Rapid and Accurate Wall Thickness Measurement of Turbine Blades using CT

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Abstract
Engine performance requirements are driving changes in component manufacturing technology to multi-wall castings, complex cooling schemes, matrix composite, additive manufacturing and other new techniques. This next generation of component parts is also driving an evolution in Non-Destructive Testing (NDT) requirements. As we begin to widely make the transition from film to digital radiography, we are now needing to look much further beyond just basic digital radiography, but into the technology that it enables and facilitates. Many of these new manufacturing technologies contain the need for internal feature visualization and measurement, they push the inspection limits and force a shift from what has historically been ultrasonic and film methods to computed tomography (CT) inspections. CT has long been used in NDT research labs and development centers, but is now being required in production environments causing a closer look on throughput, visualization and cost of ownership needs for successful implementation of this advanced technology. Throughput improvements can be achieved by utilizing faster and more efficient detectors, higher energy sources or a combination of the two. Application needs dictate visualization requirements, the throughput can also be achieved by visualizing only slices of the CT volume, which also creates a more familiar 2D image for the inspector. More difficult applications, might require volumetric data which presents further challenges to maintaining throughput and production cycles and operator training for 3D visualization. Total cost of ownership expectations should also be considered while making the trade-offs in system technology between source and detector, visualization needs and throughput. As we begin to adopt digital radiography for many applications, we must already look beyond at utilizing CT technology and the requirements in production environments to keep up with the rapid evolution in manufacturing technology.

Keywords: Radiographic Testing (RT), Computed Tomography