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# Promising Areas of Energy Efficiency for Industrial Process

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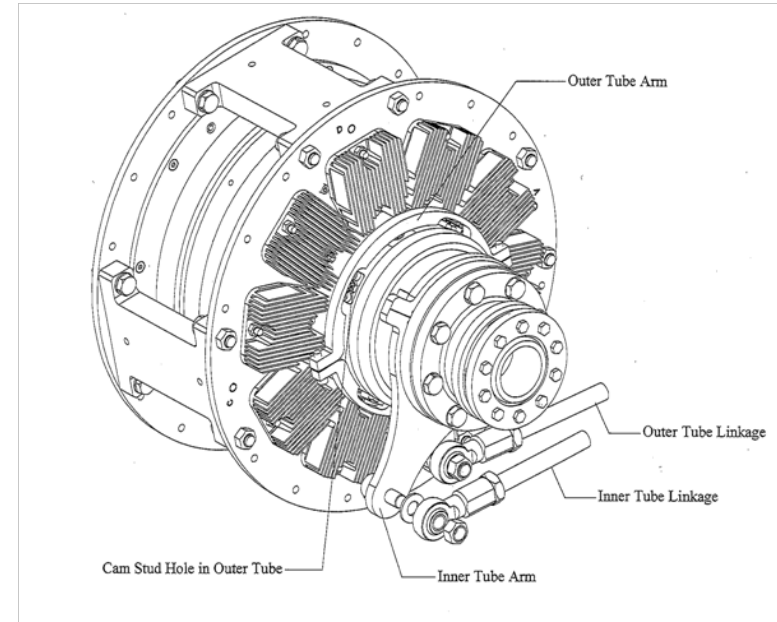
# Potential Areas for Energy Efficiency

- **Motors**
- **VSD**
- **Pumps**
- **Cooling Towers**
- **Insulation**
- **Refrigeration**
- **Compressed Air/ Blowers/ Vacuum**
- **Plastic Processes**

# Three Areas for Discussion

- **VSD for 4kV Motors – A New Solution**
- **Compressed Air – Large Potential**
- **Plastic Processes – New Developments**

