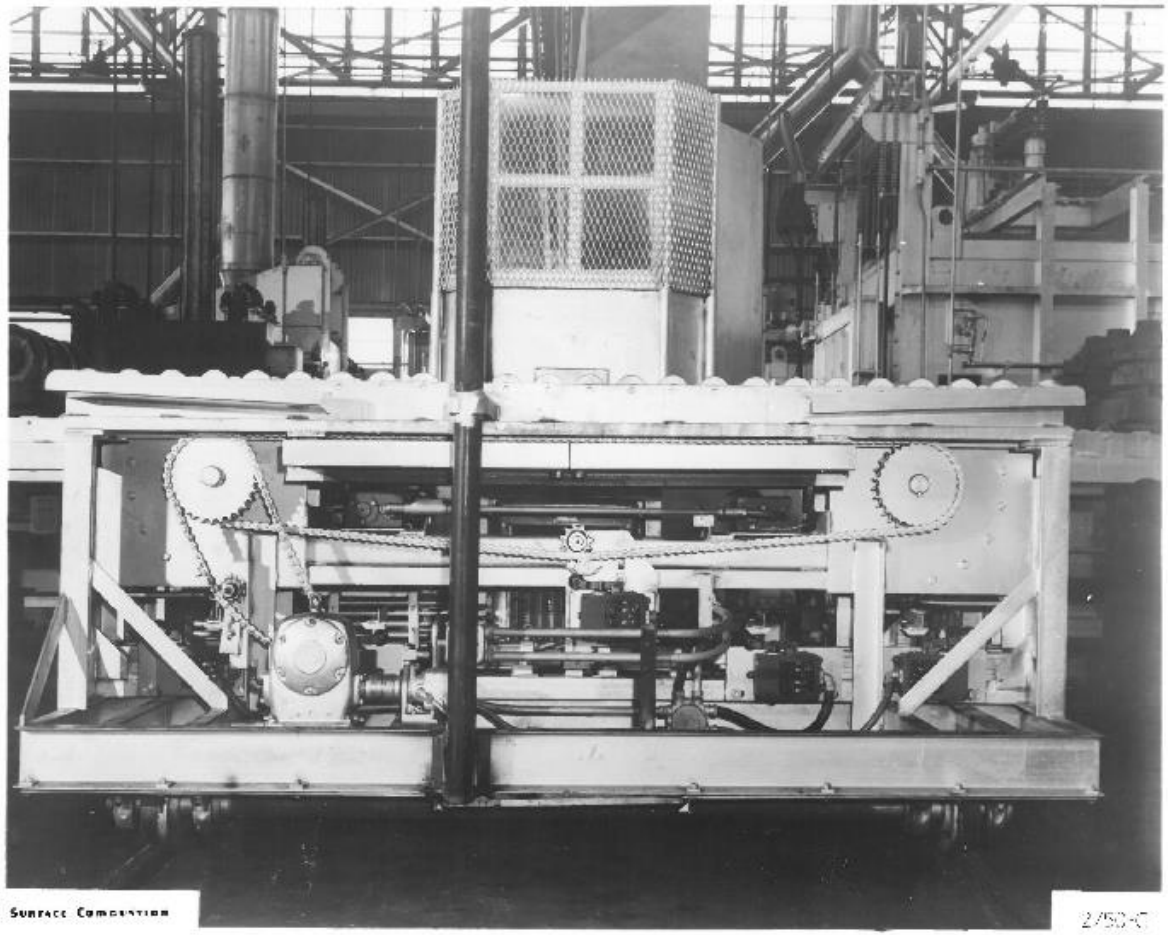
AP Torque™: Implementing Technology Into A Charge Car

Alex Kominek,
Business Unit Manager

Surface Combustion

Charge Cars Then…..



Charge Cars Now

Main Functions of Charge Car

- Transfer loads in and out of equipment
- Transport loads between different pieces of equipment
- That's it!

