9942 Enrichment of By-Product Materials from Steel Pickling Acid Regeneration Plants

Benefits

- Provide an outlet for excess iron oxide resulting from the steel picking acid regeneration process.
- Reduce disposal of iron oxides into the environment.
- Energy savings from new process efficiencies.
- Complete recycling of iron-bearing by-products from regeneration process.

Application

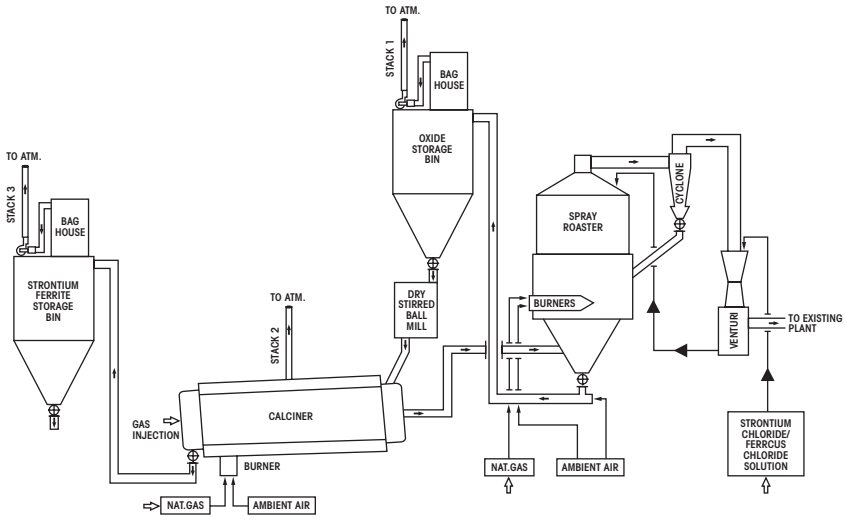
- All steel production facilities with steel pickling acid output.
- Automotive and appliance manufacturers.

Presently, acid regeneration plants regenerate "Spent Pickle Liquor" (ferrous chloride) to produce "Regenerated Acid" (hydrochloric acid) for pickle line reuse, and produce as a by-product, iron oxide (ferric oxide) powder. This oxide material has both a poor demand and low commercial value, thereby now requiring surplus materials to be permanently stockpiled or disposed of by landfilling.

The new technology will eliminate the production of the low-demand iron oxide by-product and instead, will produce an enriched strontium hexaferrite product, which is the principal feedstock material now used for the manufacture of hard ferrite magnets.

Moreover, the new technology will yield energy savings over the traditional methods now being employed to produce strontium hexaferrite feedstocks, and also provide appreciable environmental benefits, both in oxide waste disposal avoidance and through emission reductions gained over current methods utilized to produce magnetic ferrite feedstocks.

New Strontium Hexaferrite Magnetic Powder Process



Project Goal:
To develop and demonstrate, via pilot-scale testing and partial-capacity production trials, a new process for the manufacture of an enriched, iron-based product (strontium hexaferrite), through the use of existing steel pickling acid regeneration facilities.

Process enhancements and equipment additions to an existing acid regeneration plant will be made. Strontium hexaferrite powder will be produced through spray roasting of a mixed ferrous chloride- strontium chloride solution, instead of the present practice of spray roasting a solution containing only ferrous chloride.

The strontium hexaferrite powder precursor, composed of oxides and chlorides of iron and strontium intimately admixed on an atomic level, will then be subjected to further heat treatment in an atmosphere which promotes rapid, relatively low temperature formation of discrete strontium ferrite magnetic domains. Since the ferric oxide produced at a production facility is a raw material in the current production process for strontium hexaferrite powder, this innovative process will combine and greatly simplify existing production steps currently performed at disparate facilities, thereby, increasing manufacturing efficiency and lowering energy requirements to produce high-quality strontium hexaferrite powder feedstocks.

Progress and Milestones

- ❖ Project start date: July 2004
- ❖ Complete design & engineering: December 2004
- ❖ Begin construction: January 2005
- ❖ Complete construction: September 2006
- ❖ Commissioning date: October 2006
- ❖ Operational Trials: November 2006
- ❖ Project completion date: December 2006

Total Project Cost $3,717,085

Duration 3 years

Research Organization

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