BOWIE
RESOURCE PARTNERS LLC

Longwall USA 2017

Transformation/Repurposing of Face Equipment





About Me

- Name: Jacob Smith
- Education:
  - Bachelor of Science – Civil Engineering
  - Master of Science – Geotechnical Engineering
- Experience:
  - Over 7 years of engineering experience in the Civil and Mining industries
  - Licensed Professional Engineer in the State of Utah
- Employer: Canyon Fuel Company
- Position: Engineering Manger – Sufco Mine

CANYON FUEL COMPANY, LLC
SUFCO MINE

About Canyon Fuel Company

- Canyon Fuel Company is a subsidiary of **Bowie Resource Partners, LLC.**
- Operations:
  - Sufco Mine
  - Skyline Mine
  - Dugout Canyon Mine
  - Fossil Rock Mine (Future)
- Bowie Resource Partners is *the* largest coal producer in the Uinta Basin

Challenges Facing Our Industry

"Over the past decade, the coal mining industry has faced a series of challenges including competition from other fuel sources, as well as increased regulations"

– Advancing Utah Coal, May 2017

Primary Contributors:

- New Government Regulations
- Market Competition
- Aging Facilities
- Public Perception

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Challenges Facing Our Industry

"If somebody wants to build a coal-fired power plant, they can. It's just that it will bankrupt them."

– Barack Obama, 2008

New or Proposed Regulations:

- Mercury and Air Toxics Plan
- Clean Power Plan
- Regional Haze Plan
- Stream Protection Plan
- Coal Lease Moratorium
- New Respirable Dust Standards
- Proximity Detection

Challenges Facing Our Industry

- Opening the Door for Market Competition:
  - Risk of increase operating costs, due to environmental regulations
  - Aging coal-fired power generation facilities (Average 39 years)
  - Increase in natural gas production from domestic shale basins which reduced the price of natural gas

VS

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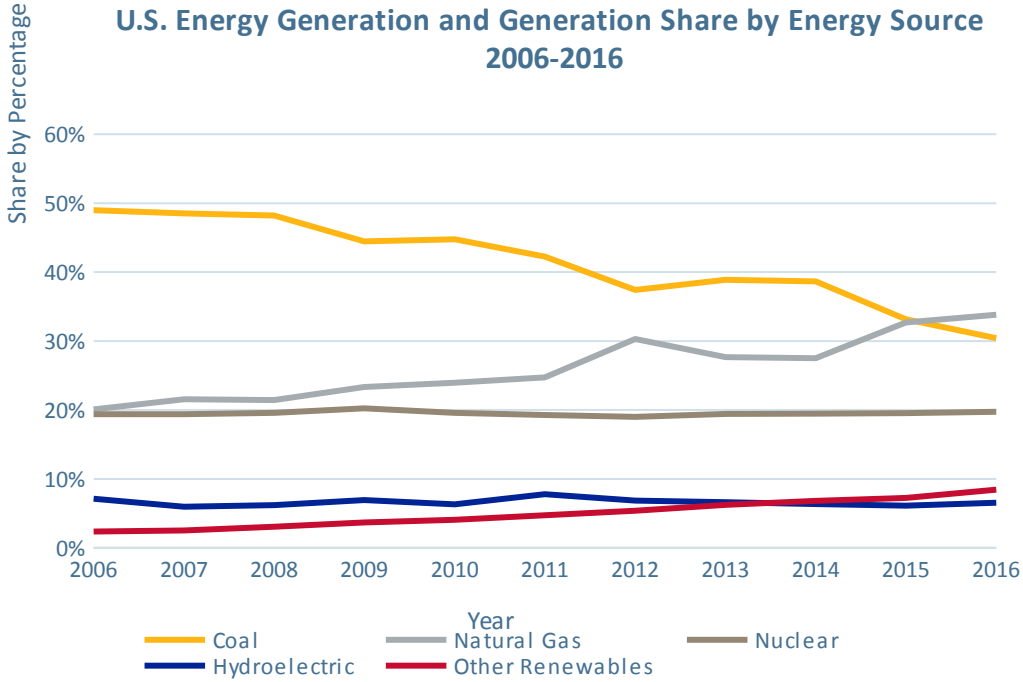
Market Demand