What Happens if the Charge Car Doesn't Work?

- Work doesn't get loaded
- Heat treating is shut down
- Money is lost
- That's it!

Key Components of Charge Car

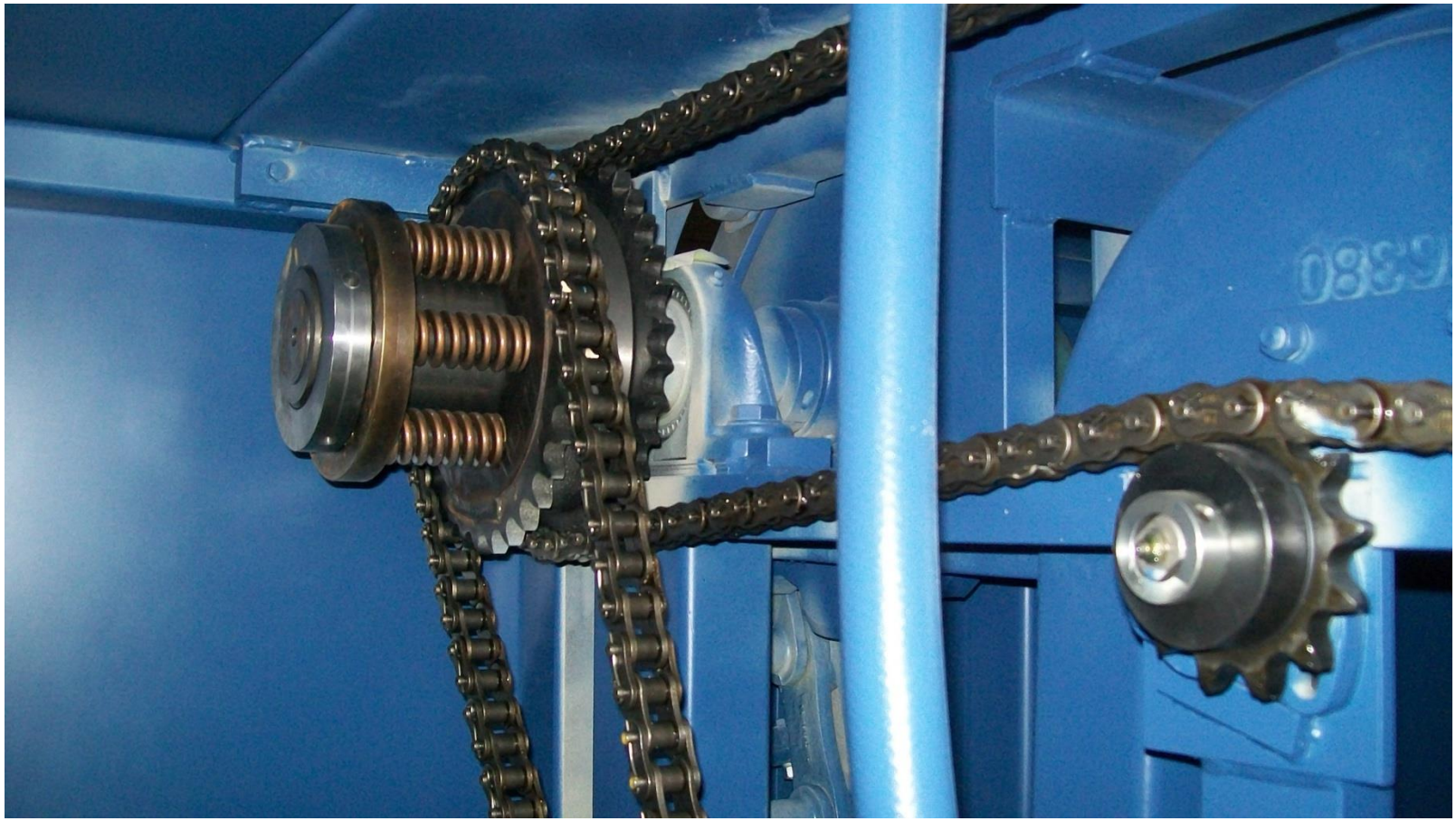
- Lateral Drive
- Handler Drive
- Handler Chain and Handler Head
- Limit Switches
- Locking Rams

