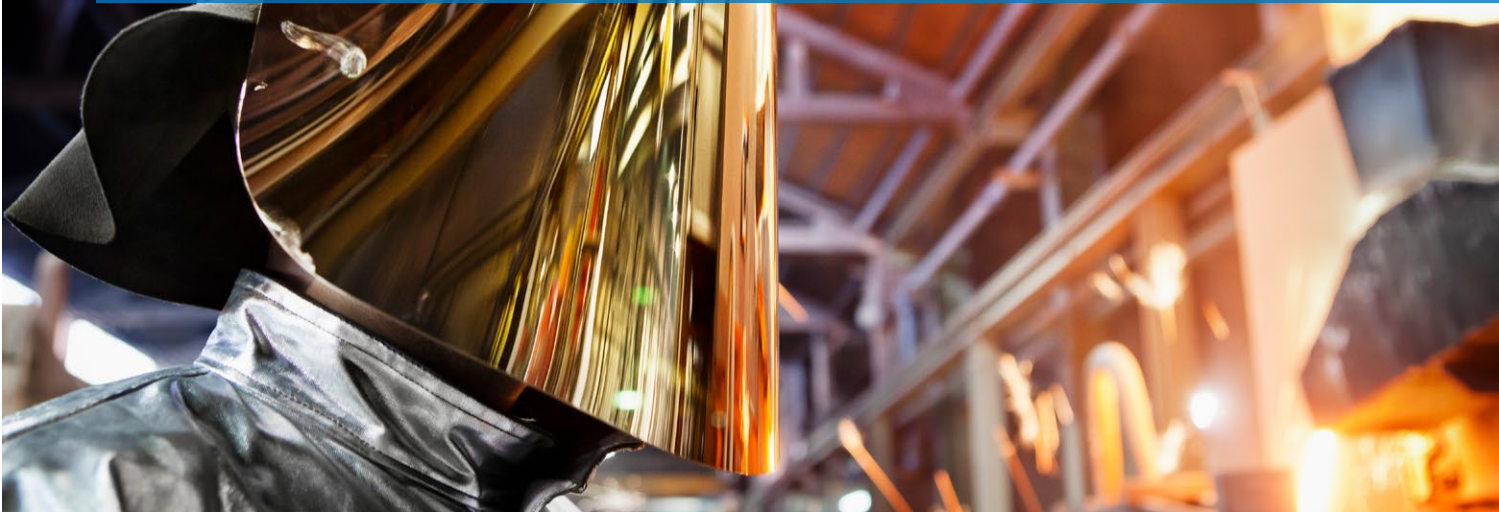


## Customer Success Story: Elimination of lubricant oil smoke pollution

**Market segment:**  
Steel production



# Filtration system creates a cleaner environment while cutting operating costs

**Location:**  
China

**Challenge:**

Eliminate oil smoke air pollution from a compressor lubricant tank, simplify maintenance and reduce operating costs with a system that can be replicated easily for other plants.

**Solution:**

Replace an OEM cartridge-type demister and fan-type mist extractor system with a system using a low maintenance Eaton® Type CLC two-stage coalescer separator.

**Result:**

Replacing the existing cartridge-type demister with an Eaton CLC coalescer separator has almost totally eliminated smoke vented from the oil tank resulting in a cleaner operating environment and a more breathable, odor-free atmosphere. The Eaton system is completely closed and virtually maintenance-free eliminating the cost of demister filter cartridges and the labor involved in changing them.

*The Eaton solution uses a virtually maintenance-free Eaton coalescing separator to capture and recycle oil from the effluent stream. Operating and maintenance costs are now near zero and the plant environment is significantly cleaner.*

**Background**

One of China's largest steel producers operates plants around the country with an annual output of more than 10 million tons worth more than 35 billion Yuan. Huge amounts of oxygen are used in their steelmaking operations and the company produces it on-site with a system using large air compressors as part of the process to separate oxygen from nitrogen, carbon dioxide and other gases in the air.

Because the compressed gasses become very hot, the compressors require a special lubricant which is circulated through them as both a lubricant and a coolant. The lubricant, which is quite expensive, is stored in a large tank near the compressor and because it is hot when it enters the tank the tank must be vented to avoid a pressure built-up that could damage the tank seals.

However, any discharge of the hot lubricant to the atmosphere produces "oil smoke" that contaminates the air and condenses on surfaces in the area creating both an environmental air pollution issue and a slip-and-fall safety hazard for workers in the area. In addition, any lubricant lost into the environment had to be replaced at a significant cost.

**Challenge**

The compressor system came with an OEM installed mist collection system consisting of a pair of special cartridge-type filters and a motorized blower that evacuated oil smoke from the tank and forced it through the filters. Since the compressor is part of the system used to produce oxygen for the steel-making process it is in nearly continuous operation which complicates demister filter maintenance and often resulted in oil smoke being vented to the atmosphere while they were being serviced.



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The blower intake is open to the atmosphere, creating another potential route for oil smoke to escape and for mist to coalesce and drip onto the floor and other parts of the installation. The blower motor also consumed electricity which added to operating costs.

Based on their successful use of other Eaton filtration products, the steelmaker asked Eaton to develop a system that would eliminate the pollution hazard while simultaneously reducing operating costs. Since the same, or similar, compressor systems are used in multiple locations within the steel mill, and at other steel mills operated by the customer, the new system also had to be easily duplicated and installed with minimal downtime.

### Solution

The Eaton team designed a system based on a Type CLC centrifugal in-line gas/liquid separator using proven coalescer/separator technology. It removes 99 percent of all solid and liquid particles larger than 4 microns using a two-stage process. Standard, single-stage separators are only able to remove particles larger than 10 microns, which is much larger than the typical oil mist droplets found in the compressor lubricant effluent.

In the first stage, small liquid droplets coalesce into larger droplets as they pass through a wire mesh demisting pad. The pad increases the size of the droplets making them easier to capture in the second stage.

The larger droplets exiting the demisting pad then contact a unique Eaton Cenpeller™ technology, which causes them to swirl creating centrifugal force that throws them against the outside wall where they collect and flow to the bottom drain and return to the lubricant tank.

An Eaton Vortex Containment Plate (VCP) completes the process by preventing the droplets from being re-entrained after separation. It uses carefully placed rings that shield the separated liquid from the vortex action inside the separator and direct it to the drain.

A Type CLC coalescer/separator has no moving parts to wear out and does not use other filter media that require frequent replacement. The only maintenance required is an occasional inspection, cleaning and/or replacement of the inexpensive wire mesh demisting pad which is easily accomplished with minimal downtime.

The Eaton team designed the system to be compatible with the existing motorized blower extraction device for locations where that method is preferred or otherwise required.

### Result

Using the Eaton Type CLC coalescer/separator system the steel mill has virtually eliminated "oil smoke" pollution at the compressor stations and the cost of maintaining and replacing the previously used demister filter cartridges. The systems are designed for easy installation with a small footprint and maximum compatibility with existing piping. Each system represents a one-time investment using no consumables and requiring no operator intervention.

The steel mill has more than 20 compressor stations, all of which eventually will be equipped with Eaton Type CLC coalescer/separator systems. Their success in cleaning up the environment and reducing operating costs has been noted by other steel mills owned by the customer who also are in the process of adopting this innovative Eaton solution.



The Eaton **Type CLC centrifugal in-line gas/liquid separator** uses proven coalescer/separator technology to remove 99 percent of all solid and liquid particles larger than 4 microns. A Chinese steel mill has virtually eliminated air pollution while recovering costly lubricants and reducing operating costs with a system based on Type CLC coalescer/separators.

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