

# Flow Control Machining Technology Enables Economic and Environmental Benefits<sup>1</sup>

ATP-funded flow-control machining (FCM) technology can help achieve new environmental standards for small engines more cost effectively than with use of conventional technologies.

## Project History

In its 1995 General Competition, the Advanced Technology Program funded the Flow-Control Machining Project, a four-year \$7.9 million research joint venture involving Extrude Hone Corporation (a small company in Irwin, PA), General Motors, the University of Pittsburgh, and the University of Nebraska at Lincoln.

Originally aimed at large automotive engine applications, the Flow-Control Machining (FCM) advances the state-of-the-art in manufacturing finishing by allowing manufacturers to more effectively fabricate parts for their intended functional performance. Its use of neural-network algorithms, process control methods, and new abrading techniques are economically compatible with high-volume, relatively low-value engines as well as automobile engines.

## Environmental Benefits

The EPA has found that non-road engines contribute significantly to pollution. New EPA regulations require a 59% reduction in small-engine emissions by 2007, affecting most lawnmower engines currently available in the marketplace. FCM technology can assist in achieving compliance at a lower cost than conventional emissions-improving technologies.

## Economic Case Study

Using a benefit-cost, cash flow analysis technique, and an established macroeconomic model, this case study demonstrates the economic advantage of the FCM technology over conventional technologies for small and large side-valve lawnmower engines. Although EPA regulation may have a negative impact on GDP, the use of the FCM technology rather than conventional technology may reduce the loss to GDP.

- Use of FCM for small, side-valve lawnmower engines can save \$261 million in GDP and \$244 million in personal income over the three years 2007 to 2009.
- Use of FCM for large, side-valve lawnmower engines can save \$982 million in GDP and \$878 million in personal income over the five years 2003 to 2007.
- Using FCM for large, side-valve engines can recover about 93% of the GDP losses associated with using conventional technologies to address EPA regulations.

<sup>1</sup>Recently published ATP contractor study by Brown and Ehlen, *Technology Adoption Indicators Applied to the ATP Flow-control Machining Project*, NISTIR 6888, May 2003.

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