Energy Assessment and Optimization of Automobile Paint Shops

Applied Research with Measurable Results

SUMMARY
In our research, we seek to improve manufacturing processes to accomplish three goals: maximize profits, reduce environmental impact, and deliver innovative contributions to the field of sustainable manufacturing. While there are many efforts to produce results that satisfy only one of these goals, in our work we synthesize the best practices from multiple disciplines to deliver prioritized options.

Case Study: General Motors, Lansing Delta Township Plant, Paint Shop

WHY PAINT?
PAINTING CONSUMES 60% OF THE ENERGY REQUIRED FOR AN AUTOMOBILE ASSEMBLY PLANT. ¹

LMAS’S ROLE
We plan to bring together the knowledge and expertise of plant management, sustainable manufacturing research and development, and painting research and development.

We approach our work equipped with tools for evaluating the environmental impacts of manufacturing processes. We take the data and observations from these three groups of experts, compile this information, and find areas in which we can improve a process. Our ideas could be implemented at a local, or plant level, or may need to be considered by other departments and presented to the corporate structure.

Evaluation, Implementation, and Results

GATHER DATA

SYNTHESIZE DATA
CREATE MODELS TO MAP DATA TO PROCESSES
EVALUATE EFFECTIVENESS OF CURRENT PRACTICES
Examples: Pinch Analysis, Water Flow

CONTINUE EXISTING BEST PRACTICES
IDENTIFY NEW OPPORTUNITIES
Rank in order of feasibility
Consider impact on product quality

IMPLEMENT
SHORT TERM IMPROVEMENTS
Implemented by plant management

PROPOSE TO CORPORATE
LONG TERM DESIGN CONSIDERATIONS
May require large capital investment
Involve multiple departments’ approval

EVALUATE PAYBACK PERIODS OF DIFFERENT APPROACHES
Less than 1 year economic payback
Greater than 1 year economic payback