



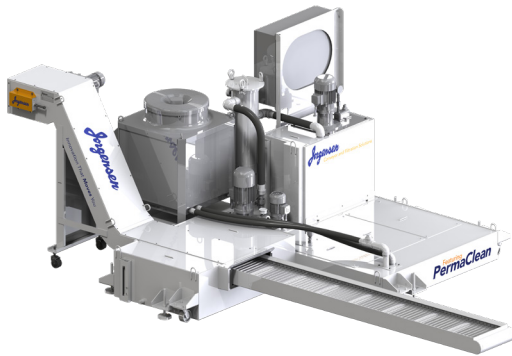
MODULARITY SOLVES MULTI-PROCESS MACHINE ISSUES

Maximizing metalcutting productivity requires more than simply applying high cutting speeds and feed rates. To be truly competitive a shop must also maximize utilization of the time available to do the work. Current time management strategies include use of multi-tasking machines that can perform multiple operations in one setup and eliminate the time spent moving parts from machine to machine to achieve

final completion. Creating a part in a single fixturing generates significant savings by eliminating work-in-process and refixturing errors. One drawback, however, is the difficulty of managing the different types of chips produced from each of the individual operations of a multi-tasking/multi-process machine. In a recent joint effort, Jorgensen Conveyors & Filtration Solutions and Bourn & Koch faced this exact challenge.

MT³: MULTI-TASKING GROWN FROM GRINDING

Bourn & Koch Inc., Rockford, IL, provider of precision automated machine tool solutions and a specialist in gear manufacturing and grinding equipment, engineered a multi-tasking machine called the MT³. It is based on a Blanchard-style vertical grinding machine and engineered to also provide full turning and milling capabilities. A dedicated robot changes tools and workpieces as well as separate grind/mill and turning spindle cartridges.



Conveyor & Filtration Solutions, Mequon, WI, a company that designs and manufactures chip handling and coolant filtration equipment.

After studying the machine, Jorgensen designed a hinged steel belt conveyor that could handle all three types of chips. The solution was based on the company's EcoFilter conveyor, a self-cleaning two-stage chip removal and coolant filtering system. In addition to the rough filtering that the conveyor belt provides, removable filter boxes inside the conveyor frame provide additional filtration where larger particulate is filtered out of the chip stream to a level of 200 microns or lower and carried away before it can reach the coolant tank. Then, the remaining coolant and

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In the development process Bourn & Koch determined that efficiently handling the various types of chips formed in the differing machining operations would pose potential problems. The main reason was that grinding typically produces a sludge-like swarf, while milling chips can be large and fragmented, and chips from turning and drilling may be long and stringy.

Bourn & Koch contacted conveyor OEMs to investigate chip management alternatives. Some of which included drag plate or drag style conveyors that typically handle grinding sludge well, but can struggle to handle the other types of chips created by the MT³ system. During its investigations, the company reached out to Jorgensen

fine particulate is pumped through a bag filter which filters the coolant to a clarity down to 10 microns or less.

For applications that are heavily weighted towards grinding which generates a higher volume of sludge, Bourn & Koch uses cyclonic filtration in lieu of bag filters coupled with Jorgensen's new PermaClean system. Coolant tanks equipped with PermaClean keep coolant in motion by adding eductor nozzles to the tank, suspending chip particulates and preventing them from settling. When combined with cyclonic filtration, the filtration system is virtually maintenance free, significantly reducing labor required for frequent tank cleaning.

MODULARITY MAKES IT HAPPEN

Both the MT³ machine tool and Jorgensen's solution offer modularity that enables users to upgrade their systems and add cutting operations or accessories. A shop can use the MT³ machine's grinding, milling and turning capabilities individually if desired. The grinding spindles provide rotary motion for milling and drilling. The turning spindles hold dedicated static turning tools that direct turning forces differently than a standard mill/turn machine. The spindles do not utilize a brake that directs turning forces through bearings meant to rotate. Instead, for turning, the entire spindle is changed out and is not compromised by adding tool adaptors or extended arbors.

