Eighteenth Annual Symposium

PROCESS SYSTEMS FOR ELECTRIC FURNACE STEELMAKING

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UTILITY & ELECTRICAL CONSIDERATIONS

The fundamentals of flicker are explained and illustrated. Preliminary explained with examples of improved precision. Comparisons of flicker are given. A new digital flicker measuring device and its use are results of The Z-ARC advantages will be used to show the advantages of PLC will be given. Operating furnaces with and without flicker problems will be monitored.

A real time demonstration of flicker on operating electric arc furnaces will be given. Operating furnaces with and without flicker problems will be monitored.

10:45 - 11:00 Coffee

NEW TECHNOLOGY

11:00 - 12:15 Systematic Approaches for Productivity Improvement Through Efficient Operation of Electric Arc Furnaces by Dr. Cezmi Bilmes, Managing Director, XPERT GmbH, Brandenburg, Germany and Halil Kulluk, President & CEO, INTEKNO A.S., Istanbul, Turkey

The EAF functioning as a melt aggregate has achieved a steadily growing relevance to steel production since early 70s. During this period the principles of steelmaking by electric heat has received important impetus from the field of process managing as well as from the use of additional aggregates. Some of these developments are:

- Foamy slag practice
- Electrode cooling

Latest developments in the field of EAFs are also in the field of new and improved equipment and optimization techniques for the process operations. For instance:

- Introduction of conductive electrode arms
- Development of completely digital electrode regulators
- Operation of EAFs by low secondary currents using additional reactance

With the introduction of new technologies the exact observation and categorization of electric values have become more important. The ArcControl© system developed by XPERT GmbH offers a wide range of possibilities to visualize, calculate and control the electrical processes within the EAF. Over the last ten years, INTEKNO has been involved in the introduction of state-of-the-art technologies to steelmaking industry and developed interesting techniques for technology and know-how transfer, such as in the domain of foamy slag practice, to meltshops employing high performance EAFs.

12:15 - 1:45 Lunch in Room 5030

1:45 - 2:45 Progressive Scrap Strategies for A Changed Domestic Steel Industry: by Richard A. Jones and Richard D. Burlingame, Ph.D., Luria Brothers Division of Connell Limited Partnership, Cleveland, OH

One of the largest and oldest broker/processors of scrap in the nation will spell out the formula for a profitable partnership between scrap supplier and steelmaker in the challenging years ahead.

Scrap procurement must now be viewed as a global enterprise and one whose optimization constantly changes. Only those suppliers with world-wide networks of information and massive capacities for scrap purchasing, processing, and delivery will be able to satisfy all the demands of the steel industry in the year 2000.

Regarding quality, only the largest and strongest suppliers can afford to operate their own spectrometric laboratories, in order to guarantee least-cost, suitable melting charges to their customers at all times. Further, these are the suppliers who can often deliver the optimized charges into the melt shop in buckets - ready to charge.

Finally, these are the firms that can provide the total financing, design, construction, and operation of the most modern scrap preparation yards located strategically close to the steel mills they serve.

2:45 - 3:30 Alternative Iron Sources for Electric Furnace Steelmaking: by Dr. David L. Schroeder, President, D. L. Schroeder & Associates, Warrendale, PA

Electric Furnace Steelmakers' will increasingly be using alternative iron sources to make steel. Each source of iron units including scraps is presented with its physical characteristics, availability, quality, need and price. Their usage and effect on steelmaking practices and costs are illustrated by usage of the EAF UTILITY. Steelmaking cost differentials between materials are given.

3:30 - 3:45 Refreshments
The new twin shelled design furnace is used to illustrate how design, alternative iron sources, material, energy sources, and operation effect the energy efficiency of the furnace. Material, energy sources, and cost balances are given to show the merit of newer electric furnace and facilities design.

4:45 - 5:15 Discussion

6:30 - 8:00 Reception

Sunday, December 8, 1996

MELTSHOP REENGINEERING

8:30 - 9:30 Auxiliary Energy Sources for Electric Furnace Steelmaking: by Dr. David L. Schroeder, President, D. L. Schroeder & Associates, Warrendale, PA

With the many sources and losses of energy experienced in electric furnace steelmaking, an understanding of the degrees of freedom in energy usage availability to the steelmaker is very important. Due to the many sources of energy, metallurgical furnaces will be used in this presentation instead of electric arc furnace design to better describe the processes that are evolving.

All energy sources are examined for:
- ability to effectively and efficiently be delivered to the process in a timely manner
- cost
- availability

The energy losses that occur are then examined for their cause and ways to minimize and/or use them.

The new twin shelled design furnace is used to illustrate how design, materials, energy sources, and operation effect the energy efficiency of the furnace.

9:30 - 10:45 Meltshop Practice Simulation Using the EAF Utility: by Mr. John d'Entremont, Consultant, D. L. Schroeder & Associates, Warrendale, PA

A computer utility allows a person without computer programming background to have an intelligent dialogue with a computer. A great effort was made to make the utility's use as simple as possible but with the power built into an EXCEL spreadsheet.

The EAF Steelmaking Utility provides valuable practical assistance in evaluation of operating process changes, of any charge material changes (scrap and alternative iron sources), and of facility/equipment changes. The utility will be demonstrated on real steelmaking cases.

10:45 - 11:00 Refreshments

11:00 - 11:45 Meltshop Reengineering: by Dr. David L. Schroeder, President, D. L. Schroeder & Associates, Warrendale, PA

Electric furnace steelmaking has changed so dramatically in the last five to ten years that in many cases it is cost effective to build a new meltshop. Starting with materials receipt through to shipping, the changes that have and should occur are examined to show how an existing steel plant has to evolve to world class standards of today and the future.

The steps to be taken in reengineering a facility are examined but alas no good examples exist in the steel industry. Examples of partial reengineering projects will be given.

11:45 - 12:30 World Wide DC vs. AC Furnace Operating Comparisons: by Dr. David L. Schroeder, President, D. L. Schroeder & Associates, Warrendale, PA

Until recently, good data on new large AC furnace operation has been scarce. Several new, large AC furnaces have recently been commissioned utilizing modern electric furnace technology. Comparing these operations with the newer DC furnace operations gives a more realistic evaluation on the technologies involved.

12:30 - 1:30 LUNCH in Room 5030

1:30 - 2:30 Luncheon Speaker, Scheduling of CSP Plants, The Dynamics of Bottlenecks and Order Variations: by Steve Gifford, Senior Consultant, Carnegie Group, Inc., Pittsburgh. PA

Economics are forcing the production capabilities of the World Steel industry from large integrated plants to smaller mini-mill plants. Along with the shift toward regionalization and downscaling are improvements in production technologies which are allowing the production processes to be tightly coupled into flowlines which can produce a diversity of products. Simultaneously, advanced scheduling technologies are emerging which may provide the opportunity to optimize mini-mill production plant-wide. This presentation discusses the potential benefits of using this emerging scheduling technology to plan and schedule a mini-mill.

A scheduling system for planning and scheduling a new mini-mill was developed to optimize plant-wide capabilities. The system generates alternative material plans for individual orders and selects the plan that optimizes yield and productivity. In addition, the system calculates a schedule for each unit that not only synchronizes the flow of material between the processes, but maximizes overall plant throughput.

With the emerging scheduling technology numerous time limit constraints between processes are represented which heretofore have not been explicitly modeled with other approaches, e.g. simulation. A unique aspect of the system is the secondary optimizations performed that minimize energy losses and refractory costs.

As a result of working with the system additional opportunities have been identified to set process parameters which can further increase throughput, reduce energy costs and improve product quality.