U.S. Generation by Share (2006-2016)					
Year	Coal	Natural Gas	Nuclear	Hydro	Other Renewables
2006	49%	20%	19%	7%	2%
2007	49%	22%	19%	6%	3%
2008	48%	21%	20%	6%	3%
2009	44%	23%	20%	7%	4%
2010	45%	24%	20%	6%	4%
2011	42%	25%	19%	8%	5%
2012	37%	30%	19%	7%	5%
2013	39%	28%	19%	7%	6%
2014	39%	28%	19%	6%	7%
2015	33%	33%	20%	6%	7%
2016	30%	34%	20%	7%	8%

Data source: U.S. Energy Information Administration

- Since 2006, total US power generation from Coal dropped from 49% to 30%
- The number of operating underground coal mines declined from 862 in 2006 to 470 in 2015, which is a 45% reduction

The Financial Dilemma

Decreasing Market Demand + Increasing Operating Costs = ?

The Ultimate Question: How does an operator *safely* maintain profitability, while meeting all state and federal regulations?

A Solution: By transforming and repurposing existing equipment

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Sufco Mine - Background

- Mine Type – Underground Coal
- Location – Central Utah
- Year Started – 1941
- Customers – Utilities & Western Industrial
- Mining Method –
  - 1 Longwall
  - 3 Continuous Miners
- Annual Production – 6 - 6.5 million tons
- Reserves –
  - Upper Hiawatha Seam
    - Total Tons Produced = Over 190 Million
    - Total Tons Remaining = Over 20 Million
  - Lower Hiawatha Seam
    - Total Tons Remaining = Over 56 Million

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Sufco Mine - Challenges

- Upper Hiawatha Seam
  - Historical Reserve Thickness = 9 – 17 feet
  - Remaining Reserve Thickness = 7 – 11 feet
- Current Longwall Equipment
  - (2) Complete Caterpillar 2.0-meter AFC, Crusher, and BSL
    - Face Width = 1,110 feet
  - (168) Caterpillar 2.0-meter Shields
    - Operating Height = 8.5 – 14.5 feet
- First Challenge
  - Managing Quality and Out-of-seam Dillution

Dugout Canyon Mine

- Mine Type – Underground Coal
- Location – Central Utah
- Year Started – 1998
- Customers – Utilities, Western Industrial, & Export
- Mining Method – Continuous Miner
- Annual Production – 0.75 - 1 million tons

- Available Equipment
  - (157) Joy 1.75-meter Shields
  - Operating Height = 7 – 11 feet
  - Total Cycles = 30,000
  - No Panline

Sufco Mine – Challenges

- Current LW Equipment
  - Face Width = 1,110 feet
  - Operating Height = 8.5 – 14 feet
  - Pan Width = 1342 mm
  - Web Depth = 42 inches

- Available LW Equipment
  - Face Width = 905 feet
  - Operating Height = 7 - 11 feet
  - Pan Width = 1042 mm
  - Web Depth = 36 inches

- Difference
  - Face Width = 205 feet (18%)
  - Operating Height = 1.5 - 3 feet (21%)
  - Pan Width = 300 mm (22%)
  - Web Depth = 6 inches (14%)

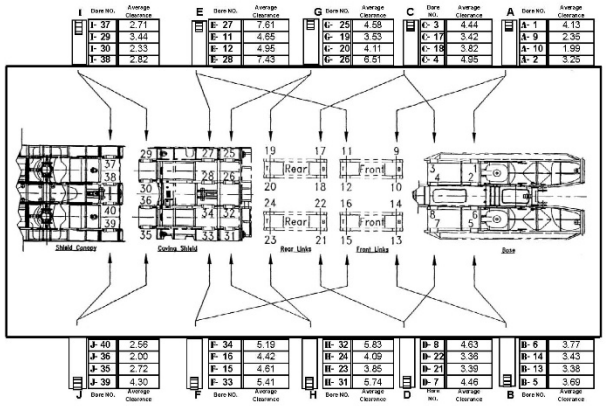
- Second Challenge
  - Maintaining Current Production

