2nd INTERNATIONAL WORKSHOP
ADVANCES IN CLEANER PRODUCTION
"KEY ELEMENTS FOR A SUSTAINABLE WORLD: ENERGY, WATER AND CLIMATE CHANGE"

Promoting Cleaner Production through Innovative University Research Methods

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Abstract

Using private and government funding, researchers at the University of New Orleans (UNO) designed and built an Emissions Test Facility (ETF) under their clean technologies initiative which is being used to train graduate and undergraduate students. The role of Emissions Test Facility (ETF) is very important in developing clean/environmentally-friendly technologies. The ETF at UNO is scalable to the needs of the processes to be optimized and allows monitoring of process parameters and the quantity/characteristics of waste streams. This ETF also contains a two-stage air pollution control system to prevent contamination of the site being used for the research. An exhaust fan with flow controller is equipped to study the emission variations under variable ventilation conditions. Exhaust rates can also be related to wind speeds in case of processes performed in open-air conditions.

UNO's ETF has been successfully used to optimize dry abrasive blasting process commonly used to remove paint, rust and other surface contaminants before new paint application of metallic surfaces. Blast pressure, abrasive feed rate, type of abrasive, level and type of contamination, and many other process conditions influence (1) energy consumption, (2) material consumption, (3) productivity (how fast the surface is cleaned), (4) used-abrasive generation, and (5) quantities and characteristics of air emissions. By simulating the process within the ETF, various process, performance, and environmental (waste potential) parameters were measured. Thus ETF was helpful in understanding the inter-relationships among process parameters, types of abrasives, and emission potential which helped in developing predictive mathematical models. These models now can predict (1) productivity, (2) material/energy consumption, (3) air emissions, (4) used-abrasive generation rates, and (5) life cycle costs.

ETF is being used to simulate and optimize other industrial processes to increase understanding of inter-relationships and develop predictive and decision-support tools. This research setup and approach greatly supports the concepts of green engineering, design for the environment, clean/environmentally-friendly technologies, environmentally-preferred material selection, life cycle cost reduction, pollution prevention, health risk reduction, and overall improvement of quality of life. This paper presents some salient features of the research approach, recent experiences, and outcomes.

Keywords: Abrasive Blasting, Particulate Emission Factors, Emissions Modeling, Waste from Abrasive Blasting, Abrasive Ranking.