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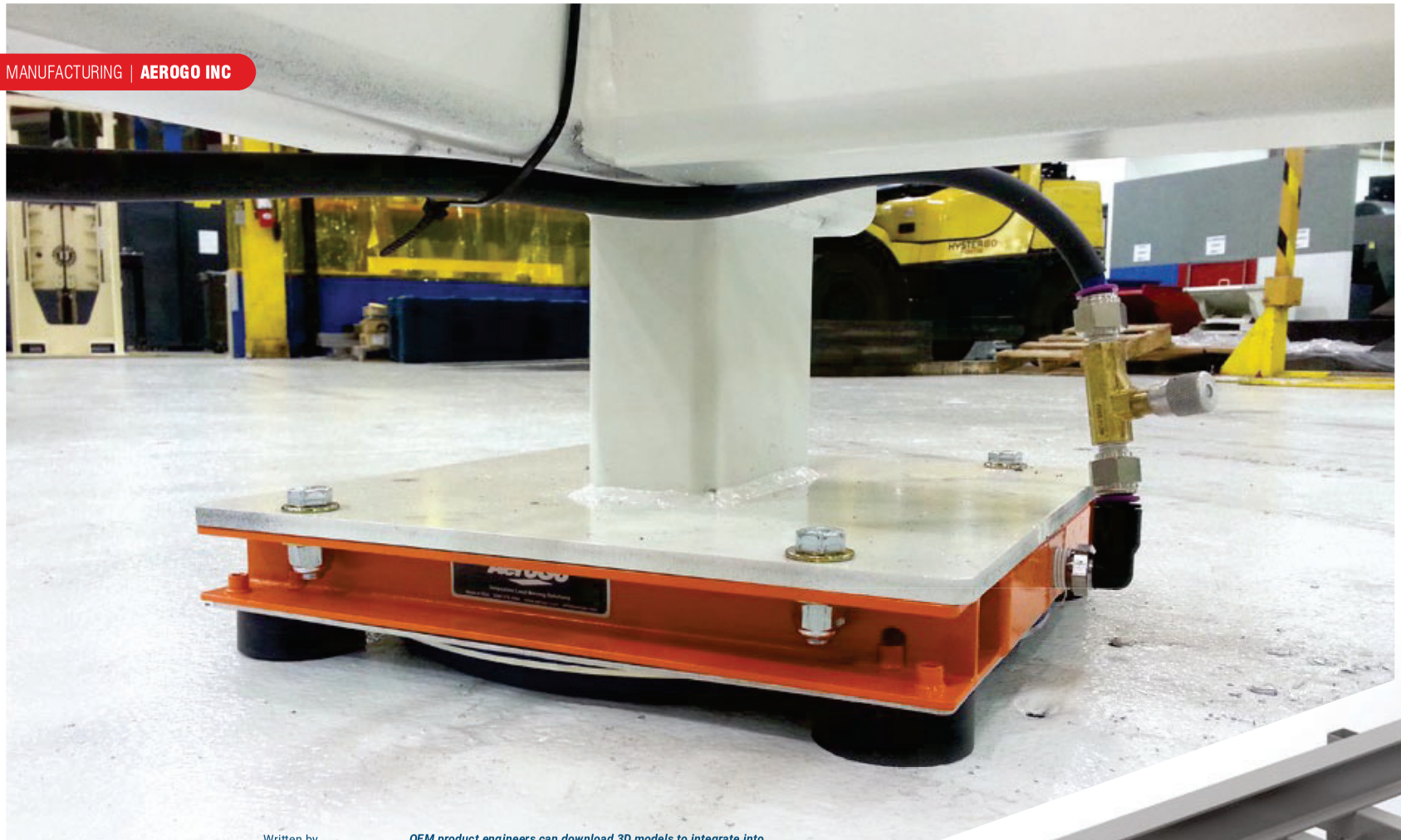

OEM product engineers can download 3D models to integrate into their CAD designs to make even the heaviest machinery inherently mobile. For end-users, the embedded air casters are "set and forget."

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Transforming Manufacturing:

The Advantage of Embedding Move Systems in OEM Equipment

In lean manufacturing language, CNC machines, tooling systems, manufacturing equipment, MRI machines, and other large-scale technologies are called 'monuments.' Once they're set in place, they're there to stay.

Additional aspects of their operation - including workers, supplies, and other equipment - have no choice but to move around them, even if doing so increases inefficiency and waste - the twin banes of lean manufacturing principles.

But what if even the largest and most intractable monument could be made inherently mobile at a push? A monument-free manufacturing or operating environment is the holy grail for lean manufacturing. Eliminating monuments eliminates a primary obstacle to efficiency.