Challenges and Solution

- Define the Challenge
  - Maintaining Coal Quality
  - Maintaining Current Production
- Identify the Solution
  - Use the Available Joy 1.75-meter shields
    - Increase Web Depth from 36 inches to 1 meter
  - Purchase new AFC, BSL, and Crusher
    - Increase pan width from 1042 mm to 1142 mm
- Make a Plan
  1. Perform Shield Evaluation
  2. Develop Shield Rebuild and AFC Scope-of-Work
  3. Bid Shield Rebuild and AFC
  4. Award Contracts
  5. Complete Work
  6. Compatibility
  7. Install Equipment

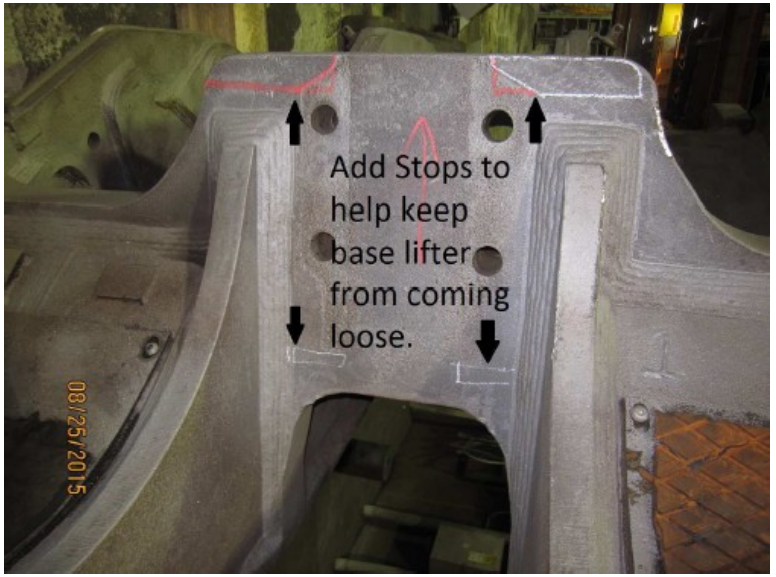
1 - Shield Evaluation

- Identified three potential vendors
- Each vendor was provided two shields
- Evaluation scope-of-work:
  - Perform Visual Inspection and Functionality Test
  - Clean, Strip, and Sandblast all Structures
  - Fully inspect all structures and welds
  - Fully inspect all leg pockets
  - Inspect all pins and bores
  - Provide report including:
    - Description of findings
    - Recommendations for rebuild



1 - Shield Evaluation

- Evaluation Findings:
  - Structurally in good condition
  - Base rear-bridge cracking
  - Pin and bore wear
- Recommendations:
  - Replace hosing and valves
  - Repair/replace base rear-bridge
  - Replace pins and recover bores



- Additional Items:
  - Lamniscate Modification (Fill holes and provide hose hangers)
  - Base Lift Repair (Add stops to prevent bolt fatigue)

1 - Shield Evaluation

- Key Process and Win-Win Solution
  - Provided Sufco with accurate and reliable information
    - Comprehensive rebuild scope-of-work
    - Avoid unexpected surprises/change-orders
  - Provided the vendor with an opportunity to become familiar with the shield
    - Reduced uncertainty during bid process
    - Confident and competitive bids

