As Rick Hungerford, president and CEO of Edge-Sweets (ESCO) points out — think of the mattress that remembers, the steering wheel that saves lives or the bandage pad with built-in antibiotic. These products start from blocks of cast polyurethane foam in various densities, then get cut, profiled or shaped by special machinery.

ESCO is a leading builder of such machinery, supplying the furniture, mattress, automotive, packaging, pipe insulation, healthcare and other industries with automated CNC profilers and horizontal cutting machines. Production speeds up to 840 inches per minute (21.33 meters per minute) are achieved on flexible and rebonded polyurethane, latex and viscoelastic materials, when used as either standalone cutting machines or in tandem with automated material handling and packaging lines. The ESCO end-user base reaches into many industries in the global market.

On two recent developments in the company’s machinery line, an engineering evaluation of competing motor, drive and controls lines was conducted, under the direction of Hungerford, who notes, “On our PMIII-1530, a horizontal profile saw with a 1.5 meter x 3 meter block cutting capability, we worked with one of our most trusted local suppliers of automation components, Wes Morgan from Electro-Matic Products, who introduced us to the Siemens motion controller, servomotor, gearmotor and drive package. We were seeking a controls platform that would have global support and standards compliance, as more of our machines are utilized for production outside the U.S. today than at any time in the past.” Hungerford further noted that, while the axes of motion are relatively limited on his company’s machine lines, the high-tension maintained and the need for precise positioning of the cutting wire on this machine made it necessary to have the most accurate and durable motor and drive combinations available onboard.
Incorporating the Simotion motion controller, Sinamics low-voltage drives and Simotics S-1FK7 servomotors from Siemens gave ESCO not only the performance levels desired, but also the global application engineering, technical support and parts inventory benefits of this international supplier. “Our machines are in use around the world,” states Hungerford, “and we needed great confidence in our control package supplier’s ability to support the machines and our sales team with parts and service, everywhere in the marketplace. In Siemens, we found such a partner. Plus, their local representative in Grand Rapids, Michigan, Electro-Matic, had established a solid relationship with our company and my team.”

Functionally, according to Hungerford, the Siemens package allowed a single, common DC bus without stand-alone drives plus the system provided by Siemens is scalable to allow the cutting machine being interfaced with additional mechanisms and loading/unloading devices as part of an overall automated production line for customers. The PMIII-1530 is operated by a single PC plus a remote operator pendant that allows free movement with full operation control of the machine during setup.

In selecting and programming the proper components for the ESCO machine, Siemens and Electro-Matic Products provided an optimized solution using the Sizer and Simotion Scout software provided by the component manufacturer. Once all the parts are in-house, construction of this machine is typically achieved in approximately 30 days, according to Hungerford, as ESCO does the bulk of the framework and final assembly onsite at the Grand Rapids factory.

The operation of the machine (as shown in the photos) begins with the CAM programming software written by the ESCO engineering team, plus additional data programs made available through ASTM for pipe and tube configuration. Hungerford mused, “It’s sorta like Etch-A-Sketch, but hardly a toy. Our engineers can take the canned programs and quickly make the necessary adjustments to the cutting paths to suit the machine cutting capabilities and the workpieces our customers are producing.” The software program is vital in accomplishing both an effective cutting as well as optimum utilization of the raw materials, through the nesting of the parts in the master workpiece block, done by the computational algorithms in the program.

The workpiece is then loaded onto the vacuum table, the cutting head is positioned and the process begins. The material used by the ESCO customer, in this case, is Owens Corning Foamular®, a rigid polystyrene prepared in a tongue-and-groove configuration for industrial pipe insulation as the end-product.
In operation, the motors, drives and feedback devices work in tandem to ensure a quick, smooth and efficient cutting of the material into the desired shapes.

The customer using the upgraded controls model of this ESCO machine is currently reporting a reduction in its cutting cycle times from 3½ hours to 20 minutes, according to Hungerford.

Commenting further about the drive performance, Wes Morgan of Electro-Matic noted that the Sinamics drive platform offered three distinct benefits. “The product line is consistent across a wide range of motor capacities, which is a real advantage for ESCO. Also, the regenerative feedback feature creates substantial energy savings for the end users, plus the Sinamics drives have a smaller footprint, owing to the dual motor modules and common DC bus system and this results in a more compact control cabinet.” He also noted the Simotion motion controller allows ESCO a single platform to perform simple axis to very complex integrated motion controls with a standard product, resulting in greater efficiencies in the design, programming and installation time for this builder and its customers.

On the second machine where ESCO implemented a controls upgrade, the HTX high-tension slitter/stacker incorporates a Simatic PLC, Sinamics variable frequency drives, Simotics servomotors, motor starters and contactors from Siemens. This machine, instead of a cutting wire, utilizes a tangential razor-like blade in a slit-and-retract motion, with the blade articulating on each pass through the material workpiece and then being automatically coated with silicone in the blade housing to maintain cut integrity.

The unit shown in the photographs here is the HTX 51-88 (indicating a 51” high x 88” wide x 132” long cutting zone), making ¼” thick cuts in a poly foam block. The machine is further capable of 1/8” cuts in production, as Hungerford noted. “This machine operates in tandem with other machinery we build, so the conveyor feed mechanism positions the workpiece for the cutting at the first station, then indexes it through the HTX to the next stations, where additional cuts and profilings are performed.

ESCO also produces vertical cutting machines, convoluters, roll splitters, contour cutting machines, metering and dispensing solutions for lab and production use, plus the company supplies fully integrated systems for polyurethane processing, including robots, curing ovens and mold designs to its worldwide customer base.