Here's the good news: Not only is it possible to make these kinds of machines fully mobile from day one, but it's relatively simple and inexpensive for original equipment manufacturers (OEMs) to design that mobility into the equipment

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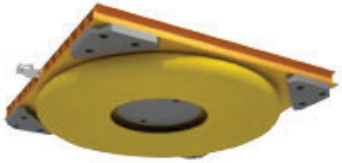
A view of a single pad from beneath, showing the skirt that provides the lift.

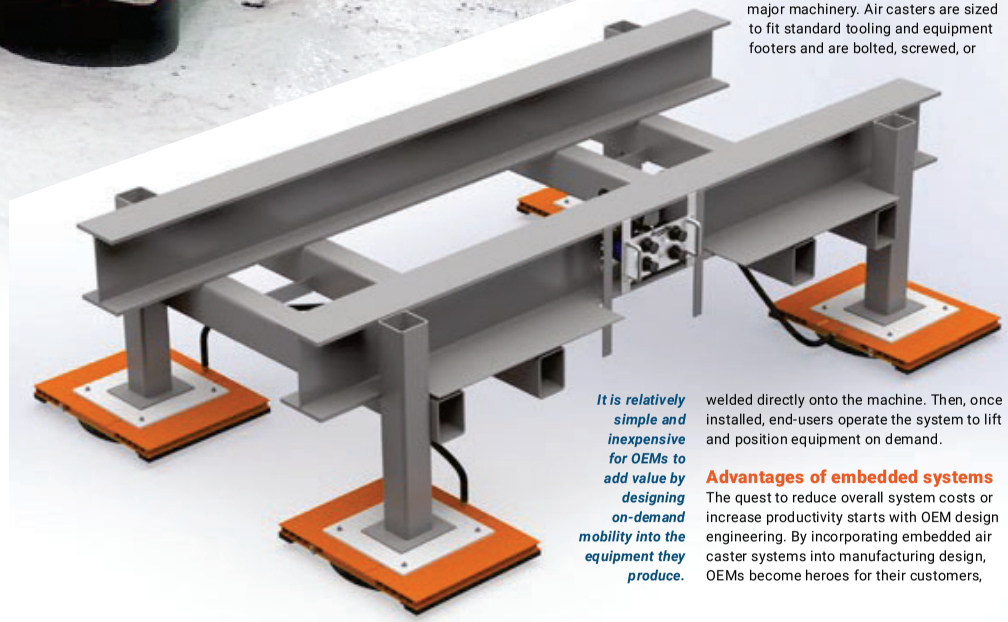


they produce. The result is a product with enormous added value for end-users at only a marginal cost increase for manufacturers.

The solution is an embedded air caster system

The secret ingredient to mobility is to use hovercraft technology by embedding air casters directly into the equipment being manufactured. Air casters are inflatable bags that fill with compressed air. As the bags reach the required pressure, they leak air underneath, creating a thin membrane of air on which even multi-ton loads literally float. It works just like a hovercraft or air hockey table. This membrane of air reduces the friction coefficient to less than two percent so that even a single operator can safely move machines that weigh several thousand pounds simply by pushing and with no strain. When the move is finished, the air casters are deflated, and the machine settles gently into its new position.

Typically, air casters are used separately from the machine as a rigging system. Yet, by using downloadable 3D models, engineers can design them directly into almost any major machinery. Air casters are sized to fit standard tooling and equipment footers and are bolted, screwed, or welded directly onto the machine. Then, once installed, end-users operate the system to lift and position equipment on demand.



It is relatively simple and inexpensive for OEMs to add value by designing on-demand mobility into the equipment they produce.

Advantages of embedded systems

The quest to reduce overall system costs or increase productivity starts with OEM design engineering. By incorporating embedded air caster systems into manufacturing design, OEMs become heroes for their customers,

the end-users who will ultimately reap the cost savings and efficiency gains of inherently mobile machinery. The benefits of embedded systems abound and include:

• **Enhanced flexibility.** Embedding move systems into equipment allows businesses to alter their factory floor layout and manufacturing configurations flexibly and speedily, as often as they want, without paying the often-significant cost for one-time rigging. The ease of machinery relocation could transform an otherwise rigid production line into a fluid, agile system. As the market demand shifts or new products are introduced, companies have the ability to swiftly reorganize their production lines to optimize workflows and ensure alignment with business objectives. For example, companies can optimize an existing or new, reconfigurable layout, including changing out the order in which operations are completed or changing the line from vertical to horizontal or perpendicular. They also are able to add new equipment easily to an existing layout, relocate equipment inside the plant or even to different plant locations, and more easily incorporate automation or robotic technologies.

