

Federal-Mogul Corporation

COMPANY BACKGROUND



Federal-Mogul Ignition Products, commonly known as Champion Spark Plug, is a global supplier of spark plugs. Champion spark plugs are used in a variety of internal combustion engines, including lawn mowers, motorcycles, cars, trucks, boats, weed-eaters, chainsaws, and even airplanes. Champion was founded by Albert Champion in the early 20th century. From the beginning, Champion has been committed to producing high-quality ignition products that offer peak performance.



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PROJECT BACKGROUND

Federal-Mogul is a large corporation owning more than 120 manufacturing and distributing facilities throughout the world. Federal-Mogul understands that their manufacturing processes can affect the environment. At Champion, efforts to improve manufacturing processes and factory equipment are continuous. The 2007 intern project at Champion focused on improvements to the boiler system and nickel plating process.

INCENTIVES TO CHANGE

With increased energy costs it is becoming more and more expensive to operate boilers. High boiler operating costs sparked Federal-Mogul Ignition Products to investigate ways to improve the efficiency of their boiler system. Raw materials such as metal are also experiencing a rapid price increase. To remain competitive in the market place a manufacturer has to manage and efficiently use all product materials. Metal finishing processes such as nickel electroplating can be very wasteful. In efforts to be more environmentally friendly and to reduce production costs, Federal-Mogul Ignition Products is open to change.

RESULTS

Steam Pipe Insulation

Throughout the Champion facility there were more than 400 feet of uninsulated steam pipe. Steam within the pipes contains large amounts of latent and sensible heat intended for use by manufacturing equipment. However, a substantial amount of this energy is lost to the surrounding ambient air. When pipes are not insulated heat energy is transferred through the walls of the pipe and released to the environment. This energy never reaches the manufacturing equipment. The problem was easily fixed by hiring a local insulation contractor to insulate all bare steam pipes. The 3Eplus software program offered by the U.S. Department of Energy was used to calculate the savings from insulating all the bare steam pipe and an estimated \$12,500 will be saved annually.

Economizer Heat Recovery

More than 7,500 gallons of 60° F water are added to the boiler system every day. This large amount of boiler make-up water causes low feed-water temperatures. On average the temperature of boiler feed-water is 150° F. To make the boiling process more efficient a boiler economizer could be used to capture heat from the boiler exhaust stack and use it to preheat boiler feed-water. If water enters the boiler at a higher temperature, less energy is used to bring the water to steam. Less energy means less natural gas is burned, which lowers emissions and saves money. A boiler economizer would save \$14,600 and 19,000 therms annually.



Nickel Recovery Unit and Rinse Water Reduction

At Federal Mogul certain spark plug components are nickel-plated. After being washed and degreased the spark plug components are placed in an electrolytic nickel plating bath. After soaking for 70 minutes, the spark plug components are lifted out of the nickel bath and placed in a rinse tank. A significant amount of nickel plating solution is carried to the rinse tank, which is lost when the rinse water is processed through the wastewater treatment system. A nickel recovery unit could be used to capture 95 percent of the nickel in the rinse water. The recovered nickel is then processed with hydrochloric and sulfuric acid to make nickel sulfate and nickel chloride, both of which can be used as make-up chemicals for the nickel bath. Recovering nickel would reduce waste sludge, wastewater, and reduce the amount of nickel chloride and nickel sulfate purchased. A nickel recovery unit would also change the classification of waste sludge to non-hazardous, offering more disposal options.

Project	Annual Cost Savings	Environmental Results	Status
STEAM PIPE INSULATION	\$12,500	9,246 THERMS	IMPLEMENTED
ECONOMIZER HEAT RECOVERY	\$14,600	19,000 THERMS	RECOMMENDED
NICKEL RECOVERY UNIT AND RINSE WATER REDUCTION	\$106,800 \$1,440	2.13 TONS 2,002,440 GALLONS	RECOMMENDED

Air Pollutants Diverted in Tons

	Total for all sectors
SO2	1.33
CO	0.20
NOX	0.64
VOC	0.17
PM	0.03

Green House Gases Diverted in Tons (CO2 Equivalent)

	Total for all sectors
CO2	253.94
CH4	42.99
N2O	0.11
CFCS	3.10