



Bühler's SORTEX A MultiVision

By Jenny Neill

Rejecting Defects

The Ins and Outs of Optical Sorting

Manufacturers once trumpeted the latest optics. Light sources, lenses, visual sensors are still part of the story but today's coffee growers want energy efficiency at high volumes, billion-cycle ejector valves, bichromatic and trichromatic sort flexibility and multiple channels along with training and support.



Three channel Xeltron Máquina XR with 32-bit Edge Technology

COSTA RICA — “Have you heard about ‘The Oliver?’” asked Price Peterson, owner of the famous Hacienda La Esmeralda coffee plantation in Panama.

Peterson described how this now classic machine shakes green coffee as it moves along a tilted, vibrating deck using gravity to separate beans that are less dense. This long-established method yields better coffee because the higher the elevation the beans are grown the greater their density and quality.

Many mills still use similar machines to process coffee before shipping. However, the coffee trade has evolved quite a bit since the days when green beans were sold by density. Machines used to sort the good from the bad have advanced too.

Optical sorters were first developed around the time that the Oliver Manufacturing Company was incorporated in 1930. ESM (short for Electronic Sorting Machines) manufactured sorters in the 1930s in a process that involves three steps: 1) bulk coffee is fed into the machine by a chute that narrows, forcing the beans into uniform monolayer or “curtain”; 2) light is reflected off every bean and recorded by two or three cameras that view the coffee from different angles as it leaves the chute; and 3) coffee beans that match the profile free fall while defective beans are deflected midair by a millisecond blast from a nozzle that turns off and on in .25 msec.

Advances in electric engineering and the development of a mass market for computer electronics along with consumer demand for higher quality coffee spurred inno-

vation in sorting machines. Processing units have advanced from simple analog units to digital microprocessors with the ability to “learn” the difference between good and bad beans by batch.

Early machines measured a single band of wavelengths, rejecting beans that were lighter or darker in color. Greater precision was first possible 25 years ago with the use of green and red filters for arabica beans and red or near infrared for robusta beans. This made it possible to eliminate unripe and waxy or chipped, broken and insect-damaged beans.

The latest generation equipment also recognizes size and shape, small cracks in the bean, ejects foreign materials like glass and stones and even recognizes non-visible defects caused by mold and bacteria to cast out “stinkers.”

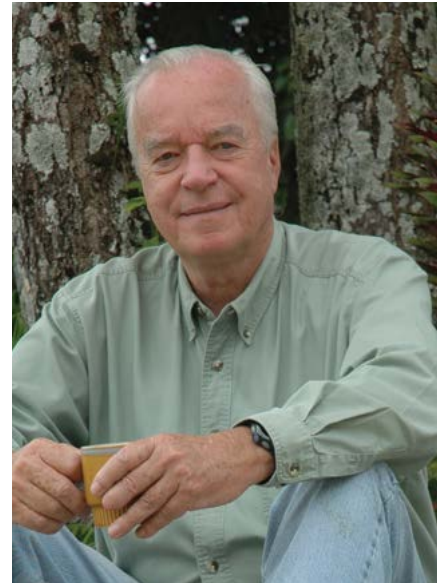
Longevity Matters

When making a \$50,000 to \$100,000 investment in automation equipment, a company’s history is a deciding factor. Representatives from four companies, some old and some newer, all pitched their wares last November at the 27th Sintercafé in Costa Rica.

Two of these firms, Bühler Sortex and Satake, were founded long before the Oliver Company with pedigrees dating to the later years of the Industrial Revolution. The other two are relative newcomers by comparison, producing optical sorters since the 1970s.

The Bühler Group was originally an iron foundry established in Switzerland in the mid-19th century. It introduced its SORTEX optical sorter in 1947, and is now part of a global corporation numbering 10,000 employees.

Rio Rafael, regional sales manager for Bühler Sortex described the firm: “We are first and foremost an engineering company. Sorters is a division of what we do.”



