

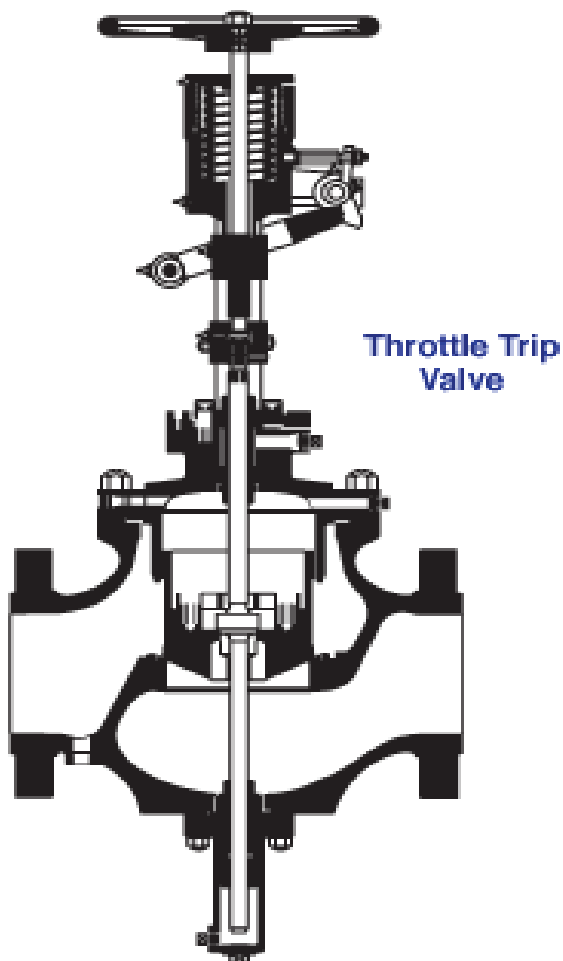
STEAM TURBINE TRIP & THROTTLE VALVE

By Sydney Gross

The T&T valve, as it is often referred to on industrial turbines, is located upstream of the steam chest and often mounted directly to it. Its main function is stopping the steam flow to the turbine to discontinue operation in emergency situations. It may also be referred to as the emergency stop valve or trip valve with some distinction in the ability of the valve to act as a throttling device. Apart from its emergency function, it is also often used to start the turbine by manually opening it to slowly admit steam to the turbine and bring rpm up to minimum governor speed, as well as execute solo trip testing runs. These functions are growing less popular, however, with the proliferation of more sophisticated electronic governing systems

capable of ramping a turbine from stopped, through slow roll, warm up and critical speed(s) to operating and trip speeds using the governor valve system.

The valve plug, once opened and latched, can be rapidly closed through a heavy duty spring attached to the spindle. Latching in the open position is typically maintained by an oil operated cylinder which responds to loss of oil pressure by releasing the latch and allowing the valve to shut. Closing time is on the order of less than ½ second. Loss of oil pressure to the latching cylinder is accomplished through a dump valve circuit that responds to events such as low lube oil pressure, over speed, rotor axial position change and high vibration as well as manual tripping.



T&T valves see harsh operating conditions. The valves are subject to high temperatures & pressures and to deposition. They are the leading causes of accidents, often during over-speed testing events. While some improvements are being made, like automated partial stroking of the valves, the entire trip system should be tested on occasion. Current generation T&T valves are designed to be exercised regularly without affecting train speed or process parameters. But many older models are not configured to permit or reliably execute partial stroking. Because exercising is critical to detecting problems and avoiding critical failures on demand, consideration should be given to upgrading or replacing valves not suitably designed or equipped.

Installed T&T valves should be sent back to the manufacturers for teardown inspection and reconditioning at each major turnaround. The repair centers will disassemble and clean valves, recut or relap seats, and recondition and reassemble the units with new gaskets, packing, washers, springs, etc., as necessary. Valves will also be hydro-tested and operationally tested.

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