



# Control Valve Upgrades

## Control valve upgrade for BBC KT-Series steam turbines

**Valves are a key element for the safe and reliable operation of steam turbines. GE offers upgraded valves that help improve reliability and efficiency.**

### Reliability Improvement

**GE regularly reviews many important components based on its extensive field experience. Configuration improvements and upgrades are applied to new products that fulfil changing requirements of the modern power generation. The core elements of valves from the former BBC KT-Series, delivered by ABB company, have been modified in order to improve their reliability and performance.**

### Background

The control valves for steam turbines of the KT-Series were developed in the 1980's. Operational experience and inspection findings have shown improvement needs. The findings displayed, for example, failures in the connection of the valve spindle with the valve head, scaling piston ring grooves, wear marks at the nitrided spindles and at the piston rings. Such a wide field experience has contributed to the development of a new upgrade package that is now available.

The steam tight control valve will help prevent premature turning of the turbine during start up procedure.

### Solutions

Upgrades are available to improve the reliability and performance of the existing valve configuration (see Fig. 1). A simple upgrade uses a single piece valve head and spindle. The sealing rings are placed in the valve head (Fig.2). The guide surfaces are welded stellite and sprayed with chrome carbide. This valve concept relies on the sealing rings to reduce leakage to the turbine when the valve is closed.

Only the internal parts of the valve are modified. For the simple upgrade, the valve chest, the actuator and the shaft end part remain unchanged.

The bell-like valve head is an inverted tube type concept and made out of a single piece with the shaft. The head now takes up the seal rings. The head guide insert is adapted accordingly and is of a totally new architecture. Only the valve lock has to be machined on site in order to take up the new head guide. The gliding surfaces are satellite sprayed instead of nitrided.

A more comprehensive upgrade is for a valve with a pre-stroke (Fig. 3). This type of valve seals completely when closed. There are no sealing rings. Guiding surfaces are welded/sprayed satellite and sprayed chrome carbide. For the upgrade to the pilot valve, a modification to the actuator is required. The upgrade can typically be performed within the timeframe of a routine steam turbine valve inspection.

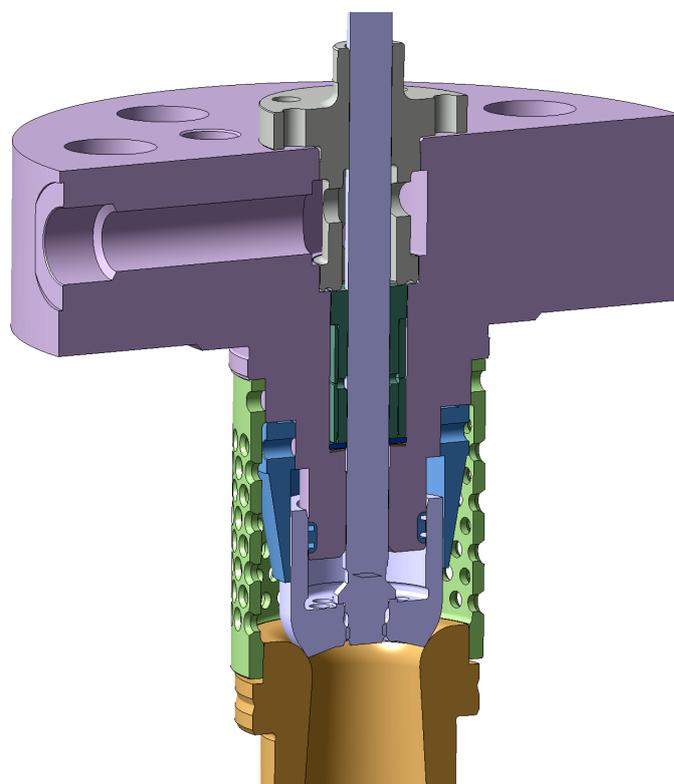


Fig. 1: KT-Series original control valve

## Key Features

- **New spindle with integral valve head**

With the spindle and valve head as one single piece, the major weakness of the original layout is improved.

- **Wear resistant cladding**

The cladding on the shaft and on the valve head reduces friction forces and results in a longer lifetime of this component.

- **Pilot valve option**

The optional pilot valve assures a steam tight system when closed. The new opening sequence requires a modification of the valve actuator.

