

# High Precision, Large Scale:

## A Look at the Special Capabilities of **Janicki Industries**



AEROSPACE



MARINE

*Founded and run by engineers, Janicki Industries designs and builds high-precision tooling for customers in aerospace, marine, wind energy and transportation. Janicki Industries provides engineering design, project management, composite fabrication, precision tooling, and the most accurate measuring capabilities in the world. Driven by customer needs, the company's R&D teams continuously push the boundaries of composite materials fabrication and techniques to create composite tools, molds, prototypes, jigs, cauls, fixtures and parts. Janicki Industries is recognized for innovative applications of high strength, lightweight composites including carbon fiber, fiberglass, metals of all types, proprietary poly resins for infusion, proprietary vacuum assisted resin transfer molding techniques, and specialized finishes.*

*Janicki Industries is a full-service engineering company specializing in large scale, high precision composite projects. Large factories, proprietary fabricating equipment and assembly expertise all support this capability. In particular, the company's 5-axis CNC machines – designed and built in-house – are unrivaled in scale and precision, with machining envelopes up to 100 feet in length and tolerances of +/- 0.005”.*



In 2012, Atlas Copco AB was named one of the "Top 100 Sustainable Companies in the World." We are #10 on the list.

Imagine your company is designing a new, high precision product. Plans require the development of new composite fabric technology specifically for this application. Building the prototype tooling will require 5-axis machining at tolerances up to  $\pm 0.005"$ . Now imagine your new product will be 100 feet long. There is one company (and perhaps only one) with the in-house

capabilities to create the composite materials and prototype tooling you'd need to bring your new product to fruition.

Janicki Industries, Inc., designs and builds high precision tooling for customers in aerospace, marine, wind energy and transportation. The organization's core competencies include engineering design, diverse



GROUND TRANSPORT



WIND TURBINES



composite fabrication processes and materials, and production of prototypes, fixtures and tooling, all supported by advanced material and process R&D conducted in-house.

At facilities in Sedro-Woolley WA, Hamilton WA, and Layton UT, Janicki Industries unites what would seem to be contradictory capabilities: ultra-precise tolerances and very large scale. The company's signature 5-axis mills, which are engineered and built in-house, enable the fabrication of machined parts and prototype tooling that few companies in the world can provide.

"Our machine capacities are among the largest in the world, with a maximum envelop size of 100 feet by 20 feet by 8 feet," says John Hunter, Special Projects Manager/Compliance with Janicki Industries. "We make the mills in Sedro-Woolley. We believe them to be the most



accurate mills in the world, but we don't sell them. We use them to build prototype tooling for our customers."

One reason the 5-axis mills are so precise is Janicki Industries designed each wrist joint with two motors that oppose each other. This "contra-torque" arrangement eliminates all back-lash within the wrist to remove vibration and acceleration problems. A team of Janicki Industries automation and control engineers designed and refined the mechanical, software and electronic/servo-control mechanisms to achieve high accuracy while the machine is in motion and under load. Proprietary CNC software, also developed in-house, uses custom volumetric error compensation algorithms that provide unprecedented accuracy on large-scale projects. Machine positions are controlled by servo mechanisms with extremely high-resolution optical encoders. The resolution of these encoders is better than 0.000012 inches (0.312microns). A typical sheet of paper measures .003 inches.

In the midst of challenging economic times, Janicki Industries has built ongoing success because of the technology the company develops and the creative ways it is applied for customers who have uncompromising demands.

"We've been in business 18 years," Hunter explains. "Originally the idea was to market 5-axis mills, but we discovered that customers didn't want the machines. Instead they wanted someone to make their tooling, so that's what we did. We started with customers in marine and transportation, and over years we got into commercial and defense related aerospace. We have worked on projects including the F-35 Joint Strike Fighter, the Boeing 787, the Las Vegas Monorail, various NASA vehicles, experimental windmill blades, and the America's Cup yacht BMW Oracle."