2 – Scope-of-Work

- Shield Rebuild – Standard Specifications
  - Clean, strip, and sandblast all structures
  - Inspect all structures and welds (highlight paint, dye penetrant, and mag particle)
  - Gouge and weld cracks, correct misalignment issues, and replace blocks and stops
  - Test all shield cylinders and rebuild to OEM specifications, as-needed
  - Install all new valve banks, control units, hosing, and cables
  - Replace all shield pins and recover bores to OEM tolerances
  - Reassemble shield
  - Paint all structures with one coat primer and one coat white paint

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2 – Scope-of-Work

- Shield Rebuild – Unique Specifications

  Structural:

  - Install 8-inch canopy tip extension
  - Provide new relay bar and DA ram to accommodate 1-meter web
  - Replace base rear-bridge
  - Plug access holes in lemniscate links and provide hose hangers
  - Provide base lift support blocks
  - Provide Loctite leg pocket foam protectant

  Safety:

  - Provide and install two water-curtain spray blocks recessed in canopy
  - Install new anti-skid surface plate on shield toes with pinned connection
  - Install fully-integrated multi-color lighting package

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3 - 4 – Bid and Award Contract

- Bids were requested from three vendors
- The ***Shield Rebuild*** contract was awarded

5 – Complete Work

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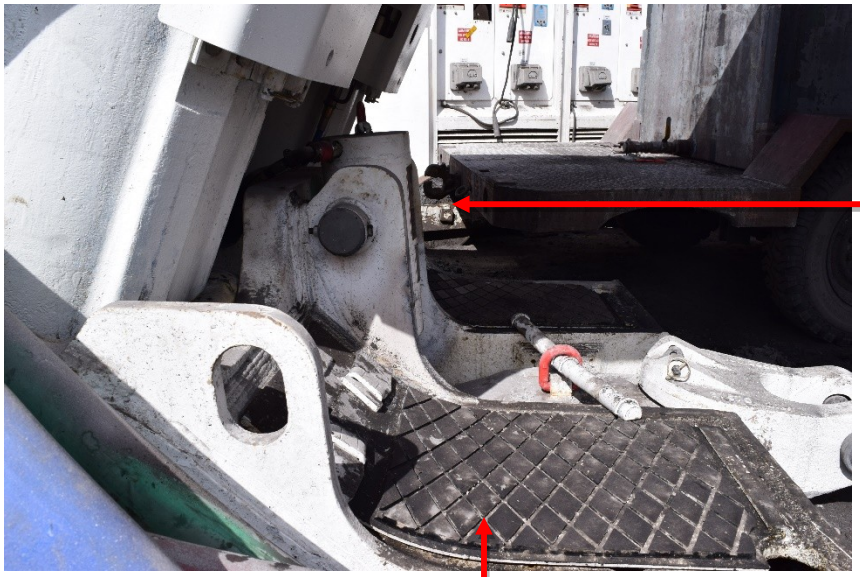
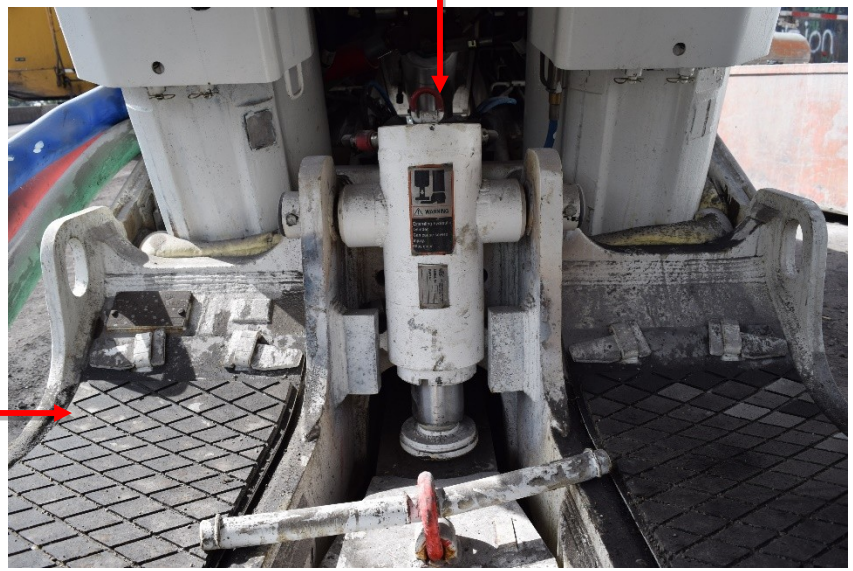
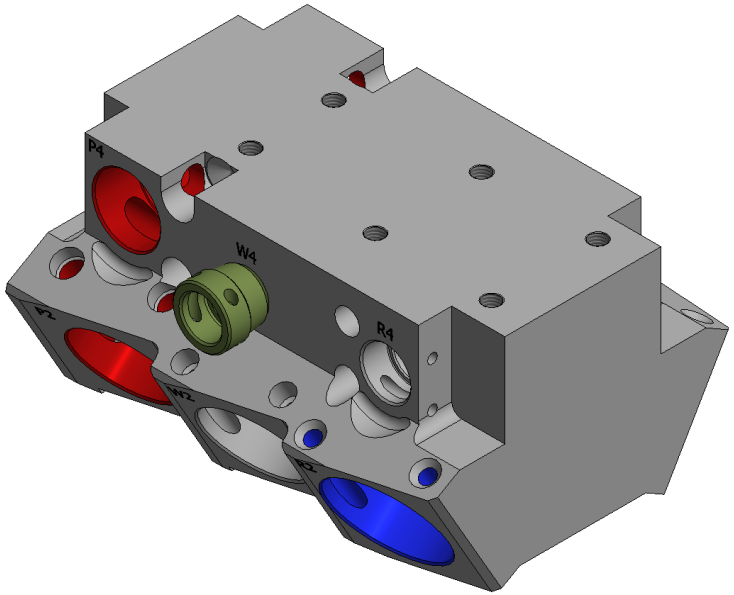