# VSD for 4 kV Motors - Magnadrive

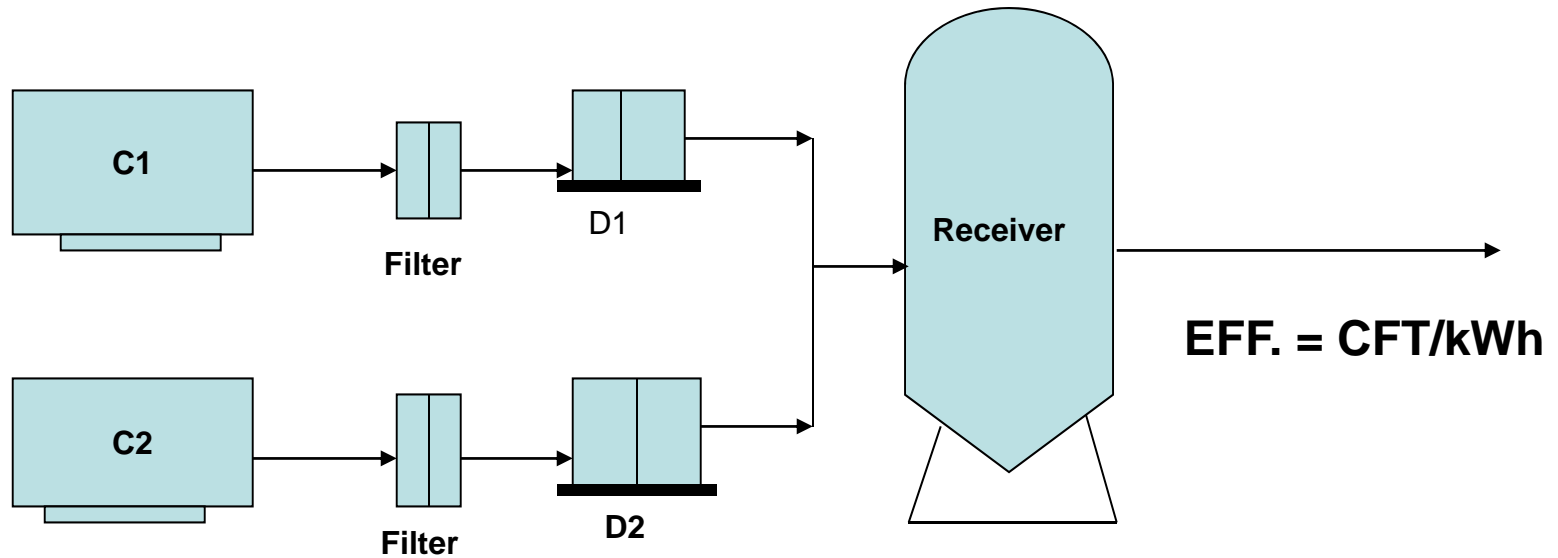


**Lower Capital Cost Compared to VFD**

**Better Tolerance of Ambient Conditions**

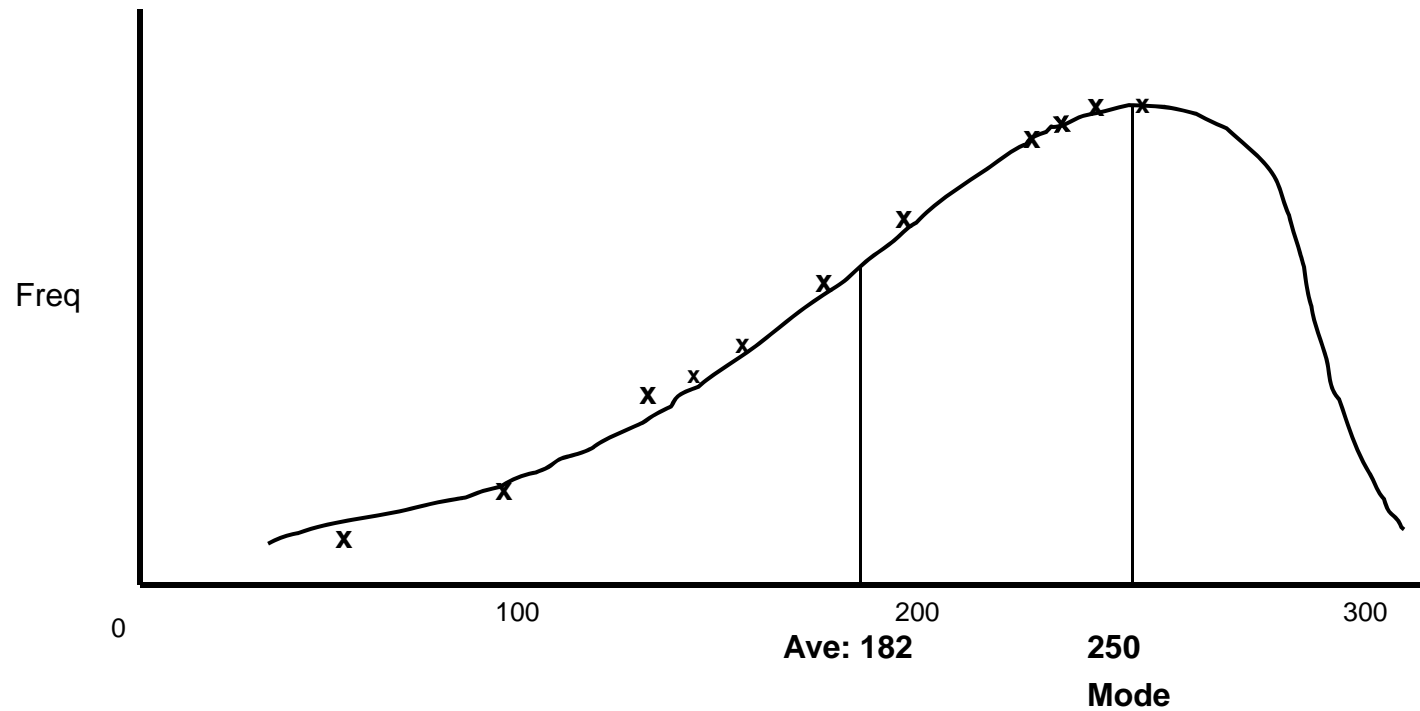
**Energy Savings – 50 to 55 % of the VFD Savings**

# Compressed Air



1 kWh  $\xrightarrow{\text{Could produce}}$  320 to 330 CFT (FAD)

# Compressor System Efficiency



# Compressor System Efficiency – cont'd

If the Average (182) improves to 250  
(with current technology, it is possible today)

## Energy Savings:

A 250 HP System:

- 57 kW in Demand
- 456,000 kWh/ year

## Total US:

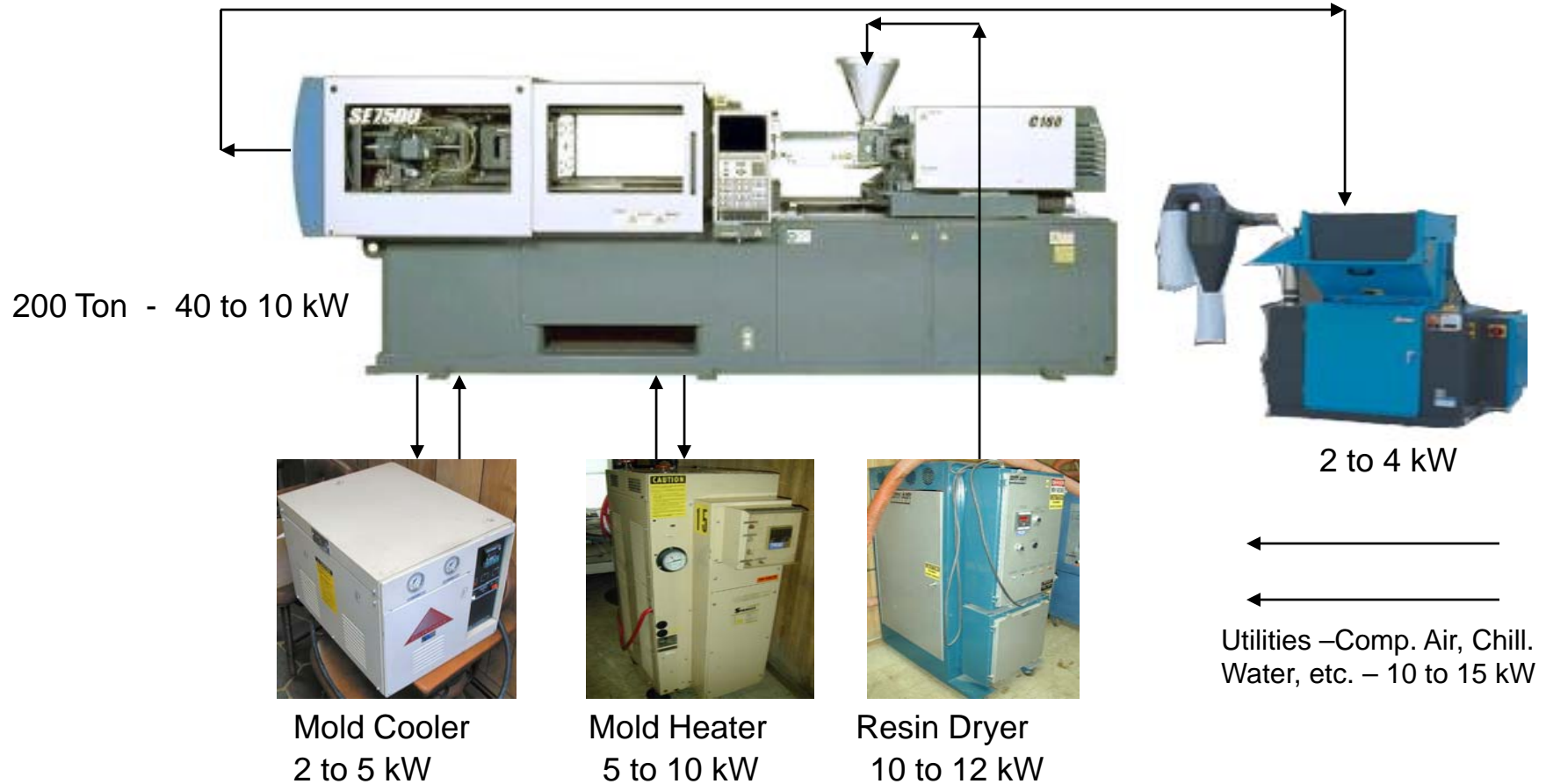
(Compressed Air Usage - 25 Million HP)

- $5.7 \times 10^6$  kW
- $45.6 \times 10^9$  kWh/ year

# PLASTIC FABRICATION PROCESSES

- ❑ Injection Molding
  - ❑ Blow Molding
  - ❑ Tube Extrusion
  - ❑ Film Extrusion
  - ❑ Thermo Forming
- ❖ Poly Styrene
  - ❖ Polypropylene
  - ❖ Polyester
  - ❖ PET
  - ❖ Nylon
  - ❖ ABS
  - ❖ Polycarbonates