- **New integral valve head helps improve reliability**

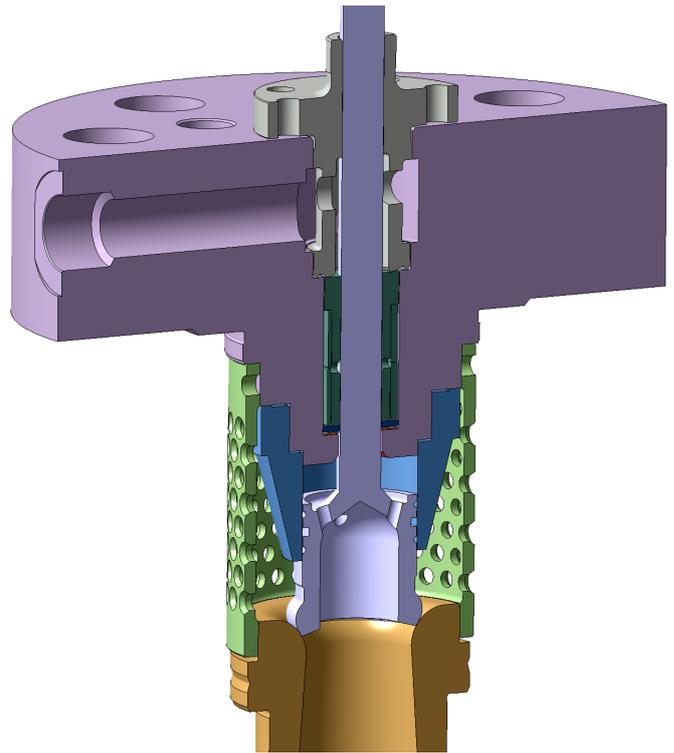


Fig. 2: KT-Series upgraded control valve

## Benefits

- **Reliability improvement**

The improved wear resistant cladding reduces friction forces and therefore the probability of shaft sticking. When fitted with the components the valve performs like new once returned to service.

- **Operational improvement**

The steam tight control valve will help prevent premature turning of the turbine during roll the start up procedure.

- **Outage time reduction**

The new cladding reduces wear during operation and helps prevent repair work.

- **Short modification time**

The required work can typically be performed during a standard valve inspection.

## Applicability

The control valve upgrade package may be applied to all BBC KT-Series turbines.

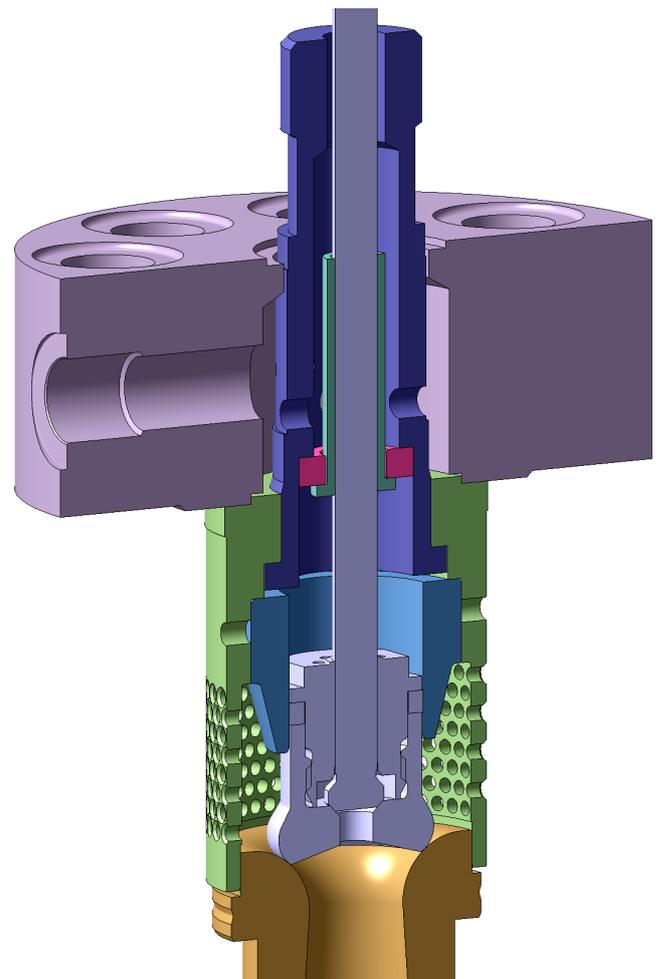


Fig. 3: KT-Series upgraded control valve with pre-stroke