Energy Efficiency Opportunity Analysis
Consolidated Precision Products

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Company Overview

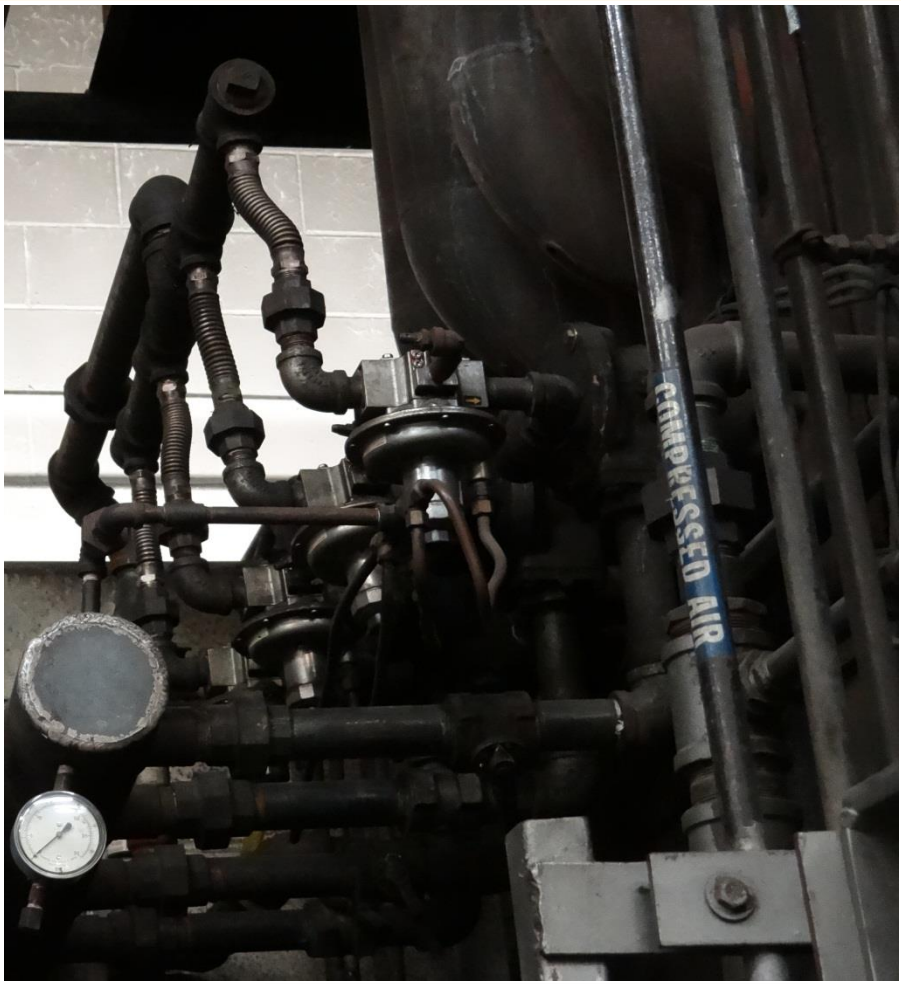
- Consolidated Precision Products is an aerospace foundry.
- Produces high precision aluminum and magnesium castings for NASA rockets, military and commercial aircraft, among others.
- 550 employees, two shifts, ~20 hour/day runtime

Incentives for Change

- Rising facility utility costs
  - Natural Gas
  - Electric
- Abundance of high temperature exhausts
- High potential for energy reclamation

Reasons for MnTAP Assistance

- Gather performance data on ovens, quench tanks, and fluidized bed
- Identify new opportunities for energy reduction
  - Prioritize changes using simple payback methods

