TURBINE PROCESS CONTROL

GE's Mark Vle DCS has one feedback loop that controlled the motor speed. The HIL simulator (P4-STM) generate setpoint trajectories for speed control (P2-SC).

AutoSD

P4-STM

P2-SC

Speed demand

SIT01

VIBTR[01:04]

Current speed

Shaft vibrations

key phasor

VIBTR01

VIBTR03

rotor shaft

Motor

VIBTR02

VIBTR04

FIGURE 10. TURBINE PROCESS CONTROL ARCHITECTURE

P2-TRIP: Over-speed and over-vibration trips

The purpose of trip is to prevent an over-speed and over-vibration of a turbine. A turbine runs when the monitored speed (SIT01) is above the RPM trip rate (RTR) or any of four vibration sensors (VIBTR[n]) are above a preset limit (VTR[n]), and then the emergency stop (Emerg) become active. The turbine run mode is activated if the push button to exit the trip mode (TripEx) is successfully triggered.

P2-SC: Speed Control

The P2-SC speed controller increases the motor speed from zero to the minimum controlling speed at a constant rate. Moreover, it facilitates engagement control with a proportional integral derivative (PID) controller to maintain the motor speed value (SIT01) as close as possible to the speed setpoint

value (AutoSD).

AutoSD

SCO

Turbine

SIT01

(P2)

P4-STM

Saturation

Ramp

Activate

PID

o

Saturation

Controller

Switch

P2-Speed Control (SC)

FIGURE 11. SPEED CONTROL OF A TURBINE.