Users can program the machine via a CAM system or program it manually to perform individual tasks. Bourn &

Koch has its own conversational grinding human machine interface (HMI) for use with Fanuc Manual Guide I for conversational type OD and ID milling and dressing. The Bourn & Koch machine control also features a master listing program in which users can build separate programs for each tool then string them together to process certain parts.

The machine control directs the standalone robot to switch tools in the spindle or change the spindles themselves. HSK 50 and HSK 63 mill/grind spindles are currently available, as are HSK 63 and HSK 100 turning spindles. The spindle cartridges lock into the machine spindle motor via a large HSK-like connection that Bourn & Koch calls its HBK 200. The standalone robot has a unique gripper that

the company refers to as Alien Claw because of the claw-like features needed to perform tool and spindle changes and complete in-process part handling.

At this point in its development, the MT³ machine is a three-axis mill/turn/grind. A virtual Y-axis creates the third axis in which Cartesian coordinates are converted to cylindrical coordinates, enabling the C- and X-axes to produce angular moves by combining motion of the rotary and linear axes. Juggling coordinates and programming enables machining of off-center bores without refixturing workpieces as the machine table moves back and forth and the X-axis moves in and out to grind around the off-center bore.

One modular feature of the Jorgensen Conveyor solution is a unique casing design that allows interchanging of conveyor belts. For the first machine Bourn & Koch designed, it standardized on the hinged steel belt conveyor. However, the Jorgensen system's modularity

shop's contract situation changes. If the shop then finds it would be performing mostly grinding, it might be necessary to change the chip conveyor system from a hinged steel belt to a drag type belt. The modularity of the conveyor system also makes it possible to buy a new belt and not an entirely new conveyor. The frame and the body of the conveyor would remain the same.

Another advantage of this very flexible and modular system is the freedom to choose different types of filtering units such as gravity filters, bag filters or cyclonic filters as the primary filtration for the system. Bourn & Koch appreciates this flexibility and notes their interest in cyclonic filtration since it eliminates filtering media and the associate maintenance.



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enables a customer intending to use the machine largely for grinding and very little milling and/or turning to order the machine with a drag style belt. The drag belt has the same conveyor body as the hinged steel belt and fits into the pre-engineered tank system.

This adaptive capability can come into play if a shop buys the machine to accomplish a certain project, then the

When Bourn & Koch approached Jorgensen regarding conveyor solutions,

Jorgensen stressed its ability to deliver a complete modular coolant package based on their FlexFiltration system that could be configured to meet individual customer needs. The system would have the flexibility to handle changes and updates to the machining system, such as through-coolant tools and filtration level adjustments. The system could also add chillers and other accessories.

COMBINING PRODUCTIVE TECHNOLOGIES PAYS OFF

Efforts to boost productivity should include an overall view of a facility's operations. Concentrating on improving performance of one machine or group of machines will help, but maximum benefits can be derived from evaluation of so-called peripheral operations whose improvements, blended with the overall machining system,

can greatly magnify overall productivity and flexibility. The combination of the machine tool innovations of Bourn & Koch with the advanced coolant circuit technology of Jorgensen Conveyor & Filtration Solutions is solid evidence of the value of this approach.

ABOUT JORGENSEN CONVEYORS & FILTRATION SOLUTIONS

With over 70 years of experience in designing and manufacturing advanced conveyor, coolant filtration and material handling solutions for the machine tool, fluid filtration, metalworking, unit handling and recycling industries, Jorgensen Conveyor & Filtration Solutions offers a wide range of standard and customized systems to companies across North America and globally. All products are engineered to provide high quality, cost effective, application-based product solutions for even the most demanding environments.

For problem-free production and material handling without bottlenecks caused by maintenance intensive systems, poor chip management or coolant filtration, the company manufactures reliable, innovative conveyor and filtration solutions, including MunchMan®, EcoFilter®, Filterveyor®, ShuttlePro, FlexFiltration, PermaClean, FlexForce and UVS Ecologic Control® systems.

Jorgensen sets the industry standard for quality, reliability, and value for all your material handling needs.