Rochester Wastewater Treatment Facility

Aeration Blower Upgrade Project

Project Drivers

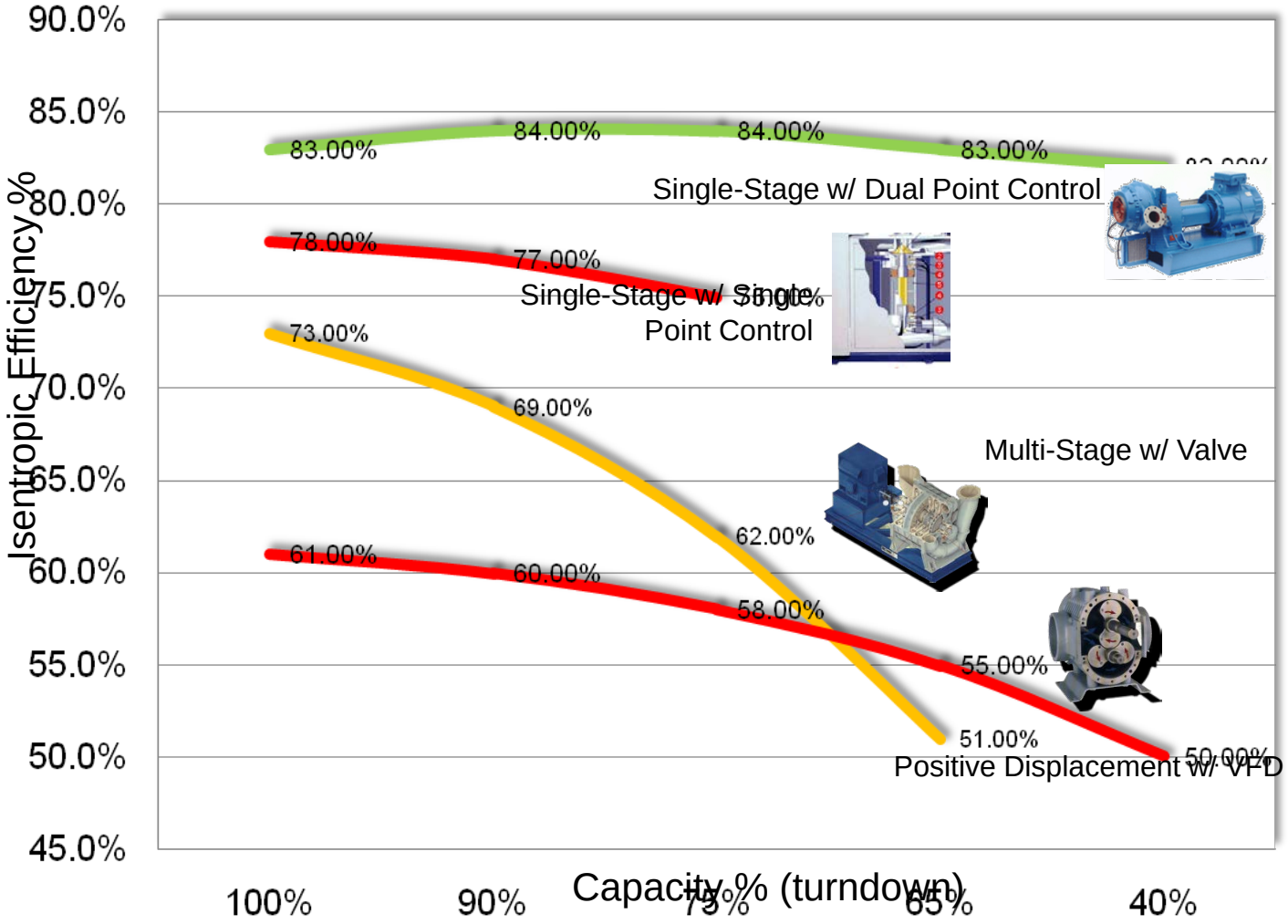
- The aeration process is the highest power demand at a WWTF
- Replacing aeration blowers with more efficient technology would:
  - Reduce energy usage
  - Reduce green house gas emissions

