



# Air Casters Turn CNC Machines Into Opportunities for Manufacturing Efficiency

*Machine tools can often be prohibitively difficult to relocate after installation, becoming immovable “monuments,” distorting facility layouts and eroding manufacturing productivity, capacity and throughput. One way to easily move CNC machines and others is by turning the facility floor into a giant air hockey table enabling air casters to easily move CNC machines.*

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Successfully moving large computer numerical control (CNC) machines is no small task. Conventional material handling methods such as wheeled casters, forklifts and riggers are expensive and require logistical compromises that make these moves impractical.

What happens after the move can be even worse. CNC machines and other machine tools are often so prohibitively difficult to relocate after installation that they turn into immovable “monuments,” distorting facility layouts and eroding manufacturing productivity, capacity and throughput. The experience of one manufacturer of furniture for retail and dining establishments provides an excellent example of how to resolve these movement issues. The company uses dozens of CNC machines in the production process. But because every piece of furniture is different, the process continually changes. Had the manufacturer been forced to maintain CNC machines in a single location, every new order would require an inefficient and costly move. It wasn't just throughput that suffered. A particularly long component to produce would require either an expensive, time-consuming, and inefficient accommodation or outsourcing the piece because the facility layout prevented feeding the part directly into the tool.

The answer for this company was to reconfigure the entire manufacturing flow minus the costly and time-consuming expenses. How? By turning its facility floor into a giant air hockey table enabling air casters to easily move CNC machines.



Operators place air casters under a CNC machine to move it into a sequential position in the work flow.

## The Science of Air Casters

Functionally, air casters like those by AeroGo, Inc. (Seattle, WA) operate like pucks in a game of air hockey. Just as the puck glides on an ultrathin film of nearly frictionless air, air casters can float ultra-heavy machinery on a film of air less than the thickness of a business card.

All that is required is a source of standard compressed air. When connected, air casters, which are donut-shaped bags attached to modules that fit within the footprint of the machinery to be moved, steadily inflate. Upon reaching capacity, excess air escapes beneath the bags to form a film of air 0.003 inches to 0.005 inches thick until the machinery literally floats.

For most floor surfaces, the friction coefficient is reduced to less than 1%, meaning an individual operator can single-handedly push equipment weighing thousands of pounds. Air casters typically require only five-to-25 pounds of force to move loads weighing up to 5,000 pounds compared with 300 pounds of force often needed to move the same load with wheeled casters.

## Traditional Material Handling Solutions Erode Efficiency

Traditional material handling systems are extremely costly in terms of time, productivity, and direct expense especially when compared with air casters. For example, hiring a rigging company could cost thousands of dollars each time a company needs to move a CNC machine along with countless hours of lost productivity. If the rigger is completely reconfiguring the shop layout, a move will likely require an unacceptable number of days.

Worse, most alternative moving methods need significant open space in the facility in which to reach and maneuver CNC machines. A rigging company or even just one forklift will necessitate an operational footprint probably three times the footprint of the CNC machine.

That means production equipment would have to be spaced significantly farther apart, translating into lessened productive capacity and throughput. It forces operators to travel greater distances from task to task throughout the manufacturing process, thereby reducing individual productivity.



Air casters fit within the footprint of the machine, minimizing the maneuverable space required.

## Four Major Efficiency Challenges

There are four major efficiency challenges that need to be resolved. They are:

1. **Time to move:** A CNC machine that would take a rigger an hour to reposition can be moved in minutes by air casters. The process is easy, intuitive and safe. All that needs to be done is to slide the air caster modules beneath the machine and inflate using standard plant air. The casters lift the CNC machine a fraction of an inch. Once it floats atop that thin film of air, it's simply a matter of gliding it into a new position. After it reaches its new destination, the air casters are deflated, and the machine lowers gently into its new position.
2. **Space to move:** Air casters fit entirely within the footprint of the machine being transported and can move omnidirectionally, including rotating in place. They do not take up any more floor space than the actual footprint of the CNC machine. The manufacturer optimizes floor space up to and including butting machines together — a relocation that's challenging or impossible with standard rigging options. An optimized floor may even free enough space inside the facility to generate these welcome layout possibilities:
  - Fit more tools into the same amount of space
  - Optimize processes into new reconfigurable layouts as needed
  - Add new equipment to existing layouts or relocate equipment within the layout
  - Remove machinery temporarily from a production line for service or storage

- Incorporate automation or robotic technologies more easily
  - Change the production flow. For example, shift from straight-line sequences into U-shaped or cell-based layouts to improve manufacturing efficiencies. Because the operator travels with the tool, air casters eliminate steps. An operator skilled on three machines or three processes can easily place multiple machines together into a cell configuration to dramatically improve throughput.
3. **Weight to move:** The amount of weight that can be transported on air casters is largely a function of the number or size of air casters. Caster modules come in a variety of configurations, from pallets, planks, and transfer carts to large air cushion vehicles, so the manufacturer can ensure the right fit for each situation. Air casters are routinely used to move everything from small machinery to 5,000-ton caissons and entire stadium grandstand sections. Clearly, weight and size are no limitations.
  4. **Safety considerations:** Air casters are safe for both the workers who perform the move and for the equipment being relocated. The casters effectively act as shock absorbers, so the move itself will not transmit load shocks to the equipment. That's an important consideration for tools that are calibrated and contain sensitive electronic components, which explains why NASA, Boeing, and other organizations in the aerospace sector routinely utilize air casters when moving delicate satellites. The casters also protect floor surfaces by evenly distributing the weight of the load allowing their safe use on epoxy-coated surfaces and even fragile raised floors.

## Achieving Efficient and Low-Cost CNC Movement

Ultimately, efficient manufacturing rests on an ability to tailor every element of the manufacturing process including production flow, plant layout, equipment positioning and smart and safe utilization of people resources. The goal is to ensure the most effective manufacturing process while still delivering a high-quality product.

Reconfiguring production lines and repositioning critical equipment like CNC machines pose significant challenges. Companies are likely to conclude that most traditional material handling systems and rigging solutions aren't worth the tradeoffs and disadvantages, especially when large machine tools must end up trapped in place requiring more space, labor, time and expense. Air casters require less of all these resources by making seemingly immobile tools moveable. That frees manufacturers to operate at maximum efficiency and maximize their business results.

### *About the Author*



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