# Details for follow-up activities: Rectangular Evase Recommendation

**Installation & Labour**

The installation of a rectangular evase is simple, but when fabricating a new rectangular evase, the experienced welder should take measurements for which disassembling of cyclone dust collector may be needed. A total of 2 days may be required to disassemble, weld the rectangular evase, and to perform tests. It is approximated that 2 welders and 2 helpers for 2 days that charge $75 per hour and $45 per hour respectively. Assuming 8 hour work days, and neglecting travel costs for the workers, the total estimated cost is $1,920.

**Implementation Schedule**

Aforementioned, if properly planned, the work can be completed in 2 days. It should be noted that the normal workflow and production rate may be affected during installation. Therefore, it is recommended, if possible, to schedule the installation during a non-working day.

**Energy saving cost**

Assuming the following:

- Volumetric Air Flow: 4.72 m³/s
- Average Pressure Reduction: 40 Pa

And substituting into the equation below,

Savings in Air Power = Volumetric Air Flow * Average Pressure Reduction

The savings in Air Power yield **188.8 W.**

Assuming the following:

- Cyclone operates 10 hrs per day
- Cyclone operated 251 days per year

And substituting values into the equation below:

Savings in Air Power per day = 188.8 * 10 = **1.888 kWh**

Annual savings in Air Power = 1.888 * 251 = **473 kWh**

With the following assumptions:

- Savings in Air Power: 188.8 W
- Fan Efficiency: 55%
- Motor Efficiency: 95%

the following equations can be used to calculate the electrical power savings (in kWh)

Electrical Power Savings = Savings in Air Power / (Fan Efficiency X Motor Efficiency)

$$\text{Electrical Power Savings} = (188.8)/ (0.55*0.95) = \textbf{361 W}$$

With the following assumptions:

- Cyclone operates 10 hrs per day
- Cyclone operates 251 days per year

The electrical power savings per day can be calculated with the following equation

$$\text{Electrical Power Savings} = 361 * 10 = \textbf{3.61 kWh}$$

$$\text{Annual savings in Electrical power} = 3.61 * 251 = \textbf{906 kWh}$$

And therefore, with the cost of electricity equalling $0.06 per kWh, the annual savings in electrical power savings are approximately $55.

**Success Stories** [1]

A study conducted by P.A Funk from U.S department of Agriculture observed that there has been a pressure drop in a cyclone that can be reduced by between 8.7 and 11.9% with the addition of a radial evase. This accounted for savings in energy.

- Evasés may reduce cyclone pressure drop without affecting collection efficiency.

- Investment in an evasé can be recovered through reduced operating energy costs

**Welders**

| Company | Location | Phone | Website |
| --- | --- | --- | --- |
| Karnel Inc | Nescopeck, PA | 570-586-1488 | Here |
| Genesis Metalworks | Lexington, NC | 336-238-5760 | Here |
| Hardee & Cox Welding, Inc | Greenville, NC | 252-355-5007 | Here |
| Wahlen's Mobile Welding | Greenville, NC | 252-902-4082 | Here |

**References**

[1]    P. A. Funk, "Reducing cyclone pressure drop with evasés," *Powder Technol.*, vol. 272, pp. 276–281, Mar. 2015.