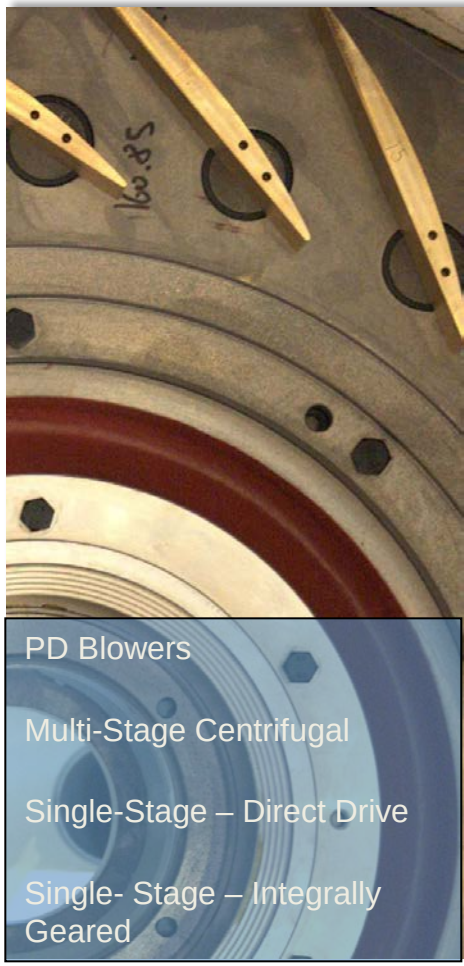
Technology Selection

- Positive Displacement Blowers
  - Low efficiency (~60% at full speed)
  - Limited turndown capacity
  - Noisy
- Turbine Blowers
  - Higher efficiency than PD blowers
  - Gear driven or direct drive
  - Control of air volumetric air flow

Blower Technologies

Performance





PD Blowers

Multi-Stage Centrifugal

Single-Stage – Direct Drive

Single- Stage – Integrally Geared

Turbine Blower Selection

- Direct Drive Turbine
  - Magnetic or air bearing design
  - Introduced to US market in last 10 years
  - Checkered history of operation
    - Turndown issues
    - Multi-unit operation issues
    - Parts availability a concern
- Gear driven turbine
  - Proven history of reliable operation
  - In market place for over 30 years
  - Recently introduced “smaller” units (~100 hp)
  - Efficiencies in high 80% range across broad range of air flow

Project Highlights

- Power analysis
  - Power monitoring performed before and after installation of new blowers
  - PD blowers – 240 amps at 4,000 cfm
  - Siemens blowers – 139 amps at 4,000 cfm
    - 42% energy savings
- Blower skids ship fully assembled
  - Dismantle in field to install in basement
  - Reassemble in-place

