TEServices Training

Metallurgical Aspects of IGT Component Repair

Outline:

General Metallurgy

Superalloys

Heat Treatment

Degeneration

Coating

Stripping/Cleaning

Welding

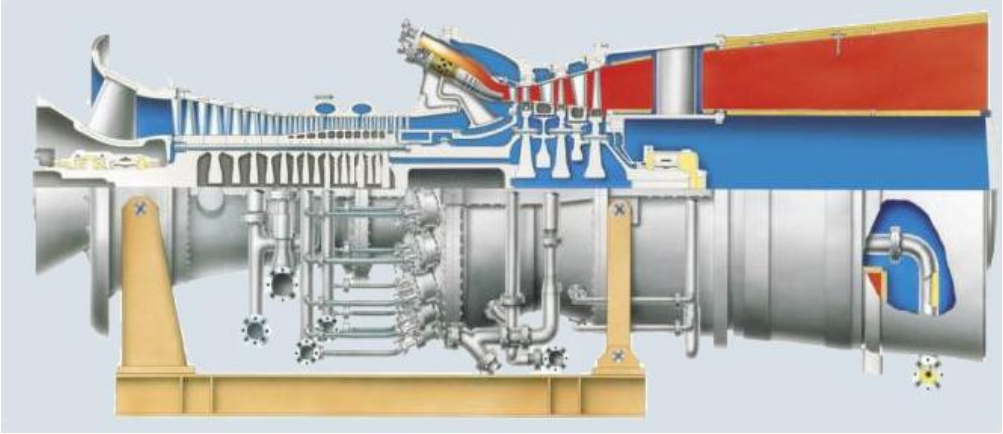
Brazing

Inspection NDT

With Case Studies

After this training, the participants should be able to:

- Recognize degeneration of IGT gas turbine components.
- Select the proper repair and coating technology to reverse this effect.
- Create an action plan to refurbish (repair and coat) these components, with proper heat treatments and in the proper sequence.



- The intention of this course is to provide technical background so that participants can make, metallurgical, sound decisions concerning the repair and coating of IGT components. This course is focused on employees of IGT refurbishment facilities who make sales, technical and production decisions, as well as give directions to refurbishment technicians. For end-users and their employees who get involved in repair of IGT components for purchasing, technical, maintenance and operational decisions, this course will be beneficial. It will enable them to understand the jargon of the refurbishment companies, make sound repair and coating decisions, create work scopes and request for quotes, review these quotes to select the best vendor, and follow the repair, coating, and inspection. The training format has been proven suitable for degreed engineers, technicians, and non-technicians.
- A full colored training manual, covering about 1000 slides is included, which will become an important information source.
- TEServices can provide training at your facility world-wide, meeting your agenda. Please contact hvanesch@TEServices.com for more information.
- The next training course will be January 20, 21 and 22 2026, Spring Hill Suites By Marriott, 2120 Nasa Parkway, Seabrook, TX 77586 Register and pay before December 20, 2025, to receive a $325 discount.
- The 3-day training course, including manual, certificate and lunches, is $1975 per participant.

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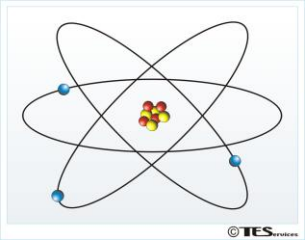
- Inspection NDT
- With Case Studies

First Day

Introduction **8:00 AM**

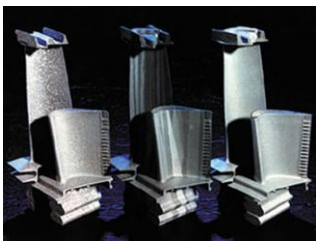
Materials fundamentals **8:30 AM**

From the atom, atom structure, metal and its alloys, solidification and phases are introduced and explained. This forms the basis of the superalloys, heat treatment and other sessions. Next are the important mechanical properties described such as: Stress and strain, yield and tensile strength, ductility, elastic modulus, creep, and hardness. This is followed by strength mechanism of the metal structure: Strain hardening, reduce grain size, solution strengthening and precipitation hardening.



