

# Combustion Inspection Elimination Kit



**High-tech process to eliminate the requirement for combustion outages between HGP and Major overhauls.**

Gas Turbines were originally manufactured with an expected operating time between overhauls of typically 8,000 hours when operating on gas fuel. Utilising the latest technology, plant users expect the most efficient performance levels available on the market. However, the addition of certain new or upgraded components to older equipment can bring attractive gains in terms of improved availability, improved fuel economy and increased power output.

With regard to availability, Turbine Services has introduced a programme to greatly improve the durability of combustion system components. This programme improves cost effectiveness of gas turbine operation by increasing combustion inspection intervals by up to 16,000 hours, and consequently leading to improved availability.

## The Problem

Stress, wear and creep growth are very common problems with the following consequences:

- Thermal stresses leading to cracking of critical components
- Excessive wear due to vibration caused by the combustion dynamics
- Creep growth in areas such as the transition piece picture frames, which leads to distortion and incorrect power distribution in the critical gas path

## The Solution

By the application of thermal barrier coatings, local "hot spotting" of the parent materials is reduced, as is the thermal stress, thus preventing cracking of critical components. By applying hard-face coatings and wear resistant materials, and by reducing clearances, wear due to vibration is minimized.

Nimonic material, which has better creep resistant characteristics in the area of the picture frame is now used extensively - in fact complete transition pieces can be supplied in Nimonic material.

## The Benefits

By employing the latest technology in this way:

- Availability is increased by reducing the number of overhauls
- Spare parts requirements are reduced

...all of which allow the power station managers to achieve their objective of increasing the overall profitability of their plant.



## The Programme

Turbine Services Component Inspection Elimination Kit, which can be tailored to suit customer Requirements and offers benefits in the following areas:



### Fuel Nozzle Tip

The gas tip diameter is machined, coated with a high temperature wear resistant material using an HVDF system and dimensionally checked to verify optimum clearances.

### X-Fire Tubes & Retainers

A Stellite wear-resistant coating is applied to the male and female X-Fire tubes on the flange. This considerably reduces wear, in this area, which mates with the tube retainers.

### Flow Sleeve Stops

(not illustrated)

The stops which locate the combustion liner in the flow sleeve have been redesigned. Additional material has been inserted into the stops to provide a wear surface in what has previously been found to be a critical area.



### Combustion Liner

**Fuel Nozzle Collar** The collar is machined and then hard-face coated, and the collar 10 ground to specification.

### Liner Stops

Hard face coatings are applied to mating areas with flow sleeves.

### Hula Seal

The area of seal in contact with the transition piece forward area is hard face coated.

### Liner Body

Thermal cracking, and high temperature oxidation attacks can be substantially reduced by the application of a NiCrAlY base coat and a Zirconium oxide top coat.

### Transition Piece Assembly



### Aft Picture Frame Arrangement

Hastaloy end frames are removed and replaced with frames of Nimonic material in a special welding fixture. U-Section inserts made of a special wear resistant material are welded into the seal groove on the picture frame. New floating seals and a redesigned side seal are supplied as part of the kit.

### Coatings

A wear-resistant coating is applied to the transition piece forward diameter on the mating area with the combustion liner Hula Seal. The aft end is coated with a Zirconium oxide application. (Thermal Barrier Coating).



### H-Block Anangement

Wear-resistant material inserts are welded to the existing H-Blocks. These two locations mate with the forward transition piece support bracket (Bull horn support).



### Bull-Horn Supports

The transition piece support fingers are machined back to allow for the installation of a cover of wear resistant material on each of the two arms of the Bull-Horn bracket.



TURBINE SERVICES is a global provider to owners and operators of industrial gas turbines, offering an employee skill-base in excess of 2,000 man-years of experience in gas turbine maintenance solutions. With our heritage in John Brown Engineering, our primary specialization is in the heavy duty frame range of GE designed gas turbines.

Our business is founded on the strength of our technical and engineering capability, reinforced by our commitment to quality and customer satisfaction that is demonstrated by our accreditations (ISO 9001:2000) and registrations (Achilles, Supply Line, FPAL and Repro).

In addition to our extensive experience, our customers also benefit from the high-tech capabilities of our parent company, Chromalloy. Leading the industry in advanced technology derived from 60 years of aero and industrial gas turbine component experience, we offer state-of-the-art component, repair, coating and manufacturing technologies.

Turbine Services is a division of Chromalloy Gas Turbine Corporation with interests in the global Aero & Industrial Gas Turbine market sector.

### Services include:

- Plant operation & maintenance
- Field & engineering support
- Component refurbishment
- Replacement spare parts
- Turbine control systems
- Plant operator training
- Rotor Overhaul
- Condition Monitoring
- Long Term Service Agreements
- Turbine Refurbishment



Gas Turbine | Maintenance | Repairs | Spares | Parts

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