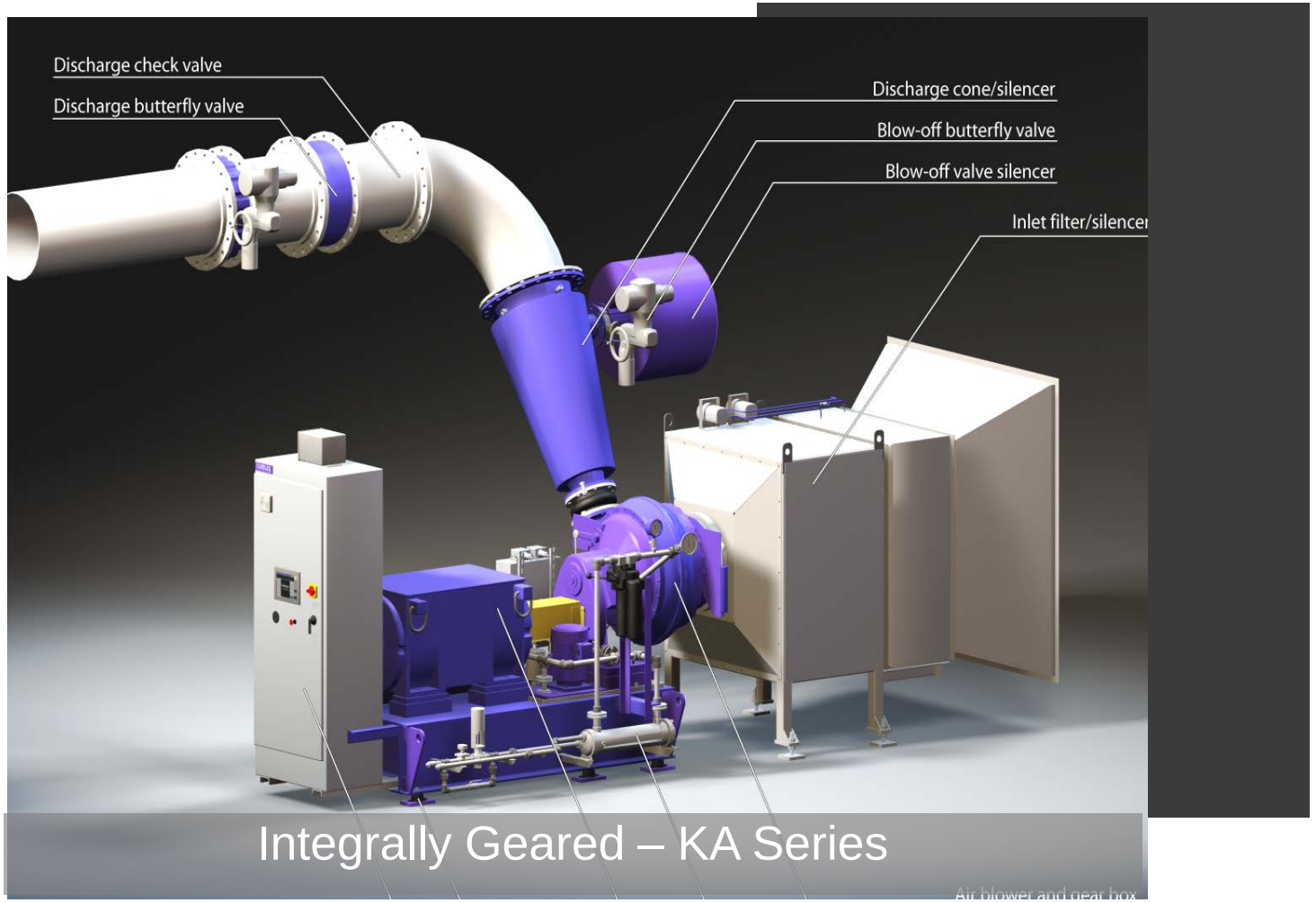
Project Cost Summary

Item	Original Budget	Grant Disbursement	Actual Cost	City Matching Funds
Design	$ 45,000.00	$ 50,000.00	$60,000.00	$10,000.00
Blower Purchase	$218,600.00	$220,610.00	$441,220.00	$220,610.00
Construction	$130,400.00	$123,390.00	$172,676.45	$49,286.45
TOTAL	$394,000.00	$394,000.00	$673,896.45	$279,896.45