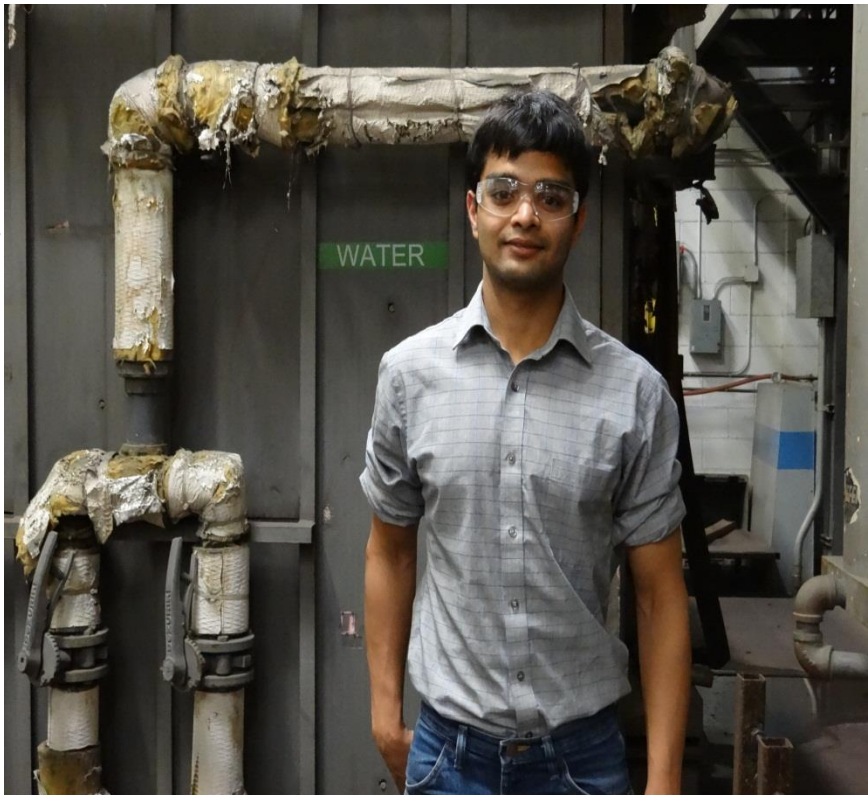


Approach

- Learn about the sand casting process
- Understand the workings of heat-treat, quench tanks, and fluidized beds
  - Qualitative analysis
  - Quantify
- Efficiency Analysis
- Find additional opportunities

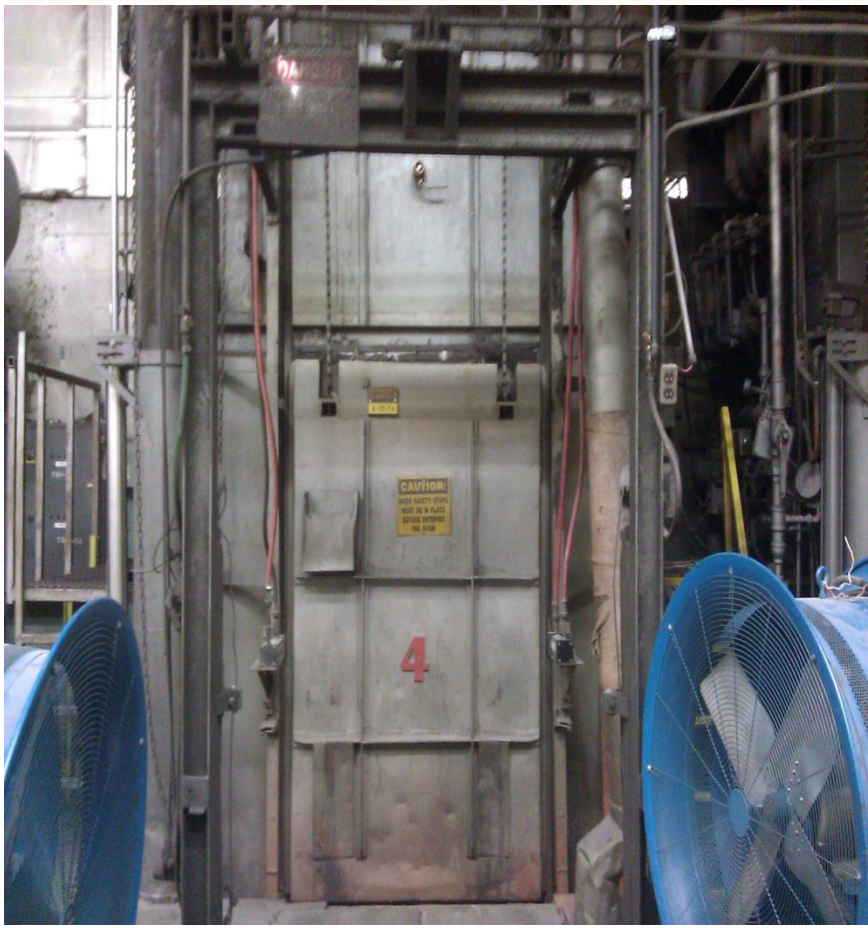
Sand Casting Process

- Molds prepared
- Molten metal poured
- Sand removed on cooling
  - Shake out
  - Fluidized Bed
- Finishing
- Heat Treat
- Aging



Heat Treat

- Oven types:
  - Gas
    - Direct Fire
    - Sealed Tube (least efficient)
  - Electric (higher efficiency)



Oven 4: Plug in Recuperator

Opportunity:

