

Field Report



Caster Water Filtration for Wheel or Twin Belt Type Casters Used in Copper Rod Production (Equipment & Process Patent Pending)

APPLICATION

In the process of producing copper rod by means of the “Continuous Cast” method, soot, graphite or carbon black is applied to the caster wheel or dam blocks as a protective thermal barrier. As molten metal is poured onto the caster wheel or dam blocks and formed into a bar, the carbon-based thermal insulator also acts as a mold release. The bar is then cooled with rinse water before being rolled into rod. This rinse water becomes contaminated with the carbon material which was applied to the caster wheel or dam blocks resulting in reduced production, reduced life of caster wheel, or dam blocks, bands, and increased maintenance for heat exchangers and cooling towers.

PROBLEM

Due to the extremely fine sub-micronic particulate size of the carbon material, it has been virtually impossible to remove it from the rinse water by conventional filtration methods including ultrafiltration. Hence, facilities typically send a larger portion of the caster rinse water to drain or waste treatment and makeup with fresh water to dilute the carbon material concentration in an effort to maintain acceptable NTU values. As a result, water usage and discharge volumes increase, and downstream treatment of the discharged caster water is required as well as discharge fees for compliance. In addition, high concentrations of the carbon material in the caster water cause plugging and fouling of heat exchangers and cooling towers.

SOLUTION

Due to the need to filter caster water, Filtertech has developed proprietary dry chemistry (PDC) which coagulates and flocculates the sub-micronic particles into a stable floc. Once formed, the floc is removed with a “High Performance” Deep Bed Gravity Filter Model GSF15 or GSF30 as shown in Figure 1.

Figure 1
Model GSF “High Performance”
Deep Bed Extended Ramp Gravity Filter



The process with special features uses a coagulant/flocculating agent which is not sensitive to overdosing or chemical instability, but is consistently repeatable. The very small percentage of flocking agents are removed with the accumulated solids via the filter media.

PROCESS

The dirty caster water is pumped on a bypass basis from the reservoir tank by a transfer pump or caster water supply pump to a mixing tank which is specifically sized and designed for the flow rate to be treated (see Figure 3).

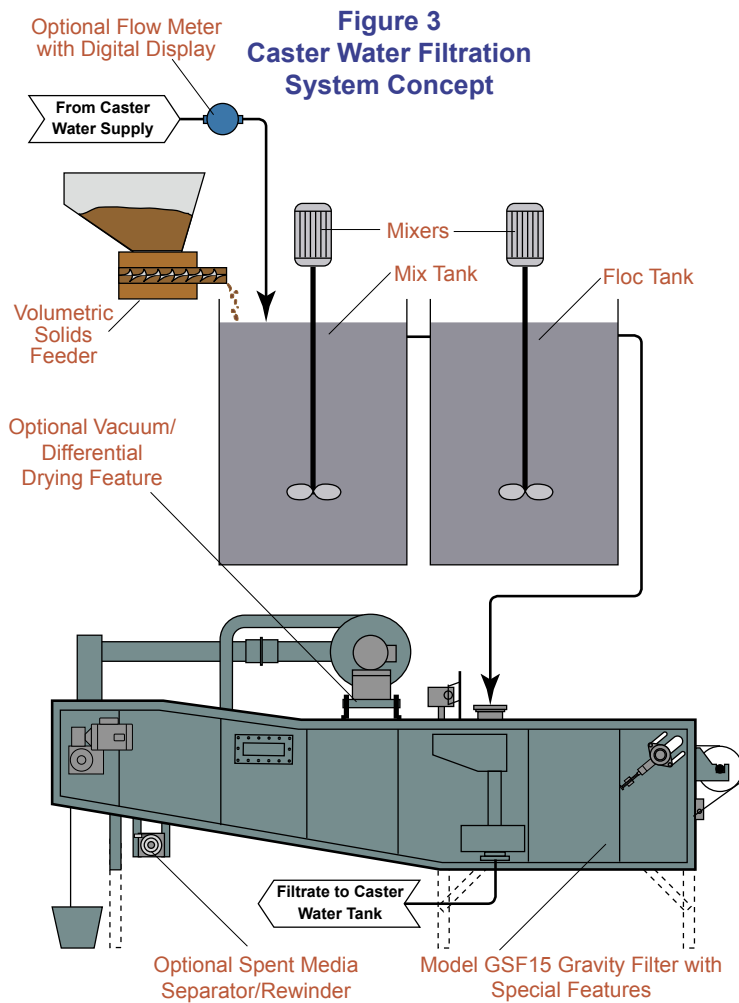
Figure 2
25 GPM (95 LPM) Treatment System