# TYPICAL INJECTION MOLDING LINE



# Injection Molding Machine Efficiency

Energy Efficiency based on Poly Styrene

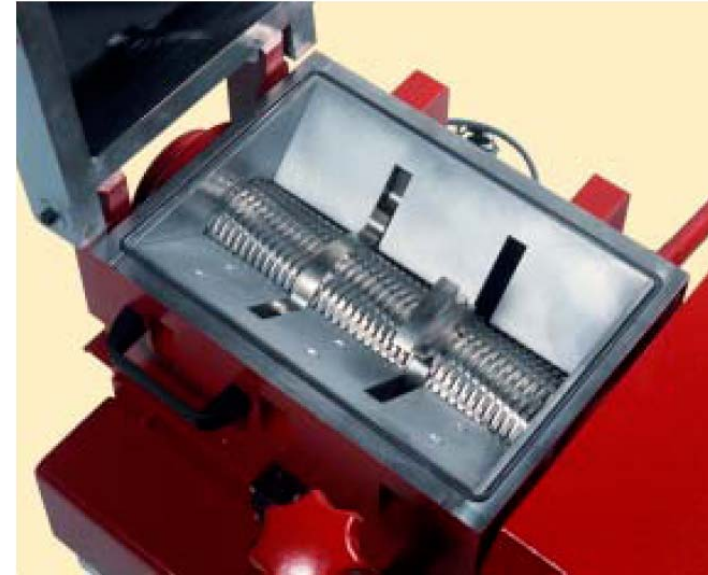
Units: kWh / Kilogram

- ❖ Hydraulic - 1 kWh/Kg
- ❖ Hybrid - 0.45 to 0.55 kWh/Kg
- ❖ All Electric - 0.2 kWh/Kg

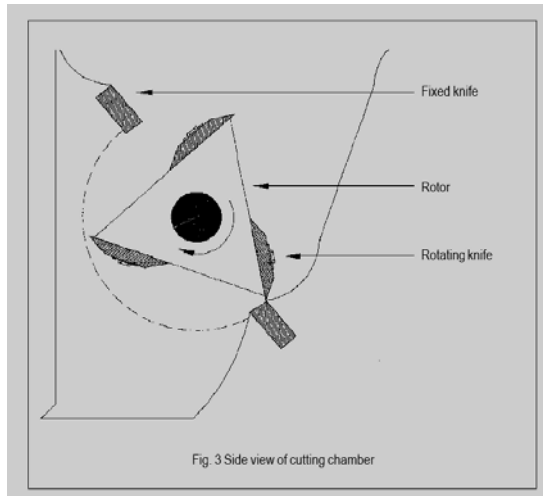
# Beside-the-Press Granulators



5 to 10 HP Conventional



Low Speed Granulator -1 to 3 HP



# Resin Driers

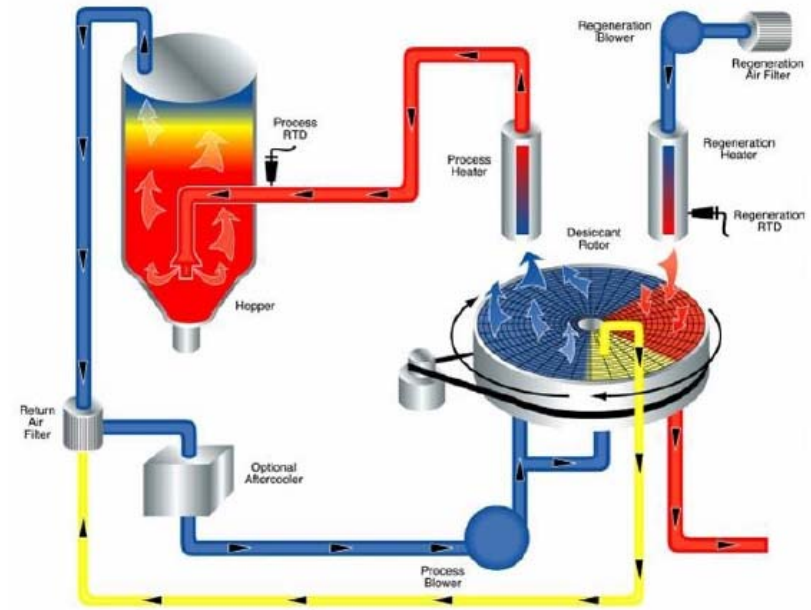


**Twin Bed Drier - Standard**



**Low Pressure Drier**

# Resin Driers – cont'd



**Desiccant Wheel Drier Schematic**

# Resin Driers – cont'd

- **Very Hygroscopic** : PET, Polyurethane, Polyester, etc
- **Moderately Hygroscopic** : Nylon, Poly Carbonate, etc.
- **Slightly Hygroscopic** : ABS
- **Non Hygroscopic** : Acetal

**Final Moisture Level Required** : 0.005% to 0.2% (depending on the resin)

**Energy Efficiency** : 0.173 to 0.083 kWh/Kg  
(based on the drier)

**(Poly Carbonate with 0.02% level is used as the standard)**