- Most used sealed tube heat treat oven
- Inefficient because flue gas

  at temp >1400F
- Has four burners, running at 60% currently

Oven 4: Plug In Recuperator

Solution

- Recuperator will increase efficiency to 71%
- Combustion air preheat to >600F

Recommendation	Environmental Savings	Implementation Cost	Annual Savings	Payback Period
Install Plug-In Bayonet Ultra Recuperators on Oven 4	12690therms	$15,510	$5,711	2.7 years

Quench Tank for Oven 19

Opportunity:

- Overpowered burner
- Custom exhaust stack getting damaged
  - Very expensive
- Repair costs alone warrant change

Quench Tank for Oven 19

Solution:

- Reduce burner capacity from 20therms/hr to 8.3therms/hr
- Increased efficiency from 56.5% to 72.5%

Recommendation	Environmental Savings	Implementation Cost	Annual Savings	Payback Period
Change setup to reduce burner capacity on quench tank for oven 19	2770.1therms/year	$3869.67	$1246.95/year	3.1years

Heat Exchanger for Fluidized Bed

Opportunity:

- Runs 24/7
- Flue exhausts at 805F!
- So much energy wasted! (77500therms/year

Heat Exchanger for Fluidized Bed

Opportunity:

- Install Heat Exchanger to use heat during the winter.

Recommendation	Environmental Savings	Implementation Cost	Annual Savings	Payback Period
Install Heat Exchanger for Fluidized Bed Flue Gases	4.45therms/Hr	$40,000	$20,465	2 years

Magnesium Pour Tipper Ladles

Opportunity:

- Tipper ladles drop temperature quickly
- Very small pouring window
- Have to use smaller quantity pots for pouring

Magnesium Pour Tipper Ladles

Solution

- Insulate ladles
- Will allow for an additional 15-20 minutes of magnesium pouring time
- Reduce/eliminate need for smaller pots

Mag Pour Burner Management

Opportunity:

- All burners for melting magnesium switched on at 3am
- Some not poured until between 9 and 11am
- Unnecessary gas consumption

Mag Pour Burner Management

Solution

- Manage burner start times

Recommendation	Environmental Savings	Implementation Cost	Savings	Payback Period
Manage Mag Pour Burner Start Times	43130therms Gas Annually	$0 – Change burner management strategy	**$19,408.5**	instantaneous

Compressed Air

Opportunity:

- Too many leaks!

Solution:

- Flow rate meters installed
- Costing them $30,000 annually!
- Xcel Compressed air audit

Motor and Belt Drive Survey

Opportunity:

- Over 150 motors and belt drives, efficiency unknown, some very old

Solution:

- Belt drive survey through Xcel
- VFDs, soft starters, more efficient replacements
- Rebates from Xcel

Summary

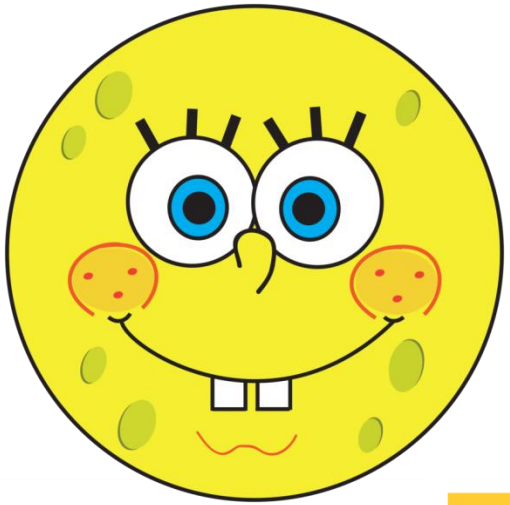
Option	Energy saved (per year)	Implementation Cost	Cost Savings (per year)	ROI Period
Oven 4	12,690Therms	$15,600	$5,711	2.7 years
Quench Tank	2771Therms	$3869.67	$1246.95	3.1 years
Fluidized Bed	38980Therms	$40,000	$20,465	1.95 years
Mag Pour Insulation	218.65kW during use	$515	Refer to recommendation section under energy efficiency options	N/A

Summary

Option	Energy saved (per year)	Implementation Cost	Cost Savings (per year)	ROI Period
Mag Burner Procedure Management	43130Therms	$0	$19,408	Immediate
Repair compressed air leaks		$1000 (labor)	$30,000	12 days
Motor and Belt Drive Survey	N/A	Small thanks to Xcel Rebates	N/A	N/A
TOTAL	**97,571**Therms + 218.65kW during mag pour	**$60,984.7**	**$76,830**	**9.5 months**

Personal Benefits

- Opportunity to utilize knowledge on heat treat, electrical engineering, etc.
- Improved communication skills
- Learned some PLC programming
- Real world exposure



Questions?