Tenova Goodfellow Inc. – AISTech 2017 Technical Papers

The Future is Here (Environmental Edition)-How to Achieve Clean(er) Meltshop

Author: Dejan Zrelec, Tenova Goodfellow Inc.

The future is here, technological wonders are everywhere around us, but still, there are only a few melt shops with good, clean work environments. Melt shops are places where people should take pride in working at ease, without face masks and without thinking what health issues would arise if they do not put a mask on. Living in this "era of technology", the question exists, why do we still have so many melt shops with poor air quality? Many steel plants have not achieved significant indoor air quality improvements in the last 15-20 years. Some are experiencing even worsening conditions due to mandatory melt shop enclosures. This paper will analyze why, in the age of technology availability such as smart gadgets, wireless connections and drones, we are way behind in relation to air quality and working environments as well as the top reasons why such improvements although very nice, are not being implemented.

EAF Optimization Using Real-Time Mass and Energy Balance at Nucor Steel Seattle Inc.

Authors: Harish Iyer, Vittorio Scipolo, Babak Babaei, Tenova Goodfellow Inc., Cameron Cossette, Nucor Steel Seattle

Nucor Steel Seattle has equipped their EAF with Tenova's *Intelligent Electric Arc Furnace* (iEAF®) system composed of EAF automation, thermodynamic models and process hardware including: Off-Gas Analyzers, Temperature Measurement, and Velocity Measurement. The iEAF® completes mass and energy balances in real-time from the basis of the net energy after determining expected losses, and real-time control is applied to the electrical power, lances, burners, injectors, as well as the fume system. Preliminary results show 5% decrease in electrical consumption, providing significant benefit to Nucor Steel Seattle. This paper presents the iEAF® system, optimization and the results achieved at Nucor Steel Seattle.

NextGen® Multipoint Offgas Analysis at Steel Dynamics Inc., Butler, IN

Authors: Igor Todorovic, Vittorio Scipolo, Avishekh Pal, Doug Zuliani, Tenova Goodfellow Inc., Andrew Spencer, Steel Dynamics Inc.

Steel Dynamics Inc. (SDI) and Tenova Goodfellow Inc. (TGI) successfully commissioned the first hybrid extractive/laser system for continuous and full spectrum analysis (CO, CO_2, O_2, H_2, H_2O vapor, N_2) on two twin shell furnaces at Butler, Indiana. A complete off-gas analysis at each shell and downstream location was included. Full spectrum analysis of each twin-shell furnace was achieved using a single analyzer and compact sampling stations located in vicinity to sampling points. In addition, systems for flow and temperature measurement provided an important insight in furnace/fume system operation. This paper will describe proven results from Phase I as well as initial results from Phase II. The overall benefits of the system for SDI include real-time water leak detection and real-time dynamic control of chemical energy and fume system suction.

Water Leak Detection for EAF Based on Offgas EFSOP® Technology: Recent Developments and Results in Lucchini RS, Lovere, Italy

Authors: Marco Luccini, Vittorio Scipolo, Tenova Goodfellow Inc., L. Poli, Lucchini RS S.P.A.

Tenova's EFSOP® Water Detection System (WDS) samples and measures the EAF off-gas chemistry (H_2, CO, CO_2, O_2, H_2O) continuously and uses these measurements to alert operators in real-time for statistically abnormal high humidity or abnormal high hydrocarbons in the EAF, which might pose a serious risk during the scrap smelting and refining phases. Specifically the EFSOP® WDS alerts operators when system metrics deviate significantly from the established statistically normal practice due to such events as (but not limited to) hydrocarbons contained in the scrap or furnace panel water leaks. The proposed paper reviews the critical factors needed for the effective development of Tenova's WDS and highlights the results obtained in the EAF at Lucchini RS, Lovere, Italy during the past year, with particular attention to the preventive alarms generated in case of panel water leaks.