KAALPANIK

BEYOND IMAGINATION

IOT CLOUD SOLUTION FOR "STEEL PLANT"

What they do...

1. A large integrated steel plant operates a 235 MW power plant to supply electricity for its manufacturing processes.
2. The client has invested heavily in automation for its equipment through the use of SCADA, PLC and DCS systems.
3. The condensers in the power unit are air cooled using fans equipped with Variable Frequency Drive (VFD) technology.

Questions we asked

1. Even though our clients employed advanced technologies to automate their processes, there was a known issue of suboptimal performance from its equipment.
2. The fans used in the cooling subsystems utilized the latest VFD(Variable frequency drive) technology, but we found that their speeds were not being controlled effectively. This was leading to suboptimal energy consumption.
3. An alternative energy consumption optimization framework would have involved significant additional capital expenditure along with modifications to the existing process and/or system.

What we did...

1. Kaalpanik offered a four week consulting engagement to stud historical operations data from the fans and make energy optimization recommendations.

2. Thereafter Kaalpanik engaged with the client to build out a real time analytics engine capable of recommending the optimal speed of the fan arra to the operators.

3. Additionally the analytics engine was also able to understand the vibrational pattern of the fan motor and provide early warnings of potential failure.

Value we offered...

1. The Kaalpanik solution lead to ~18% reduction in energy consumption for the ACC process, bringing down the usage b almost 3000 units per day.

2. The Kaalpanik solution was non-invasive for existing processes and systems and did not require additional capex infusion.

What the do...

A large integrated steel plant operates a 235 MW captive power plant to supply electricity for it's manufacturing processes.

The client has invested heavily in automation for its equipment through the use of SCADA, PLC and DCS systems.

The condensers in the power unit are air cooled using fans equipped with Variable Frequency Drive (VFD) technology.

Using Analytics to Reduce the Energy Consumption of Air Cooled Condensers in Power Plants

About the Client

Our client is a India based Steel and Cement manufacturing unit. The steel producing arm has a capacity of 1.25 million tonnes per annum. The steel plant also includes a 235 MW captive power generation unit as part of an integrated setup.

Incidental part of the electricity generated in the power plant is done using the steel plant's waste heat recovery mechanisms. A key feature of this installation is the Air Cooled Condenser system that uses ambient air to extract the sensible heat and latent heat of condensation released by the exhaust steam from the turbines and offers a significant advantage for water scarce regions like South India.

Our client organization is at the forefront of technology adoption in its manufacturing processes and had already implemented advanced control systems. However operating expenses still remained on the higher side due to inefficiencies in certain processes which required manual intervention.

The challenge for Kaalpanik was to understand the nature and root causes of these inefficiencies and make recommendations for reducing the operating expenses. Our observation was that data was being generated with a millisecond level resolution and hundreds of simultaneous uctuations made it near impossible for the operators to make optimal control decisions consistently.

Challenges

As significant investments had already been made in the instrumentation of the operational equipment, the management was hesitant to make modifications to existing systems and processes.

Kaalpanik was asked to make recommendations such that it could blend in with existing processes and additional capital expenditure or staff retraining was not required.

The Air Cooled Condenser system at the client's captive power plant was operated using a series of VFD fans. The rotational

speed of these fans were being manually set from the control centre, based upon the experience of the operator. Moreover

the fans were being operated in different speeds, with fans closer to the turbine operating at near full speed.

Thus the first phase of Kaalpanik engagement involved optimization of the captive power plant's steam cooling subsystem.

Benefits

Kaalpanik's analytic expertise helped company achieve following benefits:

Direct Operational Cost Savings: Our client was able to achieve ~18% energy savings for running their Air Cooled Condensing system, translating to about 3000 units of saving on a daily basis.

Improved Efficiency: The Kaalpanik solution did not require additional capital expenditure. It was completely non-invasive and did not require changes to their existing systems or processes. In case of a fan failure, the cooling load could be easily distributed among the other fans.

Predictive Maintenance: The ability to predict potential fan malfunctions led to reductions in unplanned shutdown of the plant and reduced the risk in operations.

Indirect Operational Cost Saving: the optimal fan speeds recommended by the Kaalpanik engine was much lower than the maximum speed. This leads to reduced wear and tear of the fan's motors and improves their effective lifetime.

Environmental Benefits: B reducing the carbon footprint in the ACC system our client was able to get closer to its annual carbon reduction target.