The separation chemistry is then added to the caster water in the mixing tank by way of a volumetric solids feeder and is stored in a bulk solids hopper requiring only periodic replenishing. The feeder utilizes a variable speed drive which can adjust the feed rate of the chemistry to coincide with changes in flow rate of caster water to the system.

During the mixing process, the chemistry becomes hydrated, and its long chain molecule is unraveled. The sub-micronic particulates become entrapped in the molecule to form a much larger floc particle in the mix tank. Specially-designed mixers are used to minimize size reduction on the developing floc particles.

Once completely mixed, the caster water overflows by gravity into the floc tank where the concentrated floc and water overflows into the Model GSF15 or GSF30 “High Performance” Deep Bed Extended Ramp Gravity Filter (see Product Bulletin FT244 & FT245). As the caster water passes through the filter, the flocked solids are removed by the disposable filter media, thus allowing only the clean water to drain by gravity back to the reservoir tank for reuse. The amount of chemistry and flowrate results in acceptable NTU water clarity.



The Model GSF15 or GSF30 Deep Bed Gravity Filter has specific features for the application which include the following:

- 304 stainless steel construction.
- Heavy-duty flat wire belt conveyor constructed of 304 stainless steel.
- Full width conveyor support rollers constructed of SCH 40 304 stainless steel with UHMW bearings.
- Sprockets constructed of high-strength polymer material with steel shafts.
- Moderate incline media discharge allows the ability to remove a wide range of solids and prevents solids from returning into the liquid pool.
- Extended area out of liquid pool to allow additional drying time for the filter “cake” prior to being discharged and collected into a hopper by others.
- Adjustable take up bearings.
- Direct drive with inline heavy-duty gear reducer and 1/2 HP, T.E.F.C. motor.
- External clean outlet box with flanged connection with inspection cover.
- External overflow box with flanged outlet connection.
- Patented Labyrinth Moving Side Seals with stationary upper seals and Stainless Steel/Teflon® retainers.
- Distribution header with top inlet connection.
- Deep liquid pool allows high pressure drop across the filter media and maximum utilization of filter area.

- 7” diameter stainless steel float ball assembly with stilling well, and three position cam/micro switch assemblies for automatic media index on, index off and overflow, fully for height and position.
- Control panel mounted and wired for 110-volt single-phase operation.
- Media jog switch located on the filter.
- End-of-media sensor.
- 125 yard (114 m) roll of filter media.

Options:

- 316 Stainless Steel Construction.
- Vacuum and Differential Drying feature.
- Spent Media Separator Rewinder.
- Media / Sludge Collection hopper.
- Controlled Level Index (CLI) feature.

The cost of operation of the treatment system consists of the chemistry, filter media, electricity, and very minimal manpower requirements.

RESULTS

The result (see Figure 4) of incorporating filtration of the caster water is a significantly clean rinse water, improved product quality, increased production up-time, reduced wheel/dam block replacement/maintenance, reduced hollow bar breaks and reduced heat exchanger/cooling tower maintenance. Discharge of the water to drain is eliminated or greatly reduced with the remaining carbon contaminant being safely discharged into a receptacle for conventional disposal.

The system is fully automatic and continuous flow, not a batch process achieving significant reductions in “NTU” values. Current system capacities range from 5,000 GPD (19,000 LPD) to over 150,000 GPD (570,000 LPD).

Total operating estimated costs which include separation chemistry, filter media, and electrical costs average less than \$.09/gallon of water treated. Equipment and installation costs are typically amortized in less than 11 months with continued significant operating savings and increased production.

For more information on the Caster Water Filtration System, please contact Filtertech or visit our web site at www.filtertech.com.

Figure 4
Dirty Caster Water (left), Clean Filtrate (right)



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