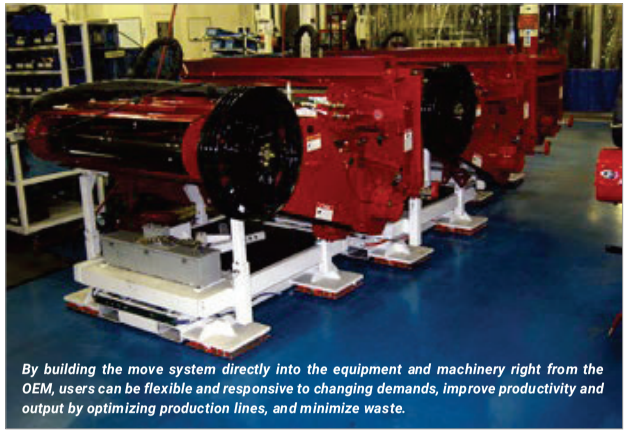
• **Increase productivity.** Embedded move systems can enhance productivity and output. Machines that are more accessible and easier to move allow managers to experiment with different configurations to identify the most productive layout. Additionally, because facilities no longer have to allocate space for move systems like forklifts or cranes, they potentially increase space utilization, which shortens cycle times, minimizes material handling, and reduces employee movement, increasing productive output.

• **Reduce waste.** Waste is an overlooked aspect of manufacturing that contributes to increased costs and decreased efficiency. When manufacturers are able to rearrange their equipment as needed, workflows are optimized to minimize waste generation. For instance, by shortening the distance materials need to travel or reducing idle time for machines, wasted resources and energy are limited.

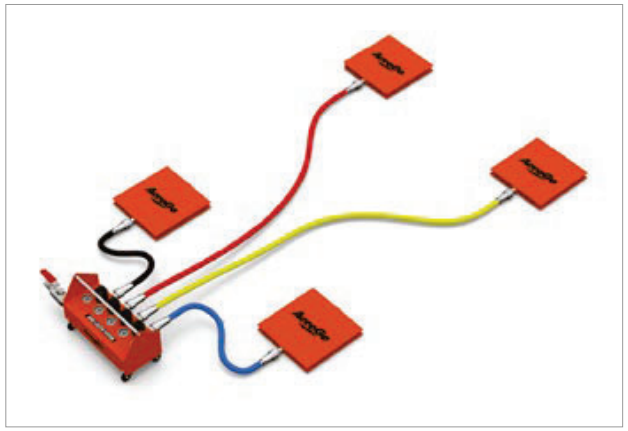
Embedded mobility can make the machinery more attractive to potential buyers or create a new revenue stream with high perceived value for the OEM. It also positions the OEM competitively by offering a way to solve serious end-user challenges through a straightforward and elegant design solution.

How it works: embedded air casters are a simple add-on

The process of embedding air casters when manufacturing new equipment starts with a few basic questions. The product designer



By building the move system directly into the equipment and machinery right from the OEM, users can be flexible and responsive to changing demands, improve productivity and output by optimizing production lines, and minimize waste.



or engineer first determines the number and location of support points on the bottom of the machine, tool, or equipment. Typically, these support points will match wherever the feet or wheels are; the number of points depends on the object's weight and where or how it sits on the floor. Then, the designers can choose an appropriate control console for the air casters. These operator interfaces are usually unobtrusive and can be fitted into virtually any free space on the equipment within reach of the operator.

With these preliminary questions answered, the product engineers can download 3D engineering models of the air casters to formally integrate the air casters into their CAD designs. They can then select the attachment mechanism - bolts, welding, or screws - according to the design needs.

These modifications can make even the heaviest machinery inherently mobile. For end-users, the embedded air casters are "set and forget." The control console offers a one-touch operator interface, and all operators need to do to move the equipment is attach an air hose and push.

Lean manufacturing has never been leaner

Traditional manufacturing equipment, generally static and rigidly positioned, presents a challenge when adjustments are needed to meet new production requirements. Retrofitting or modifying these systems to make them mobile often leads to significant expenses, disruptive downtime, and reduced productivity.

By building the move system directly into the equipment and machinery right from the OEM, users can be flexible and responsive to changing demands, improve productivity and output by optimizing production lines, and minimize waste. As the manufacturing landscape continues to evolve, companies that adopt and integrate these systems will likely find themselves at the forefront of industry evolution, enjoying increased efficiency, reduced costs, and improved competitiveness. The integration of embedded move systems in manufacturing equipment is not just a possibility for the future; it is a necessity for manufacturers aspiring to remain dynamic and competitive in a fast-paced, ever-evolving market.

AeroGo

About the Author:

John Massenburg, M.S.M.E, is president and chief executive officer of AeroGo, Inc., Seattle, Wash. Founded in 1967, AeroGo is the world leader in providing innovative load-moving solutions for awkward, delicate, or exceptionally heavy loads used in factories.

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