



Energy Trust of Oregon  
Energy Savings Applications for VFDs  
April 8, 2026

# Agenda



What is a VFD?



Quick review of force, torque, speed, power and energy consumption



Most common types of loads on motors



VFDs and their application for energy savings



Examples and discussion



Q&A

What the heck is a VFD?

# What is a VFD (VSD, Freak Drive, Etc.)?

- Variable Frequency Drive allows you to easily change the speed of rotation of a motor.
  - Based on an input signal or manually



# Trinity of Energy Use

## Rated Power

What's the equipment's HP or kW Input power?



## Run-Time

How many hours per day is this equipment on?



## Load Factor

How large a load is placed on the equipment?



## Efficiency

What % of the energy use is lost as waste?  
Can we modify any of the above factors to reduce waste?

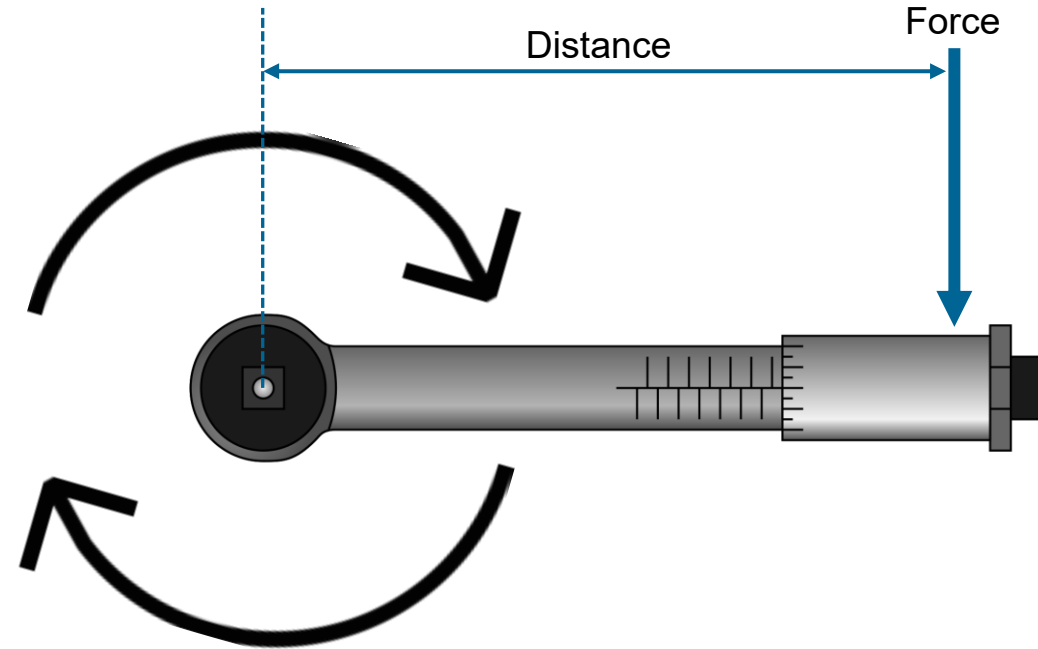


# What do they look like installed?



Torque, Speed, Power and Energy Consumption

# Force, torque, speed, power and energy consumption



Torque (NM or Ft Lbs) = force x distance

Power (kW or hp) = torque x speed

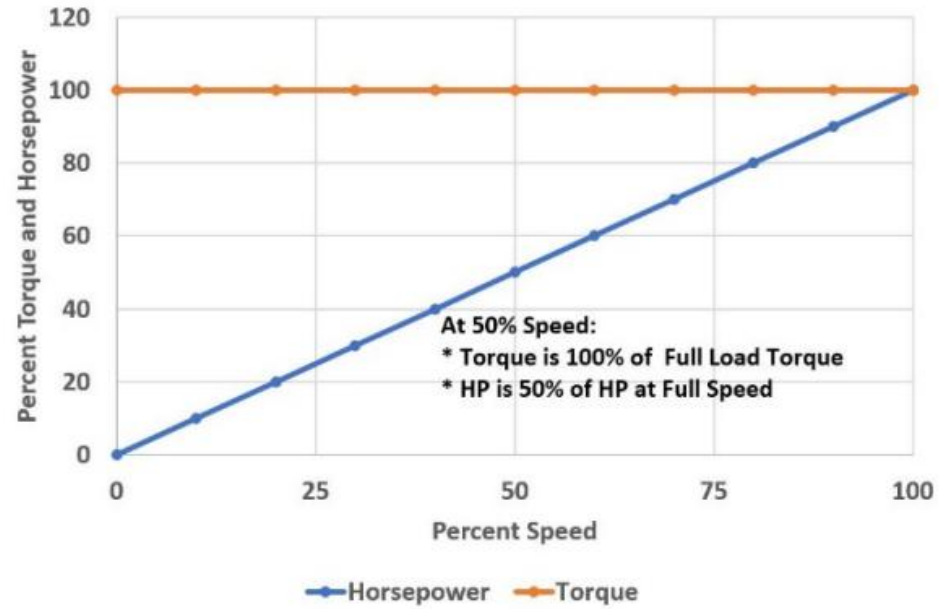
Energy Consumption (kWh or hp\*h) = power x time