Price Peterson, owner of the Hacienda La Esmeralda coffee plantation in Palmira, Panama. In 1996 a rare varietal known as Geisha was discovered on his land and in 2006 coffee from these trees set a world record price.



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Sorted green coffee samples at Xeltron booth at 27th Sintercafé.

The Satake Group was founded in 1896 when Riichi Satake invented Japan's first power-driven rice milling machine. The company expanded into optical sorting when it acquired ESM, a step that also firmed up its presence in North America as Satake USA.

Xeltron, one of the younger equipment manufacturers in this category, turns 40 this year. Andrea Castañeda, daughter of the founder and president of Xeltron, describes her company this way: "We manufacture sorting machines, nothing else." Headquartered in Costa Rica, this company's machines are popular with small-to-medium sized growers.

The youngest of the equipment manufacturers at this year's show is considered an industry leader despite its relative youth. Delta Technology has built optical sorters since 1978.

Sorters Look Alike

Comparing technologies is difficult. Each manufacturer publishes brochures that describe optics, lighting sources, power usage, and more. Yet all guard against revealing specific details about many of these features. An apples-to-apples comparison is impossible without spending hours reading through patent applications or hiring a team of engineers to take the machines apart.

"Sorters all look the same in the catalog, even down to the colors," Rafael observed. "It's really difficult for customers to separate them. I feel for them. It's a huge investment and there is an order of magnitude of difference between what goes on inside of them that isn't at all apparent from the catalog."

Anyone picking up the product literature at trade shows would agree. Careful attention to whether a pricier model or add-ons meets a buyer's requirements is crucial since most manufacturers offer several models.

For example, Bühler continues to sell its hugely successful SORTEX Z+ machines — which rank among the most accurate, high-volume sorters available. "Yet we found a growing need to remove foreign material and subtle defects with even greater accuracy," said Rafael, "That's where the multiple configuration of the SORTEX A MultiVision shines. [It] is the first sorter that [uses] multiple wavelengths of light, including our enhanced InGaAs technology, and specific wavelengths to enhance the subtle differences between the coffee and its defects."

The Evolution RGB line is the latest for Satake USA. The RGB stands for red-green-blue and is a reference to the fact this sorter relies on a full-color camera calibrated to the international color chart of the Commission Internationale de l'Eclairage in France. Conventional sorters rely on filters. Johanna Bot, director of vision systems marketing in Latin America for Satake USA explained, "We can define colors very precisely. The color you see in Colombia is defined in exactly the same manner compared with a customer sorting coffee in Hamburg."



Satake Evolution 4-4450 sorter.

Another common claim is that machines “see” more of the bean and can store some or all of that information. What gets stored may take the form of a 3D model as in the A series sorters from Bühler, a sort profile as with the Xeltron XR Series, or set of parameters including colors and defect sizes as with the Satake Evolution RGB line.

Chutes and Power Consumption

Customizing the number of channels offers the ability to run more than one lot at a time. Satake’s Evolution includes either four or eight chutes. Three channels are standard at Xeltron but machines can be ordered with six or nine as well. Delta Technology’s newest series can have up to five channels. For Bühler machines, standard configurations range from three to five modules for the SORTEX A MultiVision and one to four modules for the SORTEX Z+.

The flexibility of multiple “sorting lines” is helpful but some customers want to go full blast and get through the lot and go on to the next. They prefer to just keep it simple with one sort at a time.

Volume varies by maker and configuration. Models with several channels going at once or with add-on components that increase precision draw more power than smaller scale, basic versions. Even though technical specifications list typical power consumption, environmental conditions will have an effect.

Dust is flying everywhere in most green coffee mills, Rafael explained. Under these conditions operating a scanner “is a little like trying to drive through a snowstorm. You can do it, but it’s really hard to see the road, which means a lot of overcorrection for the driver. In the case of the sorter, it means a lot of false firing.” All that extra work by the pneumatic systems in these machines adds up to a lot of expensive wasted energy.

Cost

A number of variables contribute to operating costs such as prices for parts and service and the cost of extra training.