These projects typically involve highly advanced technology, but the new materials and methods Janicki Industries develops sometimes find their way into less exotic applications. Hunter explains that the America's Cup project has led to the development of new composite sail technology that is starting to be seen on private vessels.

"When you work with all new technology there are no hard set guidelines, so we develop things as we go," Hunter says. "We have two research and development departments, one focusing on materials and another on automation. It's interesting work and our engineers enjoy it because they get challenged all the time."

Given the high level of precision that Janicki Industries provides, pneumatic controls are utilized frequently. "When our Automation Group is developing a new machine for preparing composite fabrics," Hunter explains, "they prefer to use pneumatic motors and drives because these enable variable outputs that can be adjusted easily and precisely. Pneumatic motors are also used to operate four massive doors on our 100-foot-long curing oven, which is one of the longest on the West coast."

While Janicki Industries makes much of its own equipment, some important systems are purchased. An example is the compressed air systems that provide house air for a wide range of uses throughout Janicki Industries' operation.

"We use compressed air for pneumatic tools, operating systems on the mill, purging air in control cabinets, just about anything else you can think of," says Hunter. "One interesting application we have for air in Hamilton is air bearing pallets that allow one person to move a 40,000 pound load alone. Hook it up to house air and the pallet floats on a cushion of air."

One air bearing is located at each the pallet's four corner. The bearings are comprised of a perforated

***When a successful, technology driven business that makes much of its own equipment purchases equipment that they don't make, its expectations are high. Hunter says that is the case with Janicki Industries. "When we buy technology from someone else it has to be as forward thinking as we are."***

membrane, about two feet square, which looks something like the flexible top on an air hockey table. Bearings are sized for a certain load based on the number and placement of holes in the membrane. At Janicki Industries, house air at 120-125 PSI is fed to the perforated membrane. The larger the load, the more air is required, but even a 20-ton load just floats on the floor.

Janicki Industries does not do assembly line work, so it is difficult to predict the operation's compressed air demand day to day. Because air demand varies widely, an air compressor that runs efficiently at any level is essential. Janicki Industries has selected Variable Speed Drive (VSD) air compressors from Atlas Copco.

A VSD compressor varies the production of compressed air, continually and automatically, to meet the actual ongoing air requirement. Compared to a fixed drive compressor sized for the same application, a VSD compressor consumes about 35% less power. Because energy typically accounts for 75% of a compressor's total lifetime costs, VSD compressors provide superior return on investment.

VSD compressors are available as integrated systems including all the components required to produce clean, dry, high quality compressed air. Integrated systems also reduce installation and operation costs, and eliminate the potential for air leaks and pressure drops to further reduce energy consumption.

"We had an Atlas Copco VSD compressor at our main site in Sedro-Woolley," Hunter explains. "When we built a new building in Hamilton we had another brand of compressor, one that we'd had in the past, but the drives in that compressor were bad and the machine was down six out the 24 months we had it. We can't have that, so we replaced the bad compressor with an Atlas Copco GA75VSD. So far we've had zero problems."

The purchase of a Variable Speed Drive compressor made further economic sense because of a rebate program sponsored by Janicki Industries' electric utility.

***"We can recover up to 50% of the cost of a VSD air compressor from Puget Sound Energy,"*** Hunter

explains. "Our projected payback period is about 24 months, which is fairly short, but it's also a function of the nature of the projects we're working on. Depending on how much we use the air bearings, which use a lot of air, it could be different. So far we've had good experience with the savings realized."

***Cost-effective operations at Janicki Industries' Sedro-Woolley location are supported by an Atlas Copco service contract that has been in place since 2007. "Air compressors are complex systems," says John Kuipers, Service Sales Manager with Atlas Copco Compressors LLC in Kent, WA. "Proper service is key to a compressor's reliability and long life, and ensures that the compressor operates with the best energy efficiency. It's also one less thing that a customer needs to worry about. Janicki Industries has more important things to focus on than compressor maintenance, so they leave that to us."***

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