# Common Types of Motor Loads

- Constant torque
- Constant power
- Variable torque



# Constant torque loads



- Crane, conveyor, positive displacement pumps (most air compressors), saws
- $\text{kWh} = \text{torque} * \text{speed} * \text{hours}$



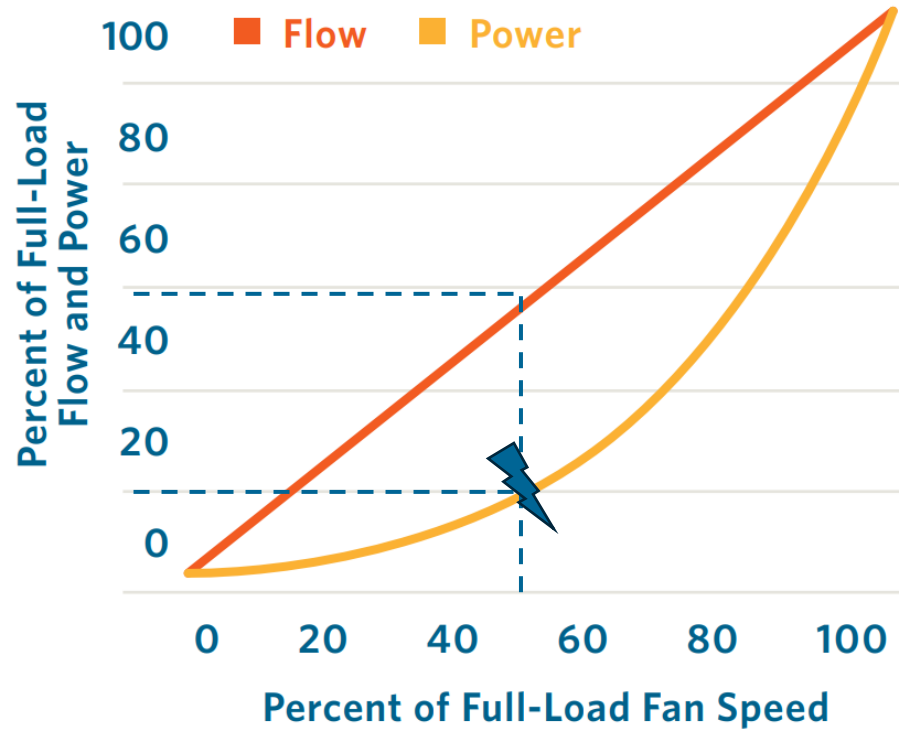


## Constant power loads

- These are loads where less torque is required as the speed increases
- Think about chopping wood (actions where momentum is your friend)
- Chippers, milling machines, lathes, grinders, winders
- $\text{kWh} = \text{torque} * \text{speed} * \text{hours}$



## Variable torque loads



- Torque required reduces substantially as speed reduces
- Centrifugal fans & pumps, agitators

# Brentwood Corporation

- On-demand Dust Collection System
- Including VFDs, isolation gates and master controller
- ~\$500,000 in project cost
- \$257,600 cash incentive
- 1,300,000 kWh/year savings
- \$86,000 est. annual energy cost savings

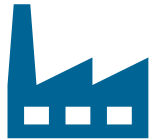


“This is one of the most compelling capital projects we have ever completed because it offers real dollar savings in electricity and is not dependent on changing market or business demands...”