Lateral Drive Options

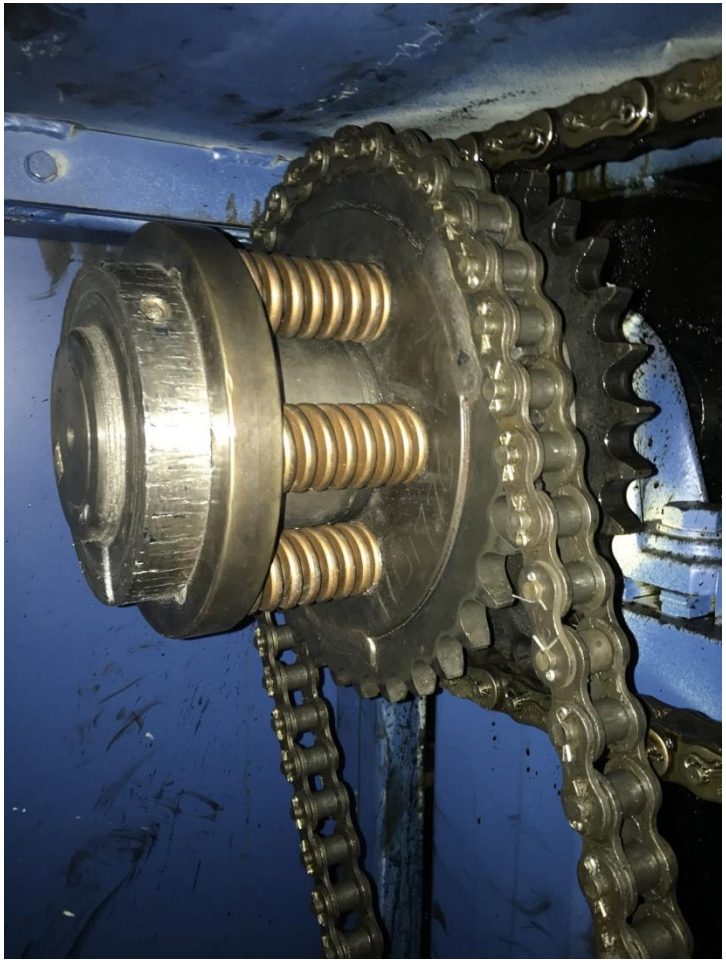
- **Single Speed Drive**
  - Manual control, manual location
- **Variable Frequency Drive**
  - Manual control, more precise
- **Laser Location**
  - Automatic control, most precise, used with VFD

Handler Drive Design

- Gearmotor
- Drive Chain
- Drive Shaft
- Drive Sprockets
- Handler Chain Sprockets
- Handler Chain
- Handler Heads
- Clutch…..or not



- Clutch adjustments made to allow heavier load or to overcome interferences in alloy (not recommended)
  - Collar is tightened
  - Springs provide additional force to the clutch