Estimated payback for single blower ~ 5 years

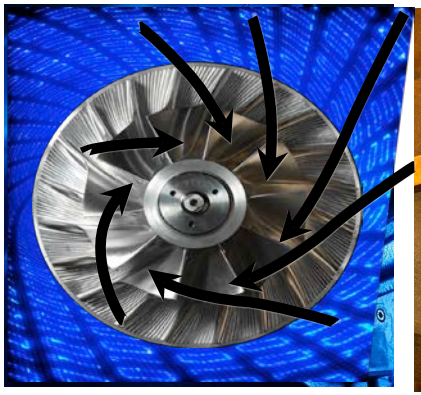
Blower Technologies

Product integrally geared



Blower Technologies

Dual Point Control

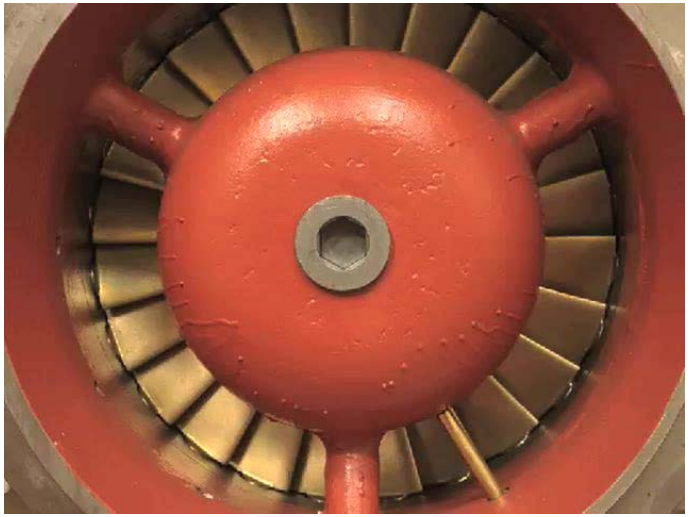


Efficiency | Turndown | Lowest TCO

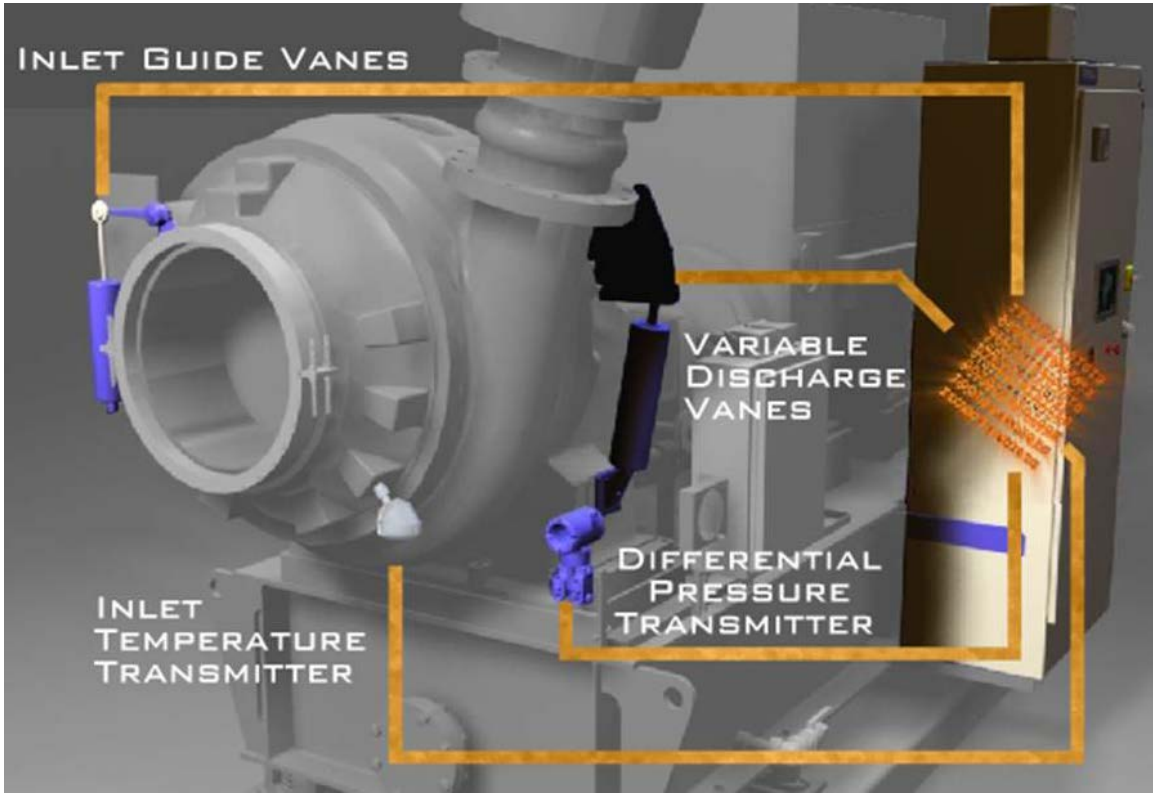
P (kw)≈= f (flow, pressure, temperature)

Blower Technologies

Dual Point Control



IGV Position



- Inlet Temperature
- Differential Pressure
- Discharge Capacity (DV Position)

P = f (Q, Δp, Ti, ηis)

How It Began – Evolution of Turblex

Blower Technologies

Installations

Containerized Units

CONTAINERIZED UNIT

Installations