Dan Wagner, plant engineering and maintenance manager, Brentwood Corporation

# VFDs and their Application for Energy Savings

# Variable torque loads are the best applications for energy savings



## Industrial + manufacturing facilities

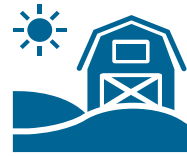
### Airflow systems

- Dust collection
- Process
- Ventilation
- Boiler combustion air fans

### Pump systems

- Primary process pumping
- Heating and cooling water loops

### Agitators



## Agriculture, nurseries, dairies, irrigators

- Ventilation systems
- Dust collection
- Agitators
- Irrigation pumps
- Boiler combustion air fans



## Water + wastewater treatment facilities

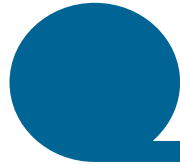
- Centrifugal blowers
- Intake and discharge pumps
- Pump and lift station pumps
- Agitators (mixing)
- Distribution pumps
- Well pumps
- Booster pumps

# Other VFD applications for energy savings



## Run time reduction

Will the installation allow for more off time?



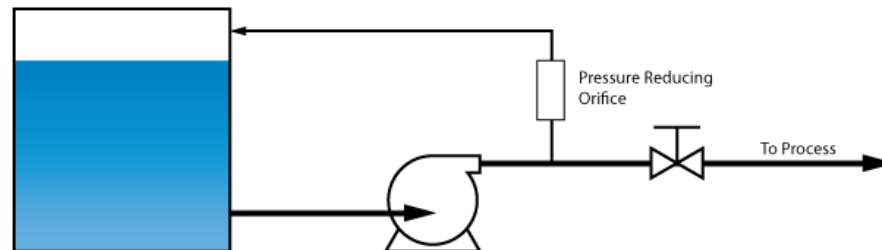
## Damped flow or bypass

Intake or discharge dampers  
Throttling valves  
Inlet guide vanes  
Recirculation/bypass



## Upstream or downstream optimization

Does adding speed control improve the operation of the upstream or downstream equipment/processes?



# Conveyor discussion

- Does slowing a conveyor down reduce power required at the drive motor?
- Does it reduce the energy required to move the product?
- Is there any opportunity for energy savings?



# Dust collection fan motor?

- Does slowing down reduce power required at the drive motor?
- Does it reduce the energy required to move the same volume of air?
- Is there an opportunity for energy savings?





What other examples are you curious to discuss?

- Chipper?
- Well pump?
- Air compressor ( AKA positive displacement pump)
- Cooling fan?



## Questions to ask?

- How will the VFD change the system's operation?
- Will speed control improve operation of upstream or downstream equipment?
- Is the current system throttled, restricted or bypassing in some way?



## VFD incentives

- Rebates:
  - New industrial pumps and fans up 22.5hp
  - Retrofit industrial pumps and fans up 22.5hp
  - Irrigation pumps up to 125hp
  - Up to 100% of Equipment and install costs
  - Applied for post purchase/install
- Incentives for VFDs over that size need to be calculated
  - \$0.45/kWh
  - Up to 90% of eligible cost
  - Applied for pre-install

# When to check in with Energy Trust of Oregon

- Are you building a new or adding on to your facility?
- Is the company considering capital equipment or controls purchases?
- Are you going through significant changes in production or occupancy?
- Do you want to investigate system optimization?
- Do you have sustainability or CO2 reduction goals?





Thank you

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# Resources

- Industrial Trade Ally Manager
- Technical Support
- Site Visits
- Copies of Forms