

Cleaner Production Case Study

Caustic Recovery Plant Zaber and Zubair Fabrics Ltd.

This series showcases success stories of PaCT partner factories in the Bangladesh textile sector, which have implemented Cleaner Production projects.

Factory Overview

Zaber and Zubair (Z&Z) Fabrics Limited of Noman Group, is a continuous/cold pad batch dye house, comprising of five individual dye houses. For over two decades, the factory has been producing dyed, printed, and finished home and fashion woven products for leading global brands including IKEA, H&M, Lidl, Kmart, and Walmart. 60-70% of the produced fabric is printed, while the remainder is solid dyed, which traditionally undergoes bleaching and mercerization.

Money down the Drain

Mercerization is a process applied to fabric to increase luster and strength, by treating it with caustic soda (NaOH) and other wetting agents at room temperature. At the end of the mercerizing cycle, the mercerized fabric is rinsed with water to remove the excess caustic. The rinse water, which is mainly weak caustic, is usually generated in large quantities, which if discharged without treatment can result in a substantial loss of caustic soda and lead to high consumption of acid for neutralization in the ETP; hence generating large volumes of sludge.

When Recovery is the Remedy

Not long ago, Z&Z was draining rinse water from its six mercerizing units, without recovery or treatment. This was stressing the factory's ETP, as the wastewater entering was high in salinity (TDS) and pH. Also, the factory was consuming large quantities of sulfuric acid (H_2SO_4) to neutralize the excess caustic. Z&Z was keen on addressing this issue by focusing on reducing acid consumption through upstream caustic recovery. The factory installed two **Caustic Recovery Plants (CRPs)** that concentrate dilute spent caustic (6%-7% NaOH) into concentrated caustic (22% NaOH), which can be reused in the process.

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Cleaner Textile

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IFC led Advisory Partnership for Cleaner Textile (PaCT) is a holistic program that support the entire textile value chain – spinning, weaving, wet processing and garment factories in adopting Cleaner Production (CP) practices and engages with brands, technology suppliers, industrial associations, financial institutions, government to bring about systemic and positive environmental change for the Bangladesh textile sector and contribute to the sector's long-term competitiveness and environmental sustainability.



Integration of the CRPs proved to be highly effective and cost-efficient for Z&Z. The benefits include:

- Recovery of caustic soda, which is further reused
- Reduced chemical consumption for neutralization
- Generation of hot water as a by-product
- Minimization of alkaline wastewater from mercerizing machines
- Protection of the environment
- Short payback

Environmental Benefit		Financial Benefit	
Caustic soda saved	6.5 million L/year	Total Investment	USD 2,300,000
Hot water generated	28 million L/year	Cost Savings	USD 3,800,000 /year
Sulfuric acid saved	400,000 kg/month	Payback Period	< 1 year

Other benefits: Reduced steam consumption in bleaching units; reduced water consumption for boiler feed water

How CRP Works

Caustic Recovery Plant (CRP) concentrates weak caustic into strong caustic by passing steam through heat exchangers to evaporate excess water from the solution. At the end of the process, the concentrated caustic is recovered, while vapor from the last stage is condensed with cooling water, where it absorbs the waste heat from the vapor. This results in hot water generation as by-product, which can be used in other units.

The simplified diagram (Figure 1) shows how the CRP at Z&Z operates.

Voluminous Savings

Z&Z operates two four-stage CRPs that run at a combined capacity of 76,800L/day. The strong recovered caustic has a concentration of 28 °Baumé, which is the same concentration

as that required at the beginning of the mercerization process. At the end of the recovery process, the recovered strong caustic and vapor condensate are returned to the mercerizer machines. The hot water by-product is used in the bleaching units and boiler feed tank.

On average, each CRP recovers 6.5 million L of caustic/year at a concentration of 28 °Baumé, and generates around 28 million L hot water/year as by-product. Prior to the installation of the CRPs, Z&Z was consuming 700 tonne H₂SO₄ /month for wastewater neutralization at the ETPs. With the CRPs installed and caustic recovery in place, acid consumption significantly reduced to 300 tonne/month, resulting in a 57% reduction. COD and salt levels in the effluent have also reduced. In total, Z&Z invested USD 2.3 million to set up the CRPs, resulting in combined savings of USD 3.8 million/year, and having a payback of less than one year.



"We have been able to make significant savings in resource cost by reducing our caustic consumption through recovery. At Zaber and Zubair, we are actively engaged in implementing similar resource efficiency initiatives to optimize our resource consumption, and to achieve economic and environmental sustainability."

Md. Rashed Mosharrof
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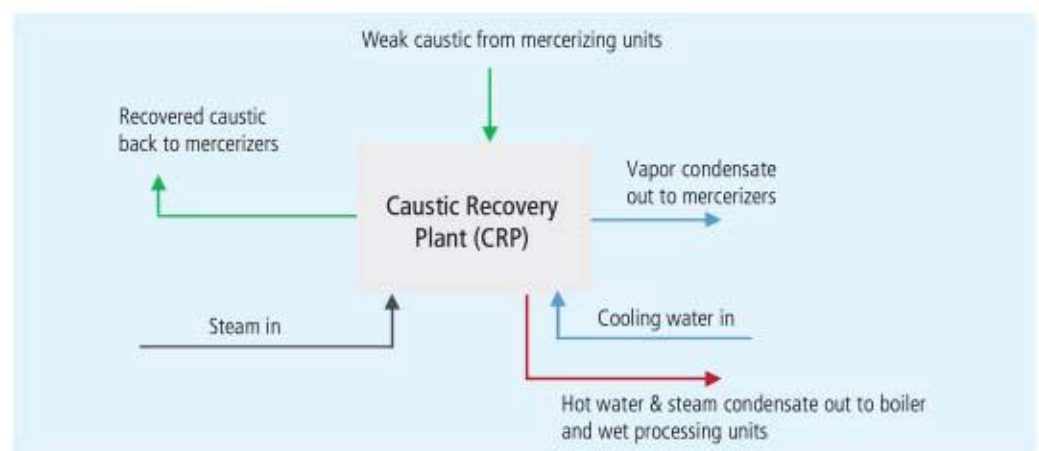


Figure 1: Caustic Recovery Process at Z&Z.

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