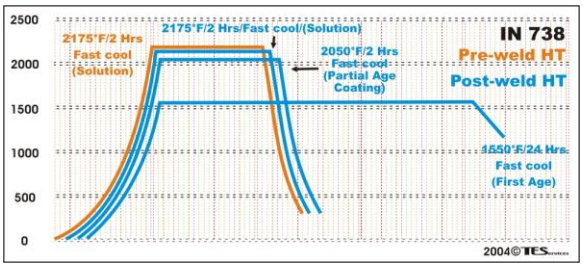
Superalloys **10:30 AM**

After a historic overview, a short refreshment of the strengthen mechanism, explained in sessions 1, is given. The difference between Fe, Ni and Co base superalloys is explained and their application in the IGT reviewed. The effect of strength and other mechanical properties of carbides, TCP phases, gamma prime, solution strengthening and grain size, will be explained and placed in superalloy context. The effect of Al and Cr is explained in the last chapter.



Heat-treatment **1:00 PM**

The different furnaces used for IGT components repair with their advantages and limitations will be discussed. Next, the quality issues related to heat treatment will be reviewed. The effect of heat treatment on weldability and serviceability will be explained for steel, cobalt, and nickel base superalloys. Attention will be given to the differences between solution strengthening and precipitation hardening nickel base superalloys.



Case Studies **3:00 PM**

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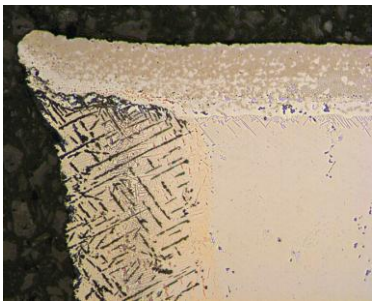
Second Day

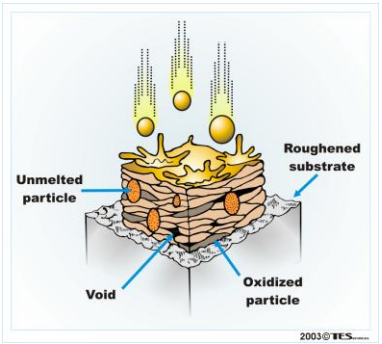
IGT Component Degeneration — 8:00 AM

After introduction of the industrial gas turbine, the operation condition of the IGT components and its degeneration are discussed. Base materials and coatings of the IGT components are reviewed in the eye of the environment that they are operated in. Further samples of degeneration are given.



Coatings — 10:00 AM

All the coating processes, such as LPPS, HVOF, EB-PVD and CVD, which are used for protecting IGT components, are described. The application of these different coating processes for different environment in the IGT are given with the advantages and disadvantages of them.



Stripping and Cleaning — 1:00 PM

The different chemical, thermal chemical, mechanical and other stripping, and cleaning methods will be reviewed. Some of these methods are hydrogen and fluoride ion cleaning, water jet, salt batch and coat and strip methods. This session will be concluded with the different inspection methods, such as heat tint, macro-etch and metallurgical evaluation.

Case Studies — 3:00 PM

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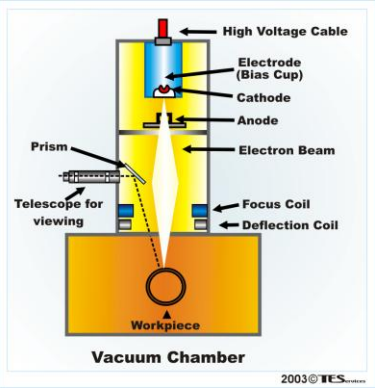
Third Day

Welding

8:00 AM

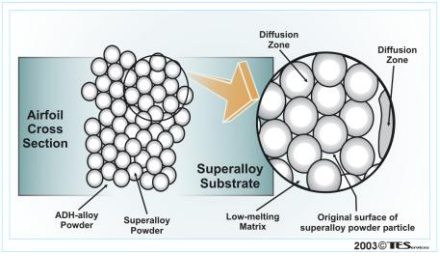
The different welding processes which are used for IGT component repairs are described, and their characteristics given. For the different base materials, a typical weld scope, advantages, and disadvantages of the different weld methods as well as samples of repairs are given. The difficulties of welding precipitation strengthening superalloys and how to overcome these get special attention.



