ETHYLENE

PROVEN EXPERIENCE. PROVEN RESULTS.

ETHYLENE

AS GLOBAL PLASTIC DEMANDS CONTINUE TO INCREASE, SO DO THE PRESSURES ON ETHYLENE PRODUCTION. WITH EVER-INCREASING PRODUCTION TARGETS AND A HIGHLY COMPETITIVE MARKET— OUR CUSTOMERS ARE TELLING US THAT IMPROVING RELIABILITY, MAXIMIZING PROCESS YIELD AND THROUGHPUT ARE BECOMING MORE AND MORE CHALLENGING.

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Process optimizations
for a 600,000 MT/A ethylene plant can achieve the following gains:

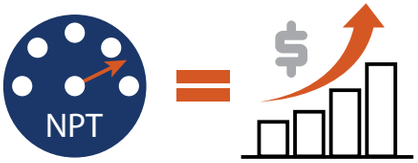
1%↑ THROUGHPUT = $**8,400,000**/ YR

1.5%↑ YIELD = $**12,600,000**/ YR

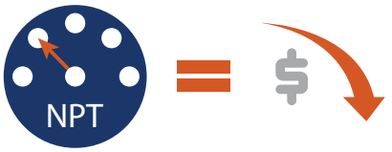
AVOIDING TRIPS = $**2,000,000**/ DAY

SHAFT POWER SAVINGS OF UP TO **9**%

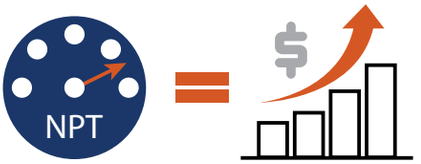
Higher compressor speed = increased throughput



Over time, increased process resistance results in speed reduction



CCC helps you maintain higher speed during times of increased process resistance



Increase Throughput

When using a control system that is constrained by a compressor pressure limit you may actually be operating below your production capabilities. Higher compressor speed equates to increased throughput. As time goes by, it becomes important to be able to handle increases in process resistance without being pressure limited which would result in reduced compressor speed. CCC's control system helps you to maintain higher compressor speed when you would otherwise be pressure limited. Advanced algorithms limit overshoot and provide tight control allowing the system to operate at higher pressure limits and at a higher compressor speed. Throughput is maximized by optimizing the pressure set point limits.

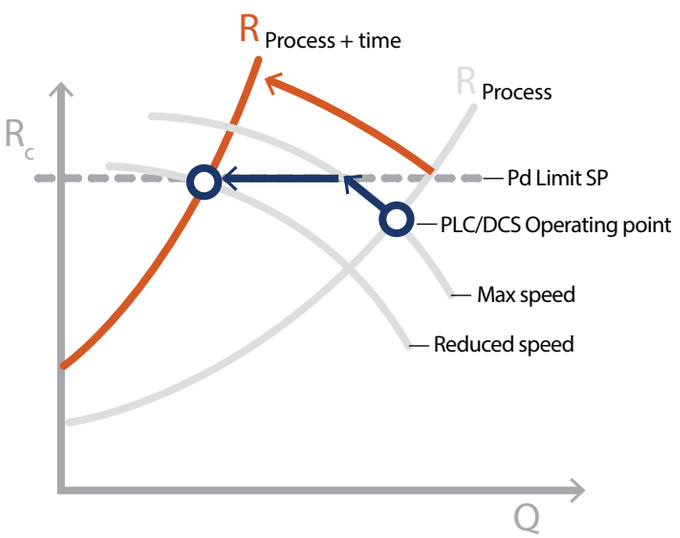
For every 1 bar (or 100kPa) of discharge Pressure (Pd) raised, customers can achieve between 1% and 1.2% increase in annual production.

Consider a 600,000 MT/A facility…

1% increase in throughput would equate to approximately $8.4M/year in increased revenue

