Development of centralized grinding coolant filtration system For Eagle Burgmann

General Information

Business Group:		**Eagle Burgmann India Pvt. Ltd**
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Project started (mm/yy):		**June 18**
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on-going (Yes=X/No=blank):		**X**

May this project information be used outside of the Freudenberg-Group? **Yes x No**

Purpose and Goal:

The purpose of this project is to develop a centralized grinding coolant filtration plant that can

1) Continuously supply clean coolant & eliminate the need for coolant disposal
2) Increase the coolant life from 15 days to a minimum of 3 months

Abstract:

Eagleburgmann India Pvt. Ltd. is in the business of manufacturing mechanical seals and supply systems. The mechanical seal consists of two seal faces, viz. hard face & soft face. Sintered/reaction bonded silicon carbide (Sic) is used as the raw material to manufacture hard seal face.
Eagleburgmann uses a grinding process to manufacture the entire seal face.
The machine manufacturer's filtration system was not able to separate the Sic dust from the coolant. As a result, coolant life & machine bearing life were significant concerns from cost, quality & HSE points of view.
The manufacturing team of EBIN took up this challenge to develop a cost-effective solution for efficient filtration of grinding coolant. After a thorough literature survey & vendor trials, a two-stage filtration system (gravity sedimentation + sand bed filtration) was identified as an effective solution to our problem. This system is operational for more than four months now and continuously supplies clean coolant without any issues.

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Project Description

The problem in hand:

The size of silicon carbide dust particles after grinding is 0.5 microns to 5 microns. The filtration system provided by the machine manufacturer was a simple gravity-based paper filter. This filter was not able to separate the Sic dust from the coolant. As a result, the coolant became sticky & un-usable in just 10 to 15 days. This coolant had to be discarded in the coolant treatment plant & the machine had to be filled with freshwater & coolant.

Secondly, when the coolant becomes old, the Sic dust gets settled on the machine ball bearings. Sic is an abrasive substance. When the bearings rotate at high RPMs, the Sic particles on them caused premature wear of machine ball bearings.

Finding a solution & implementing it:

1) Conduct a particle size study of dirty coolant to find out size wise proportion of Sic particles. We found that more than 95% of particles fall within the range of 0.5 – 5 microns.
2) Literature & market survey – a thorough survey was conducted to find out various filtration solutions available in the market. The most promising options were – sand bed filters, cartridge filters & press filters. Sic being non-magnetic, magnetic separators were of no use. Also, since the particles had a very low mass, the centrifuge was not a solution.
3) Vendor trials – after interacting with Innovation Filter System, EBIN sent a used coolant barrel for conducting tests. It was found that the sand bed filter was most efficient concerning performance & cost.
4) Develop a customized solution to suit EBIN requirement – a standalone sand bed filter would not suffice the need. A sedimentation tank was provided wherein the dirty coolant after back-flushing of the sand filter was transferred. The Sic in coolant was mixed with a cationic coagulant to speed up the process of sedimentation. The sludge was removed from the bottom, and the supernatant liquid was transferred to the auxiliary tank.
5) Install & commission the system – the system was installed outside the shopfloor, and four machines were connected to it. The coolant was supplied to the machines from the main tank. The filtration system was separately connected to the main tank so that there is no interference between machines & filtration system.

Scope and Specifics

Organizational Impact

The coolant has not been changed for more than three months for the four machines connected to the filtration system. Only the sludge is collected in containers and sent to the hazardous waste disposal facility. As a result, the volume of disposal has drastically reduced, thus reducing our environmental impact.

The problem of coolant becoming sticky is wholly eliminated. As a result, the associated problem of frequent wear of machine bearing & jamming of measuring instruments has also been solved. The installation of a sand bed filtration system by Innovation Filter System has helped run the machines without any downtime.

Continuous supply of clean coolant on the machine has improved the HSE conditions while working. No presence of hazardous Sic dust in coolant fumes during machining.

Space occupied by the inbuilt machine filters inside the shop floor has been released, thus making room for an additional machine

This system will be further extended to all 20 machines.

Measurability (Results)

Savings accrued in 3 months of operation on four machines -

1) Direct saving of 2400 lit of water & 120 lit of coolant (total – 2.52m3) oil, which would have otherwise been disposed of in the hazardous waste disposal facility
2) The volume of sludge that is to be disposed of – 0.02 m3 instead of disposing of 2.52 m3 of coolant (99% reduction)
3) ZERO machine downtime for coolant change & bearing replacement

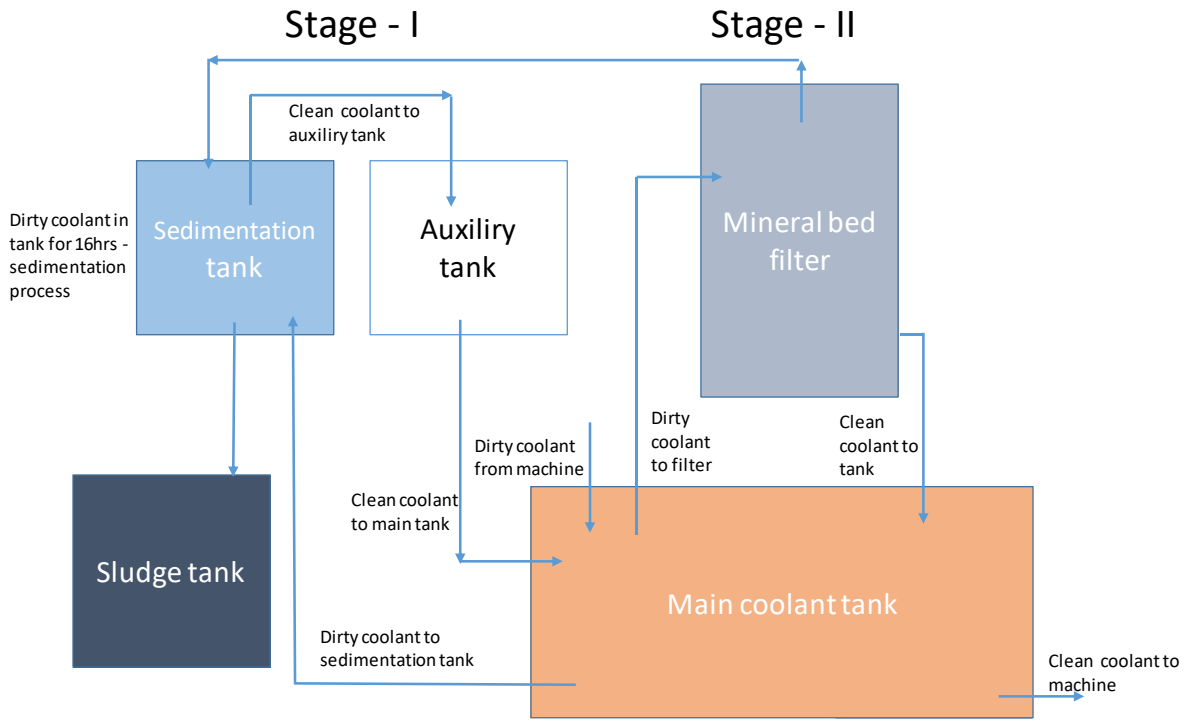

Figure 1: Filtration solution provided by Innovation Filter System

Figure 2: Sand-bed filtration system implemented by Innovation Filter System

Figure 3: SiC sludge collected after implementation