

A client was preparing to build a new large chemical facility. The process uses several batch reactors to create the crude product and then switches to continuous operation for the rest of the process.

The reactors used pressurised water at high temperature as a solvent, but it was important to cool the contents to bring the pressure below atmospheric before discharging the batch. This required a high flow rate of water that was supplied from a dedicated tank and the heated water from cooling the reactor was stored in another tank.

While the next batch was processing, the cold water tank was slowly filled from the water supply and the hot water was used elsewhere in the process. Between them the hot and cold water tanks would only hold the equivalent of one tankful at a time. Both tanks were of 1000 m³ capacity.

When first engaged by the client, Covey Consulting demonstrated that one tank could be eliminated by operating the other as a stratified unit – hot water at the top, cold water at the bottom and the interface moving depending on the time of the cycle.

This change saved about \$1.5 million in capital in current prices. As Covey became more involved in the process we found that by re-organising the flow scheme the second tank and some heat exchangers could also be eliminated. Instead of using fresh water as a heat transfer medium, some of the used reactor solvent water could be employed. This also meant that by avoiding an intermediate heat transfer fluid, thermal driving forces were increased with a resulting reduction in heat exchanger sizes and improved heat recovery.

Overall these changes reduced the total project cost by about 5%.



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