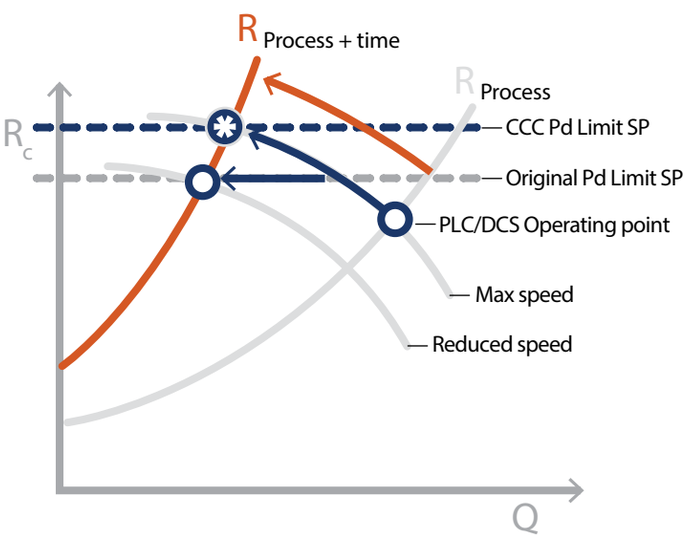
Life before CCC

Throughput is limited due to reduced compressor speed



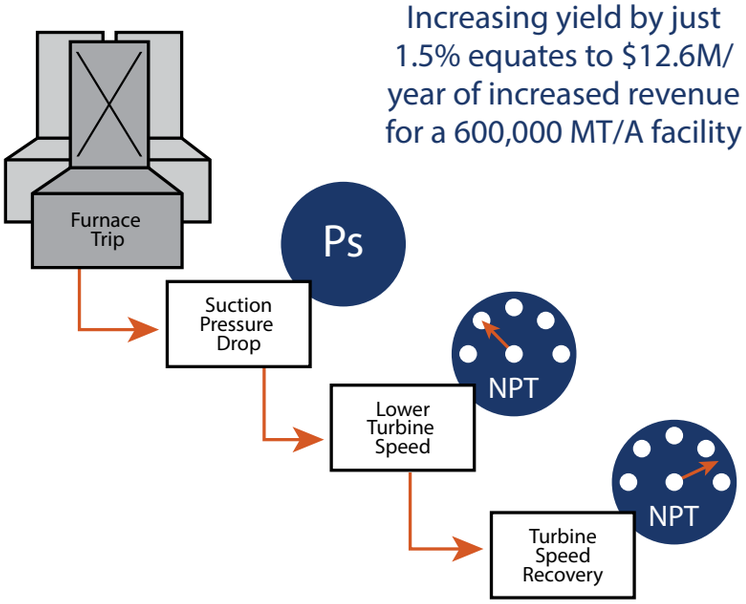
Life with CCC

Throughput is optimized due to maintaining max compressor speed



Achieve Design Yields

How your system responds during process disturbances could be costing you millions. When a single furnace trips, the suction pressure (Ps) drops. The turbine speed will then lower to satisfy control set point requirements. Once the suction pressure returns to normal, the turbine will return to normal operating speed. In some cases this sudden loss of Ps can even lead to a Cracked Gas Compressor (CGC) trip.



Increasing yield by just 1.5% equates to $12.6M/ year of increased revenue for a 600,000 MT/A facility

Response time is critical

- A sudden loss of Ps can lead to CGC trips.
- CCC takes only 2–5 minutes to stabilize pressure under the largest of typical disturbances.
- A general purpose control system may take up to 15 min to stablize pressure in a similar situation and large pressure swings could be experienced.

How does CCC provide you increased yield?

- Robust control algorithms minimize control margins and allow for control at lower CGC suction pressure.
- Coordinated control of the antisurge valves and turbine speed quickly stabilizes the process and satisfies the pressure set point in less time following process disturbances.
- Reducing CGC Ps by 14kPa results in an estimated 1.5% increase in yield.

Improve Reliability

Unplanned process shutdowns cost the average ethylene plant in excess of $2M in lost revenue per day. CCC engineers design coordinated antisurge control systems to provide the highest reliability without sacrificing performance. The control system provides a fast acting control response and advanced multivariable control techniques enabling users to maintain their production online.

Decrease Energy Costs

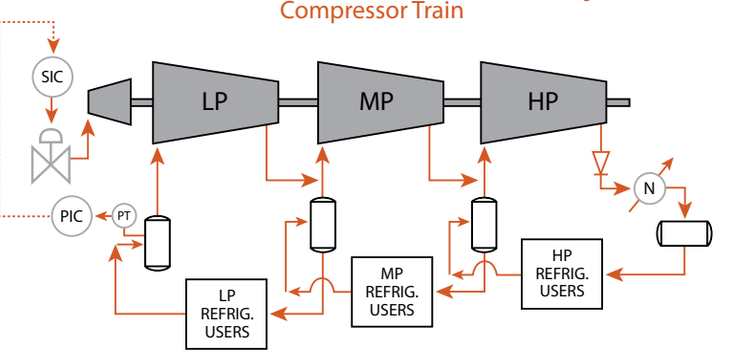
The interactions between front-end process changes and the propylene (C_3) refrigeration train are complex. Optimizing the train's energy usage is nearly impossible without advanced and integrated controls on the compressor and its driver.

Propylene (C_3) Compressor Train

The full integration of Ps control and antisurge control systems can allow for a significantly expanded operating envelop for each compressor section without recycle. Our customers have been able to achieve shaft power savings of as much as 9%.

Ask about our energy savings guarantee program.

Optimize operations of your Propylene (C_3) Compressor Train



EXPERTISE BEYOND CONTROLS™