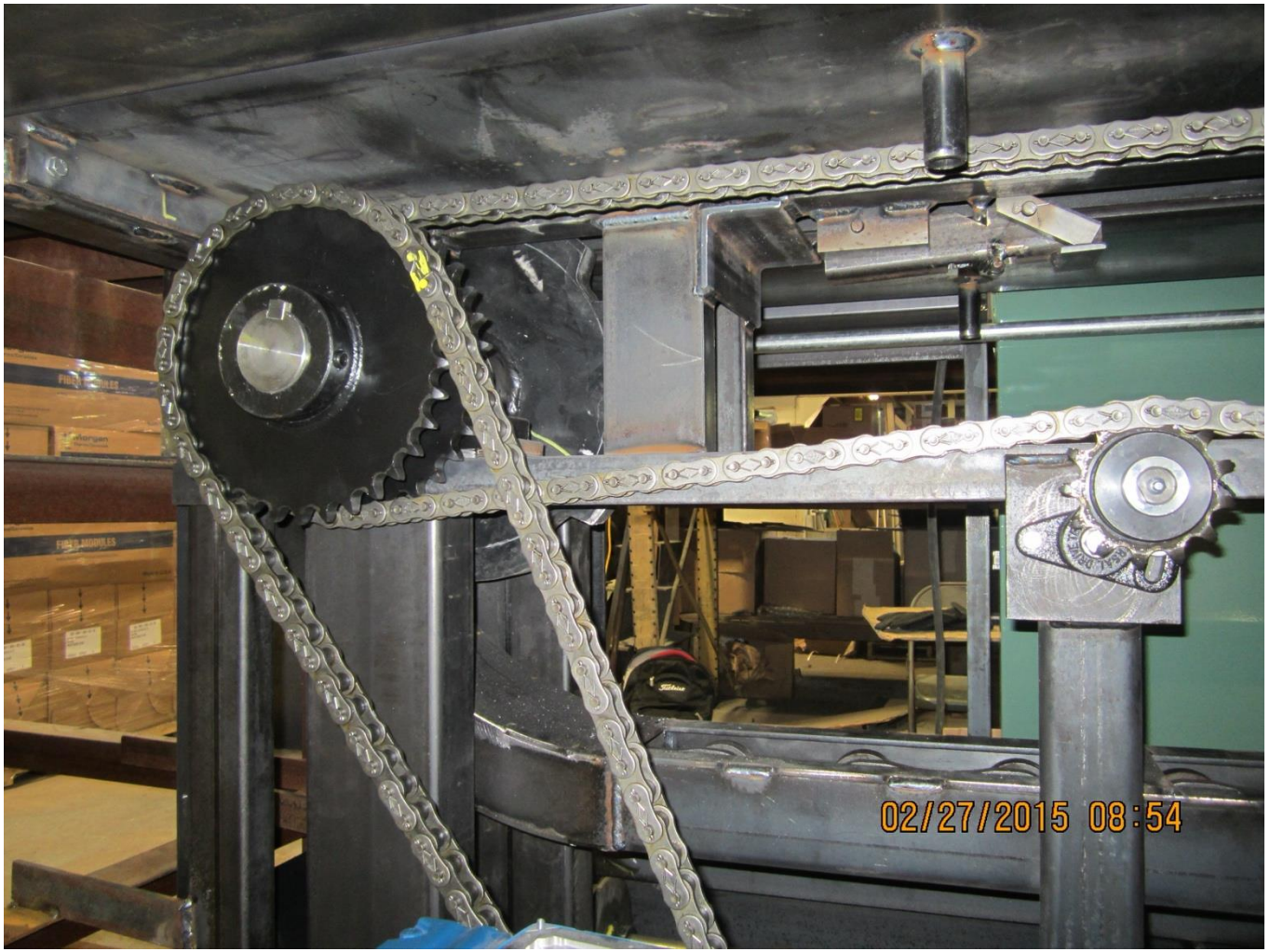


- Broken clutch pins as a result of pushing the unit beyond designed capacity

AP™ Torque System

- Removes the mechanical clutch
- Includes a Variable Frequency Drive
- Removes the mechanical rotary limit switch
- Includes an absolute encoder


