



## U.S. Department of Energy Energy Efficiency and Renewable Energy

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# INDUSTRIAL TECHNOLOGIES PROGRAM

## Improving the Energy Efficiency of Fan Systems

### Fan System Assessment Tool (FSAT) Saves Energy

Experience has shown that greater energy savings can be achieved through system optimization than through component optimization. The Fan System Assessment Tool helps users quantify energy consumption and energy savings opportunities in industrial fan systems.

By reducing the engineering time associated with analyzing fan systems it now becomes easier to understand the economic and energy

significance of changes in both system equipment and operating practices.

FSAT does not tell the user how to achieve the identified savings, but is a simple and effective tool to help users understand how well their fan systems are operating, determine the economic benefit of system modifications, and help determine which options are most economically viable when multiple opportunities exist for system modification.



#### With FSAT, users can:

- Determine system efficiency
- Identify degraded fans
- Collect data for trending system operation
- Examine the energy (and economic) impact of varying operating scenarios
- Quantify potential cost and energy savings

	Existing fan, motor	Existing fan, EE motor	Optimal fan, EE motor
Fan efficiency, %	53.1	53.1	74.9
Motor rated hp	350	350	300
Motor shaft power, hp	350.0	350.0	248.1
Motor efficiency, %	95.3	95.8	95.9
Motor power factor, %	87.6	87.8	86.0
Motor current, amps	385.8	382.6	276.9
Electric power, kW	273.9	272.4	192.9
Annual energy, MWhr	2399.4	2386.5	1690.2
Annual cost, \$1,000	96.0	95.5	67.6
Annual savings, \$1,000	0.0	0.5	28.4

Figure 1: FSAT image showing the tool's main data input screen

**To download the Fan System Assessment Tool (FSAT) and other free software tools or participate in an on-line tool forum, visit us at:**

**[www.eere.energy.gov/industry/technology\\_delivery/softwaretools](http://www.eere.energy.gov/industry/technology_delivery/softwaretools)**

**To learn more, contact the EERE Information Center (1-877-337-3463) or visit the Technology Delivery web site at [www.eere.energy.gov/industry/technology\\_delivery/softwaretools](http://www.eere.energy.gov/industry/technology_delivery/softwaretools)**

## System Effects

The Air Movement and Control Association International, Inc. (AMCA) has documented that there is often a difference in performance between a tested fan configuration and an installed fan configuration. These differences are known as system effects. FSAT helps users quantify the difference between rated performance and installed performance due to such things as:

- High duct velocity
- Discharge dampers locked in position
- Obstructed inlets
- Incorrectly sized fans
- Poor duct geometry
- Degraded impellers

## Tool Description

FSAT is simple and quick to use, and requires only basic information about fans and the motors that drive them. With FSAT, users can calculate the amount of energy used by a fan system; determine system efficiency; and quantify the savings potential of an upgraded system. The tool also provides a prescreening filter to identify fan systems that are likely to offer optimization opportunities based on the system's control, production and maintenance, and effect.

FSAT estimates the work done by the fan system and compares that to the estimated energy input into the system. Using generic typical performance characteristics for fans and motors, indications of potential savings (in energy and dollars) are developed.

**The Fan System Assessment Tool was jointly developed by the Air Movement and Control Association International, Inc and the Oak Ridge National Laboratory for the U.S. Department of Energy's Industrial Technologies Program**

## A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

For more information contact:  
EERE Information Center  
1-877-EERE-INF (1-877-337-3463)  
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