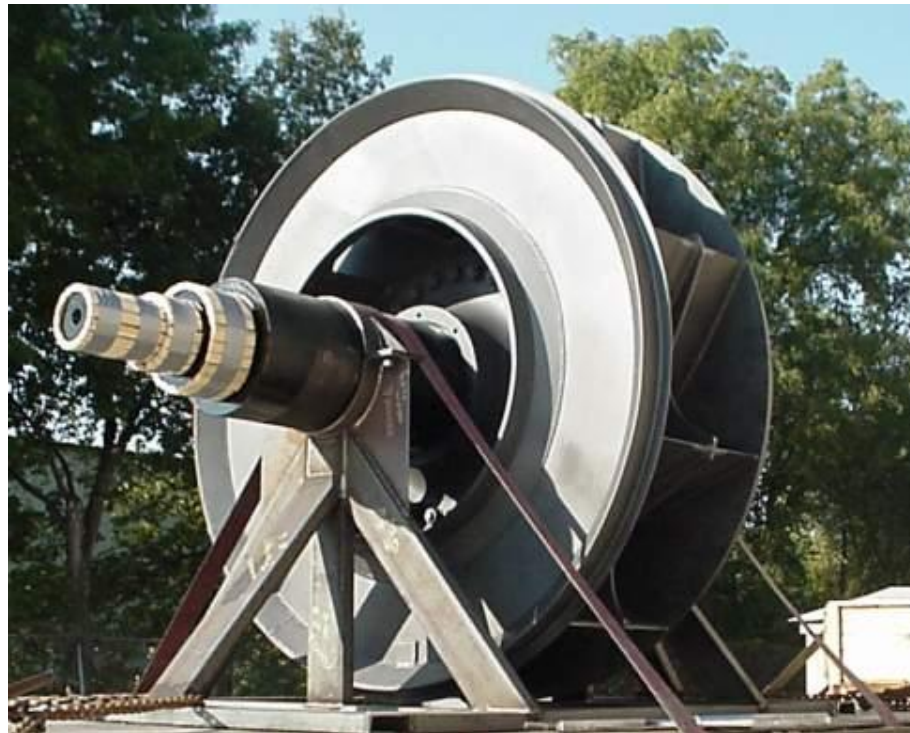


## Methods of Increasing Output for existing Centrifugal Fans

- Improve Condition of existing Fans
- Blade Tip Extension
- Rotor Retrofit
- New Fans designed to fit on existing foundation and interface with existing ductwork

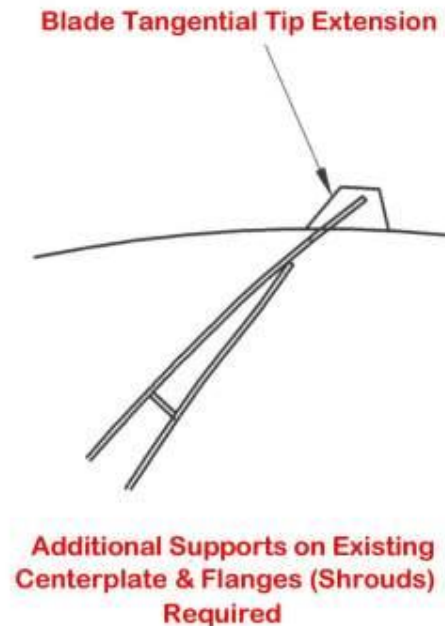


# Improve Condition of Existing Centrifugal Fans

- Proper fit of the existing wheel and inlet bell is crucial to maintaining efficiency in centrifugal fans
- Excessive gap or lap at the inlet will result in recirculation of gas within the fan, reducing the fan's output and efficiency.
- Modifying the inlet bells to have a proper gap and lap is one way of improving output and efficiency in centrifugal fans
- Output of fans can also be effected by elbows or other flow restrictions placed close to the fan inlet and/or outlet. The addition of well-designed turning vanes can reduce or eliminate these negative effects
- The elimination of leaks throughout the system is another way of effectively increasing fan output by having more of the flow from the fan go through the intended system path.

# Blade Tip Extensions

- Limited to approximately 15% pressure increase
- Limited to certain blade shapes (Not FC)
- Will have a decrease in efficiency from the existing fan design as the new impeller shape is less optimum for the existing fan housing
- Will only provide an increase from the output of the existing fans condition, so it will not address improper installation or leakage issues described on the previous slide.
- Will involve field modification of the existing wheel, frequently using specialized weld procedures for quenched and tempered materials, and require rebalance of the wheel



# Rotor Retrofits

- Are applicable for output increase greater than blade tip extensions
- Allow for installation of a more efficient and stronger rotor shape (ie: Airfoil)
- Ability to do retrofit depends on the size of the existing housing and inlet boxes and type of blade shape of the existing fan
- Means of control can be changed in a rotor retrofit to a more efficient method
- A rotor retrofit can also involve a speed increase
- Ability of the existing foundation to function properly with the increased output rotor and motor should be investigated



# New Fans designed to fit on Existing Foundation

- Are applicable for output increase greater than rotor retrofits
- Allow for installation of a more efficient and stronger rotor shape (ie:Airfoil)
- Means of control can be changed to a more efficient method
- Can also involve a speed increase
- Ability to interface with existing inlet and discharge ductwork should be investigated
- Ability of the existing foundation to function properly with the increased output rotor and motor should be investigated
- This can involve impact or shaker testing of the existing foundation to determine foundation stiffness and natural frequency
- A detailed analysis of the new fan and motor and the existing foundation, conducted by someone knowledgeable in foundation design, is recommended