SOLA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VFD Set-Up

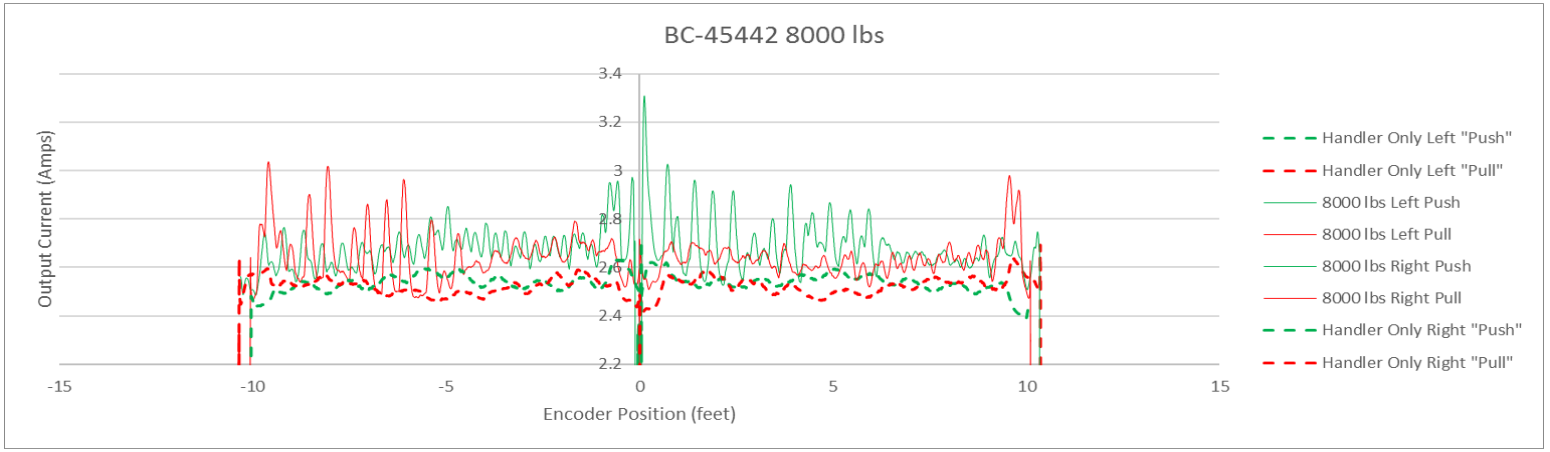
- Torque limiting parameter set to limit the total torque used by the gearmotor
- Shear Pin Setting also utilized to protect the motor