“Operator training during the machine start-up is important, so that the customer gets the most out the technology,” according to Satake’s Bot. “In addition, in Houston, we offer in-depth training, in an environment away from the distractions and pressures of daily production.”

Alternatives for servicing a sorter vary by vendor, but most provide an array of choices. Satake USA has added a remote monitoring subscription service called Satake Everywhere to monitor and repair software. Bühler pioneered remote monitoring with its SORTEX Anywhere software. Bühler’s Total Care consists of a menu of servicing and maintenance options. Once selected, Bühler locks in yearly pricing.

There is no set price for this equipment. Machines are made to order and allow a limited amount of design choices that will change the price. The more customization required, the more consultative the sales process must be.

Representatives for Bühler SORTEX generally close a sale within months but it can take years. “Though the machines look fairly uniform from the outside, there are hundreds of variations possible inside,” said Rafael. “What we’ll do is work with the customer to find out what it is they want to sort, how much volume they want to run, what are their primary criteria and then we’ll work with them to design the system around that — platforms, in-feed, takeaway.”

To learn more, all four manufacturers are exhibiting at the Specialty Coffee Association of America tradeshow in Seattle from April 25-27. ☕



Johanna Bot, director of vision systems marketing in Latin America, Satake USA.

Sifting Cents

Before You Buy Know Your Business



Rio Rafael, regional sales manager for Bühler Sortex

Major updates are available from most equipment manufacturers this spring as trade show season gets into full swing. Whether a sorter purchase is intended for a coffee grower, a miller, or a roaster, the decision involves a significant capital expense. Knowing certain operational details makes it easy to evaluate which sorter fits the business case.

Buying even the smallest and least expensive optical sorter is a significant investment. No matter what type of coffee business you are supplying it is important to enter the market with a thoughtful business case for acquiring one.

Hacienda La Esmeralda garnered fame for setting a record for highest price coffee at auction in 2006 and then went on to obliterate that record the following year. Behind that story, however, is another. In 2006, George Howell took delivery of a bag from that farm that contained a defective black bean. Price Peterson, owner of Hacienda La Esmeralda in Panama explained, “There was probably one black bean out of 5 million beans in that bag but it was right on top.”

The farm had been sorting beans by density for years. Peterson’s son decided to invest that entire year’s profit in an optical sorter choosing a trichromatic Xeltron, Model 3000 R-S3, with the goal of never letting “blacks” slip through to clients again.

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The high-quality/high-price business case is a solid one. However, equally strong cases exist for coffee producers and mills dealing in lower grades too.

Outside Influences

Larger economic factors play a part as well. When the c-market price is high, no one thinks about automation. Rio Rafael, regional sales manager for Bühler Sortex, recounted why: “One commodity producer explained to me: ‘I could sweep product up off the floor and sell it for \$3 per pound.’”

With prices near all-time lows, however, more coffee suppliers start thinking about finding efficiencies or developing secondary markets. Selling rejects for a fraction of the lowest price is tough to do but beats the alternative.

Rafael proposed this logic for building a new business case: “If you’ve got one pound of good in every 10 pounds of reject material, you’re throwing away \$1 on every bag that goes out.”

Cooperatives, mills, and farms producing sufficient output for automation are wise to consider that logic. Rafael asserted, “If you’re processing hundreds of thousands of bags per year, you’re literally throwing money away.”

Build the Case

Big or small, taking time to articulate the following business criteria is a must for anyone shopping for an optical sorter:

- * Capacity needs – How much volume does the business handle? What percentage of that coffee will be sorted?

- * Costs of power – What is the cost of electricity? Do prices fluctuate according to season? What implications does this have for ongoing costs of operating a sorter?

- * Expected output quality – Is the highest level of quality the only concern? For example, will the company develop different profiles for different markets: “single origin specialty” versus “single serve blends” versus “solubles”?

- * Current sorting baseline – How is coffee sorted today? How long does the process take?

- * Expected new efficiencies – Given the sorting baseline, what efficiencies are needed to justify the investment in new equipment? ☕