allows processors to easily and intuitively switch between multiple products on the same machine.

7. Bühler has a global network of specialist groups. Did you benefit from their expertise?

Food safety has always been at the core of our development process and during the SORTEX F project, we capitalised on our in-house talent in the research and development of cutting edge hygienic equipment design, camera technology and lighting.

Our close collaboration with the Food Safety group (part of Corporate Technology), was instrumental in achieving the industry-leading hygienic platform developed for this machine to deliver our customers’ requirements. This collaboration ranged from conferencing to specialised group design workshops.

8. How do you feel the development of the SORTEX F will impact our customers?

Already, the reactions have been very promising. The PolarVision™ system is a real game changer in terms of ease of use - the ease at which a variety of products can be sorted using just a single setup is unprecedented. The hygienic design has also attracted a lot of attention; for example, the open design of the machine, the elimination of niches and crevices and the use of high quality food safe materials throughout, is the complete package that our customers require.

9. What does the future hold when it comes to hygienic food processing?

We expect the legislation and requirements surrounding food safety to increase. The FDA Food Safety Modernisation Act, for example, has far-reaching implications for our customers, who are now obligated to up their game, in terms of the hygienic equipment they employ. By listening to our customers, analysing trends in the industry and being ahead of the curve, the SORTEX F is in prime position to be the preferred solution, in the years to come.

10. What has made this project memorable for you?

This is the first machine project I’ve led so it already holds a special place for me. Add to that the incredible technology, such as the revolutionary PolarVision™ and the real step change in terms of hygienic design on this machine - makes it even more special to be working on something so cutting edge. It also gives me great satisfaction to be working with such high-calibre people and to have access to excellent mentors both here in London and abroad.