Brazing

10:00 AM

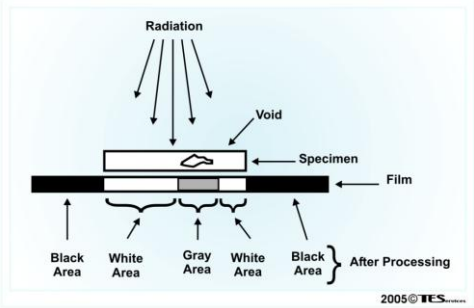
The different brazing processes which are used for IGT component repairs are described, and their characteristics given. The cleaning methods for the different base materials are revisited again and the advantages and disadvantages of brazing versus welding are discussed.



Inspection: NDT

1:00 PM

Explanation of the different Non-Destructive Testing methods used for inspection of the IGT components, such as Magnetic Particle Testing (MT), Liquid Penetrant Testing (PT), Radiographic Testing (RT), Eddy Current Testing (ET) and Ultrasonic Testing (UT) and application of the NDE technologies to inspect IGT components are given.



Case Studies

3:00 PM

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Instructor: Hans van Esch

With Senior Level technical expertise in IGT refurbishment, Hans van Esch is a metallurgical authority. His career at Hickham Industries, Elbar, and Chromalloy coupled with bachelor's degrees in chemical engineering and business administration have enhanced a long career in process development for IGT repairs and coatings. Specialty repair process knowledge includes heat treatment, HIPing, chemical cleaning and stripping, inspection, welding, high temperature brazing and coating. A member of ASM, ASME and AWS, Hans has been active as session chair, member of several sub-commissions, wrote and presented papers and training sessions. Projects include support for EPRI --Westinghouse 501, GE MS7001 and MS9001 conventional and advanced component repair specifications. Hans has several Turbine Component Manufacturing and Repair patents.

Registration form: **Spring Hill Suites by Marriott**
2120 Nasa Parkway
Seabrook, TX 77586 - Tel: 281 474 3456
January 20, 21 and 22 2026

Name: _____ Title: _____

Email address: _____Phone:_____

Company:_____

Address:_____

City: _____State: ____ZIP: _____

_____ I have enclosed check or PO to TEServices, Inc.

_____ I will pay (credit card) through PayPal.

• For more information contact Hans van Esch, TEServices phone 281 867 1500 or email to: hvanesch@TEServices.com.

• Please scan and email the registration form to hvanesch@TEServices.com or mail to TEServices, P.O. Box 58781, Houston TX 77258.

• The 3-day training course, including manual, certificate and lunches, is $1,975 per participant.

• Register and pay before December 20, 2025 and receive a $325 discount.

• Cancellation fee after December 20, 2025 is $650.

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www.TEServices.com
Mail@TEServices.us
Phone: 281-867-1500

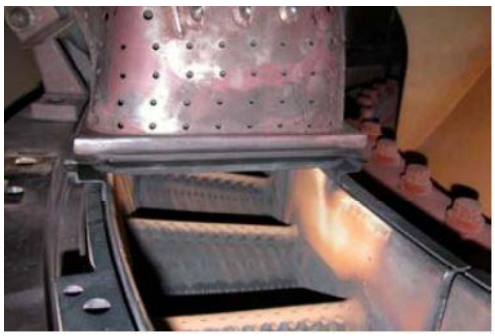
TEServices

Turbine End-user Services, Inc (TEServices) in Houston specializes in the following Gas Turbine related services:

Audits

Technical and Quality Audits

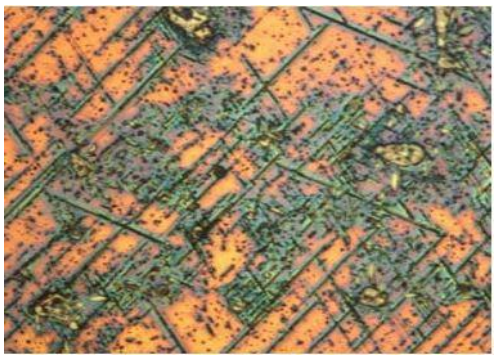
To ensure that your suppliers have the technical expertise, resources, and quality system in place.



Verification

Intensive Vendor Verifications

To ensure that your components are manufactured and refurbished to your specifications and expectations.



Metallurgy

Metallurgical Evaluations

To assess the initial, work in progress, and refurbished condition of your gas turbine components.

Training

Comprehensive Training Courses

To increase your knowledge concerning gas turbine component manufacturing and refurbishment.

Other

Resolving Technical Issues

To evaluate your needs, and create your repair and bid specifications, as well as to assist resolving overhaul, maintenance, repair, coating, and inspection issues.

Let TEServices help you resolve your gas turbine component problems