



BELAC NEWS

A Chromalloy Joint Venture Company

From the President of BELAC LLC

With a team dedicated to product safety and reliability, BELAC is fully committed to ensuring that the well-being of your customers is at the forefront of everything we do.

We were the first to achieve Parts Manufacturer Approval (PMA) from the Federal Aviation Administration for the sale of High Pressure Turbine (HPT) engine blades for commercial and military aircraft. Now with more than 43,000 BELAC HPT blades in operation — over millions of flight hours — we're proud of our record.

No Airworthiness Directive has ever been issued in our history and all equipment is designed to outperform the OEM standard.

How did BELAC achieve a record of exceptional safety and reliability?

Every BELAC HPT blade is the result of testing, inspection and quality control. We adhere to the same rigorous standards as the OEMs. BELAC conducts FAA-supervised tests and subjects turbine blades to extreme temperatures for extended periods — conditions far beyond those experienced in normal flight. Inspections provide assurance that each manufactured part conforms to FAA-approved design data and is safe for operation.

And the BELAC quality management system is certified by the international manufacturing standard ISO 9001:2000 and aerospace sector standard AS9100B.

Trust BELAC for safety, reliability — and exceptional quality.

Chong Yi
President



New Chromalloy Castings serves BELAC and customers worldwide

Chromalloy has unveiled a new state-of-the-art casting center in Tampa, Florida. The 115,200-square-foot facility more than doubles capacity over the company's previous casting center in Tampa.

The operation is a key supplier to BELAC LLC and casts all BELAC High Pressure Turbine (HPT) blades.

The new center is already operational and company officials are planning open house tours for customers later this year. "The new center has 10 furnaces, produces turbine parts in up to 30 different alloys and superalloys, and at any given time is casting parts for up to 20 customers," said Tom Trotter, Chromalloy Castings General Manager.

Chromalloy Castings is larger than most industrial casting facilities in the world, offering more in terms of materials used and the size and proportion of turbine engine blades and components that can be cast.



With the expanded capability, Chromalloy has become a single-source provider for new parts for Original Equipment Manufacturers (OEM), as well as a supplier to turbine operators who order Parts Manufacturer Approval (PMA) airfoils and components through Chromalloy and BELAC.

With BELAC design engineering, testing, certification and production of HPT blades, the Chromalloy casting center assures the highest quality and reliability for PMA equipment. 🌐

BELAC inspection process goes Lean

When founded in 1998, BELAC LLC used the latest manufacturing principles to develop the facility's production layout, workflow and processes.

BELAC has remained dedicated to continuous improvement over the years. And the business routinely evaluates its work areas and processes to determine where improvements can be made.

The Operational Excellence team recently developed a value stream plan and identified the



product inspection area for improvement. Tony Smith, Director of Manufacturing, said as BELAC production volume continued to increase over the years "that growth set the stage to identify new and better ways operationally to conduct the inspection process."

Changes to the business's inspection area by a trained Lean team resulted in a new scheduling process and paperless system for submitting quality forms. Work flow improvements in the shop reduced part travel distance. "The result has been very positive," Smith said. 🌐

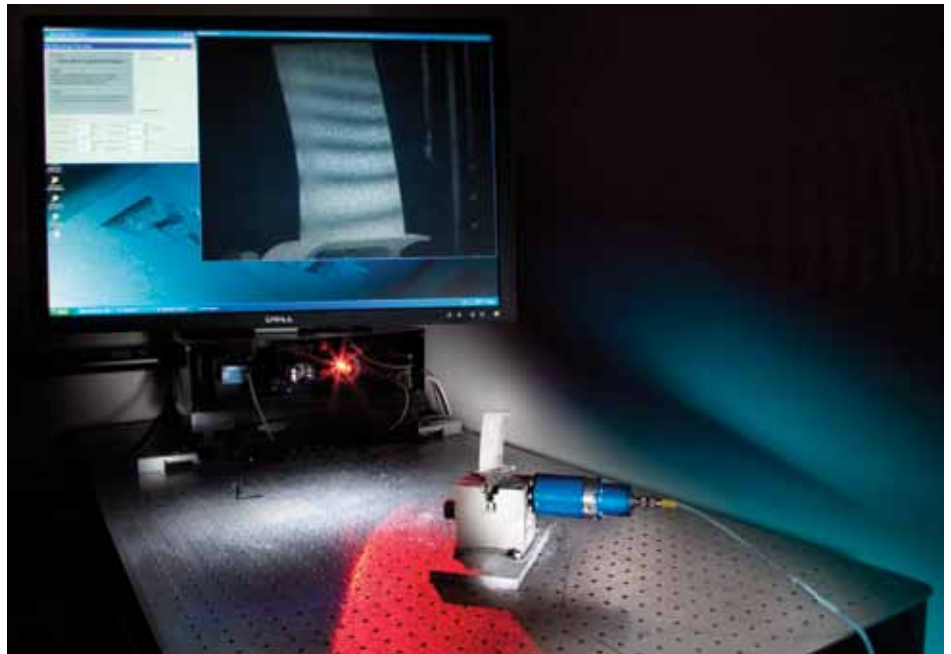


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BELAC Laser Holography System

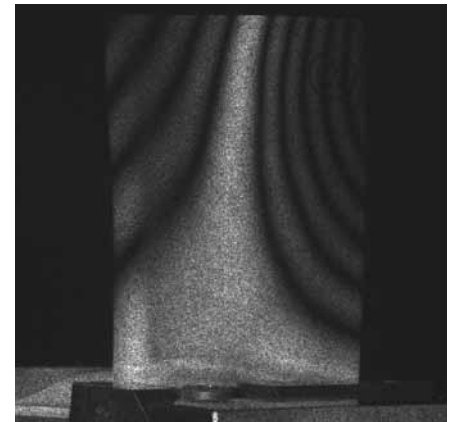
Rigorous testing ensures HPT blade quality, reliability

The BELAC development process for Parts Manufacturer Approval (PMA) High Pressure Turbine (HPT) blades includes of a series of tests and inspections performed to ensure the parts are substantiated to the Federal Aviation Administration (FAA) as equivalent to original equipment manufacturer (OEM) parts.

Testing and inspections demonstrate that BELAC HPT engine blades perform identically to or better than their OEM counterparts.

"Modal testing is one such test performed on BELAC and OEM HPT blades to provide an exact comparison of blade vibrational characteristics," said Mehrdad Vandyoussefi, Director of Engineering. Modal testing identifies the natural frequencies and mode shapes of BELAC blades to determine if they are within the ranges of the OEM parts. BELAC performs modal testing on HPT blades using laser holography technology.

In the modal testing, a signal (low-voltage electric current) is sent to a mechanical vibration source (shaker) via an amplifier. The shaker transfers mechanical energy to the blade with tightly controlled frequencies and amplitudes in order to "excite" the blade — and consequently the blade starts vibrating. The returning signal from the blade is processed to obtain the blade's natural resonance frequencies.



Real time mode shape representation of the 1st order torsion frequency on a BELAC PMA First Stage HPT blade.

Simultaneously, the blade is exposed to a laser beam as a part of the process to generate an interferometry image. The image captured by the high-resolution digital camera is then processed by the laser holography software to create a mode shape image.

During the PMA substantiation process, at least 50 new blades of each BELAC and OEM blade are evaluated for modal testing by means of laser holography. With the use of this leading technology, Belac demonstrates that its quality parts have equivalent performance to OEM's when subject to cyclical loads. 🌐