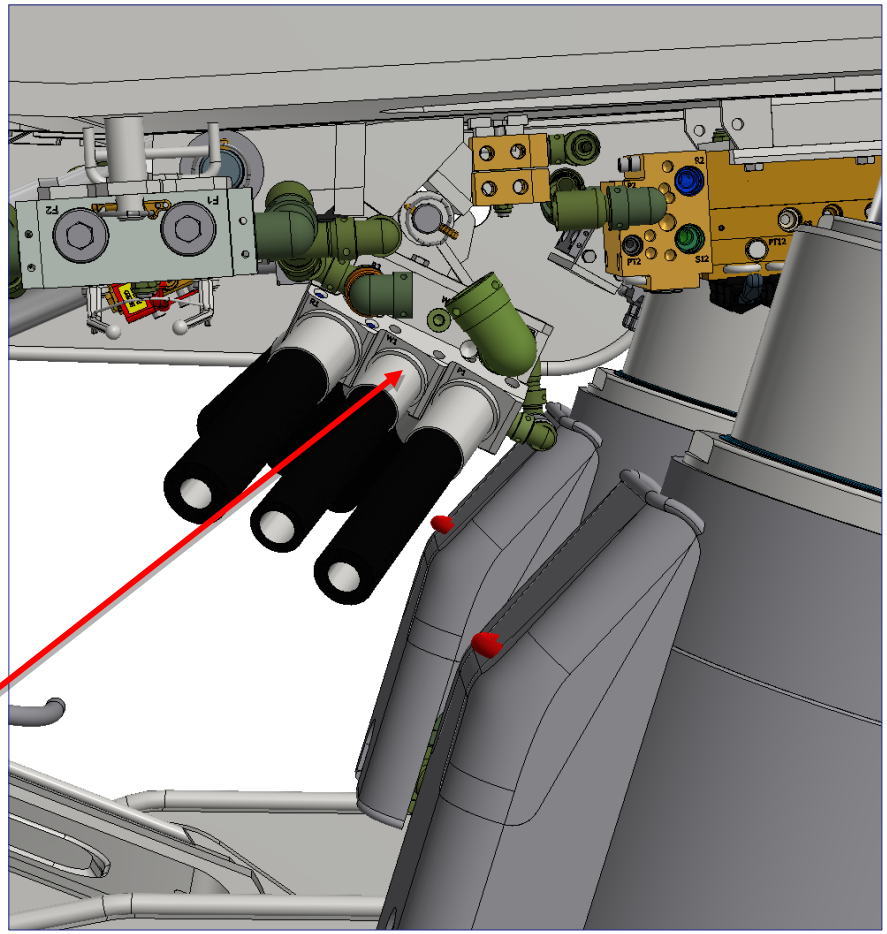
Updated Gimble-Style Base Lift



Anti-Skid Toe Surface Cover

5 – Complete Work





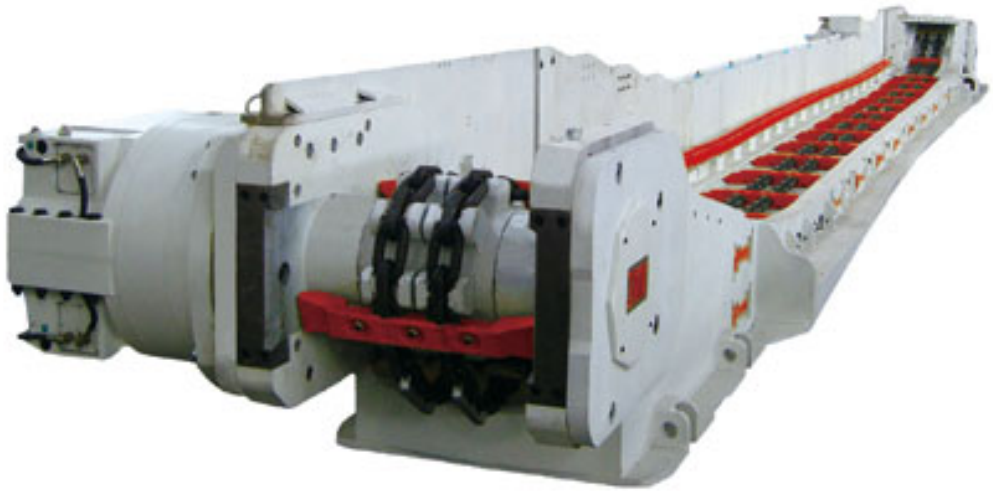
Angled faces of hydraulic ports ensure that the inter-support hoses are steered away from the legs in lower part of working range

2 - 3 – Scope-of-Work and Bid

- The initial Scope-of-Work included 1142 mm AFC, BSL, crusher, power-units, and drives
- Through the bid process, Sufco identified that the incremental cost of purchasing new BSL, crusher, and power units did not make good financial sense
- Sufco elected to reuse a portion of the existing LW equipment:
  - CAT 65 Series Headgate and Tailgate CST power units
  - 1650 HP Motors
  - Crusher
  - BSL

4 – Award Contract

- The Scope-of-Work was changed, to reflect the equipment that would be reused, and bids were requested from three vendors
- The ***AFC*** contract was awarded



5 – Complete Work

5 – Complete Work

6 - Compatibility

6 - Compatability

7 – Install Equipment

Summary

The Challenge: How to *economically* maintain coal quality and current production levels, with lower seam conditions

The Solution:

- Rebuilt 157 1.75-meter Joy longwall shields
  - Increased web-depth from 36 inches to 1 meter
- Purchased two new AFC panline with headgate and tailgate drives
  - Utilized existing BSL, crusher, and power units
- Entered LCM agreement with Joy on two rebuilt shearers

We feel this is a great example of how transforming and repurposing equipment can help maintain profitability during strenuous times

Thank You!

JOY GLOBAL

SWANSON® INDUSTRIES

BOWIE RESOURCE PARTNERS LLC

Any Questions?