Initial Benefits and Advantages

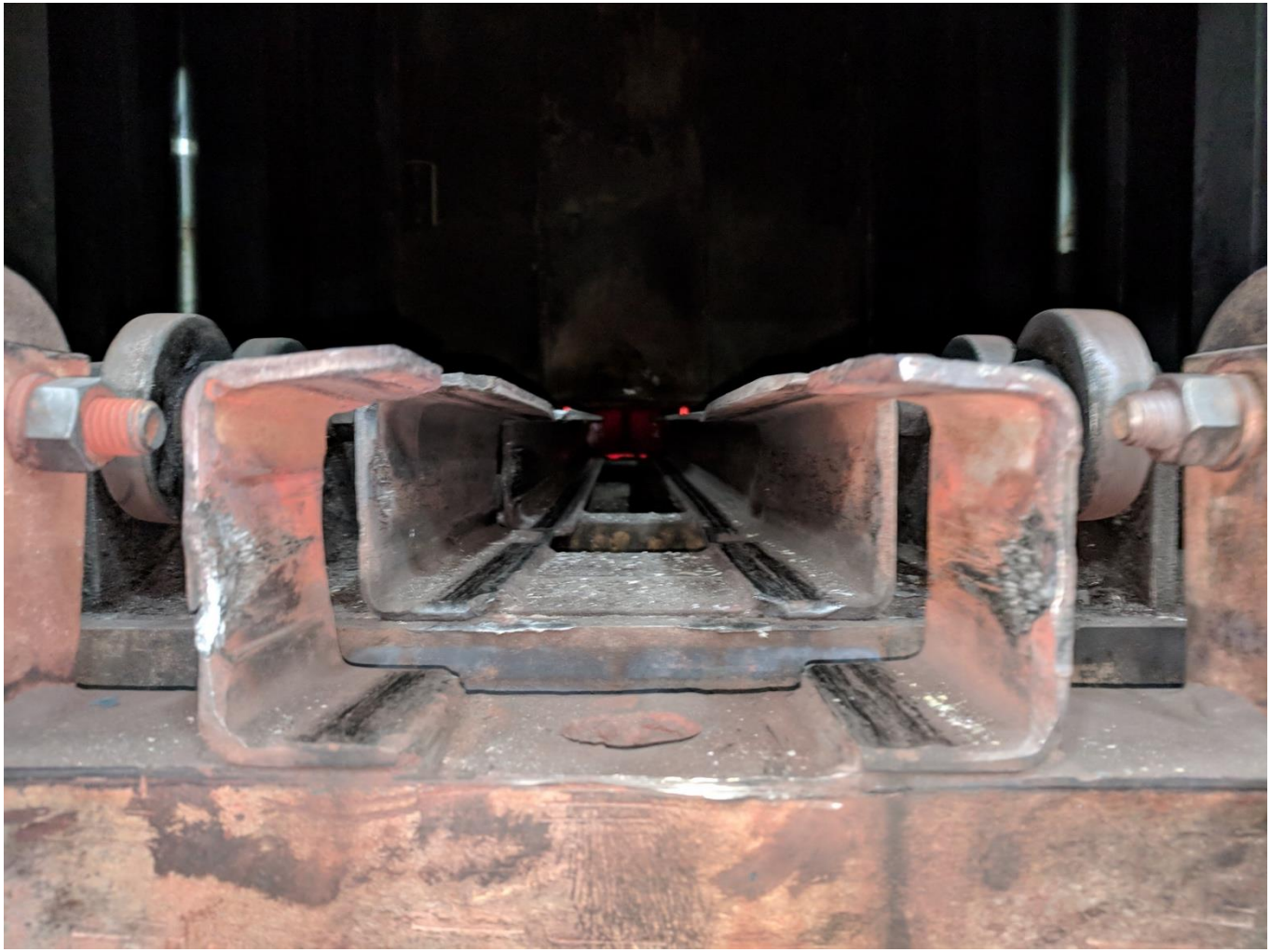
- Reduced maintenance required to replace clutches
- Less stress and stretching of drive chains
- Protection of motors
- More reliable tray placement (encoder)

Added Benefits and Advantages

- Predictive Maintenance
- Longer lasting car
- Longer lasting alloy


BC-45442 8000 lbs
Output Current (Amps)
3.4
3.2
3
2.8
2.6
2.4
2.2
-15
-10
-5
0
5
10
15
Encoder Position (feet)
Handler Only Left "Push"
Handler Only Left "Pull"
8000 lbs Left Push
8000 lbs Left Pull
8000 lbs Right Push
8000 lbs Right Pull
Handler Only Right "Push"
Handler Only Right "Pull"


BC-45442 3620 lbs
Output CUrrent (Amps)
3.4
3.2
3
2.8
2.6
2.4
2.2
-15
-10
-5
0
5
10
15
Encoder Position (feet)
Handler Only Left "Push"
Handler Only Left "Pull"
3620 lbs Left Push
3620 lbs Left Pull
3620 lbs Right Push
3620 lbs Right Pull
Handler Only Right "Push"
Handler Only Right "Pull"



Preventative Maintenance

- Repeated alarms at the same position with the same piece of equipment indicate maintenance needs to be done

Predictive Maintenance

- Record a baseline “trace” of the alloy transitions
- Regularly rest and compare the same transitions
- Compare one furnace transition to the next
- Compare one alloy tray vs. next tray
- Higher amp draw = worse shape = replacement time

Thank you!
Any Questions?

Alex Kominek
akominek@surfacecombustion.com
419-891-1487

www.surfacecombustion.com

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