

PRODIGY

THE PRODIGY PLATFORM IS THE NEXT GENERATION OF CCC TURBOMACHINERY CONTROL SOLUTIONS. INTEGRATED WITH ADVANCED CONTROLS, APPLICATION EXPERTISE, AND ENGINEERING SUPPORT OFFERED BY CCC, THE PRODIGY CONTROL SOLUTION HAS BEEN DEVELOPED TO IMPROVE YOUR PROCESS AVAILABILITY, INCREASE PRODUCTION AND MINIMIZE LIFECYCLE COSTS.

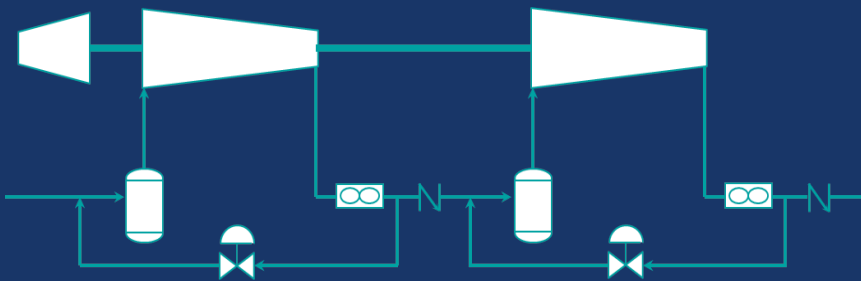
Total Train Control[®]

Driver Control

- Gas, Steam and Extraction turbines
- Variable Speed Drives
- Startup/Shutdown Sequencing

Compressor Control

- Single/Multi-Section
- Axial/ Centrifugal
- Compressor networks



Process Control

- Mass Flow
- Pressure
- Flare control
- Quench
- Temperature

Maintain Process Availability

As disturbances in your process happen, it's important that you not only stay inside process limits, but stabilize your operation as quickly as possible. CCC's proprietary algorithms have been refined through years of application-specific experience. These algorithms help you to minimize process upsets and quickly return your operation back to normal in a safe and controlled manner.

- Avoid single point failure risk with dual redundancy designed in every module
- Keep your unit running while replacing a hot swappable module
- Replace modules faster with self-learning functionality for plug-and-play
- Improve failure detection with quick and easy diagnostics
- Accurately perform your root cause analysis with 1 ms resolution Sequence Of Events (SOE)
- Maintain your operation with fallback strategies that help you in case of transmitter failure
- Minimize risk of shutdown with embedded CCC control applications functionality and engineering solutions
- Eliminate mechanical failure with "fan-less" design



Optimized Production

With CCC control systems, you can safely operate closer to your process limits, reduce risk of trips, and achieve more process throughput.

- Run the compressor safely and efficiently by adjusting compressor performance based on production demand
- Increase overall unit efficiency by reducing or eliminating unnecessary recycling
- Balance load between compressor trains with advanced and proven load sharing algorithms
- Reduce risk of trips with advanced control algorithms for minimizing the effect of process upsets, including feed-forward control, pressure override control, and loop decoupling
- Increase throughput and widen your operating envelope with coordinated strategies between the process and antisurge loops
- Achieve high quality of control and better diagnostics with fast loop execution



Decrease Lifecycle Costs

Longer control system lifecycle with 25+ years of support

- Reduce energy cost:
 - Direct Power savings with 2 x less power consumption than traditional system
 - Reduce overall system cooling cost
 - Leverage smaller UPS requirements for additional energy savings
- Minimize panel space with small system footprint and integrated FTAs
- Expand your system capabilities up to 576 I/O points with modular system architecture
- Keep consistency of operation by upgrading in stages with compatible legacy systems
- Minimize training expenses by staying with technology you know



EXPERTISE BEYOND CONTROLS™



$$h_r = \frac{R_c^\sigma - 1}{\sigma} \quad k_{avg} = \frac{\log\left(\frac{P_{d,des}}{P_{s,des}}\right)}{\log\left(\frac{P_{d,des}}{P_{s,des}}\right) - \eta_{p,des} \cdot \log\left(\frac{T_{d,des}}{T_{s,des}}\right)}$$

$$\Delta P_o = \left(\frac{W}{A}\right)^2 \cdot \frac{1}{\rho_d} \quad h_r = \frac{R_c^\sigma - 1}{\sigma} \quad \Delta P_o = \left(\frac{W}{A}\right)^2 \cdot \frac{1}{\rho_d}$$

$$\sigma = \frac{\ln(T_d/T_s)}{\ln(P_d/P_s)} \quad S_s = \frac{K \cdot f_1(h_r) \cdot P_s \cdot f_2(Z_2) \cdot f_3(Z_3)}{\Delta P_{o,c}}$$

$$h_r = \frac{R_c^\sigma - 1}{\sigma} \quad \rho_d = \frac{P_d \cdot MW}{Z_d \cdot R_o \cdot T_d} \quad k_{avg} = \frac{\log\left(\frac{P_{d,des}}{P_{s,des}}\right)}{\log\left(\frac{P_{d,des}}{P_{s,des}}\right) - \eta_{p,des} \cdot \log\left(\frac{T_{d,des}}{T_{s,des}}\right)}$$

$$\Delta P_{o,img} = \left(\frac{A_{sp}}{2 \cdot A^-}\right) \cdot \Delta P_{o,ss} + \left(\frac{A^-}{2 \cdot A_{sp}}\right) \cdot \left[(R_c^-)^{(\sigma^- - 1)} \cdot (\Delta P_{o,s}^-) + \sqrt{[(R_c^-)^{(\sigma^- - 2)}] \cdot (\Delta P_{o,ss}^- \cdot \Delta P_{o,s}^-)} \right]$$

$$\Delta P_o = \left(\frac{W}{A}\right)^2 \cdot \frac{1}{\rho_d} \quad S_s = \frac{K \cdot f_2(Z_2) \cdot f_3(Z_3) \cdot Y}{X} \quad \rho_d = \frac{P_d \cdot MW}{Z_d \cdot R_o \cdot T_d}$$

$$\sigma = \frac{\ln(T_d/T_s)}{\ln(P_d/P_s)} \quad k_{avg} = \frac{\log\left(\frac{P_{d,des}}{P_{s,des}}\right)}{\log\left(\frac{P_{d,des}}{P_{s,des}}\right) - \eta_{p,des} \cdot \log\left(\frac{T_{d,des}}{T_{s,des}}\right)}$$

$$\Delta P_o = \left(\frac{W}{A}\right)^2 \cdot \frac{1}{\rho_d} \quad S_s = \frac{K \cdot f_1(h_r) \cdot P_s \cdot f_2(Z_2) \cdot f_3(Z_3)}{\Delta P_{o,c}} \quad h_r = \frac{R_c^\sigma - 1}{\sigma}$$

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