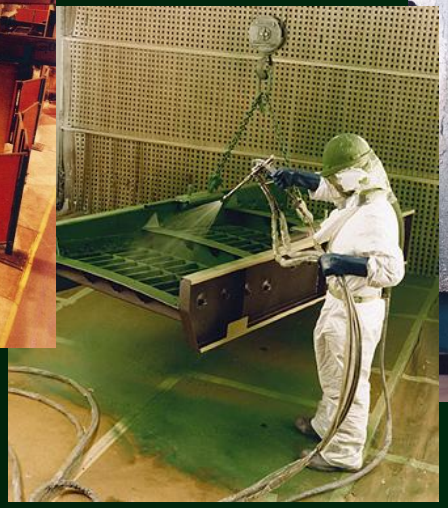
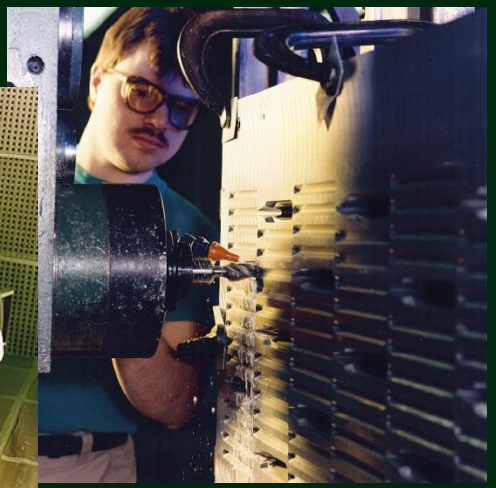
Derrick Stack Sizer™ for the Coal Industry

Illinois Mining Institute
August 2012 Meeting

Company Profile

- Derrick Corporation is a private company founded in 1951 by H. William Derrick
- 500,000 ft^2 (46,452 m^2) manufacturing facility located at 590 Duke Road in Buffalo, New York
- Focus on fine screening applications in the mining, industrial, chemical and oil & gas drilling industries





The World Leader in Fine Screening Solutions

DERRICK CORPORATION

2011 Plant Expansion

2011 Plant Expansion

2011 Plant Expansion

2011 Plant Expansion

Buffalo, New York USA

Niagara Falls, New York USA

Buffalo, New York USA

DERRICK® CORPORATION

Recent Advances in Fine Screening Technology

STACK SIZER™

Key Derrick Corporation Product Developments for the Coal Industry

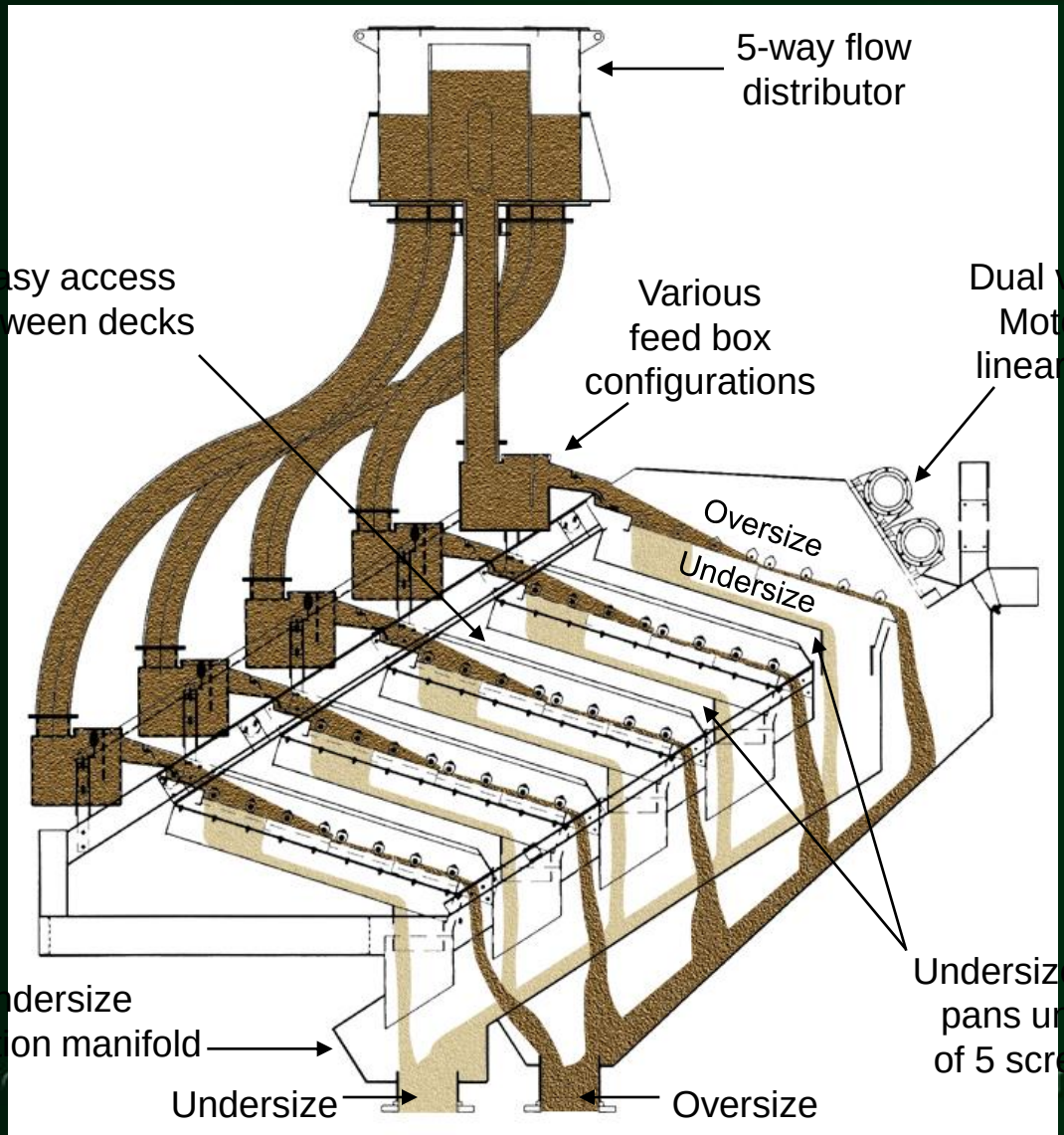
- 1977 – Sandwich Screen® woven wire panel
- 1977 – Multifeed screening machine
- 1989 – Polyurethane screen surfaces
- 1990 – Hi-G™ Dryer screen (8 Gs)
- 1993 – Pyramid™ screen surface (3 dimensional)
- 1997 – Super G™ vibrating motor
- 2001 – Stack Sizer™ screening machine

5 Deck Stack Sizer

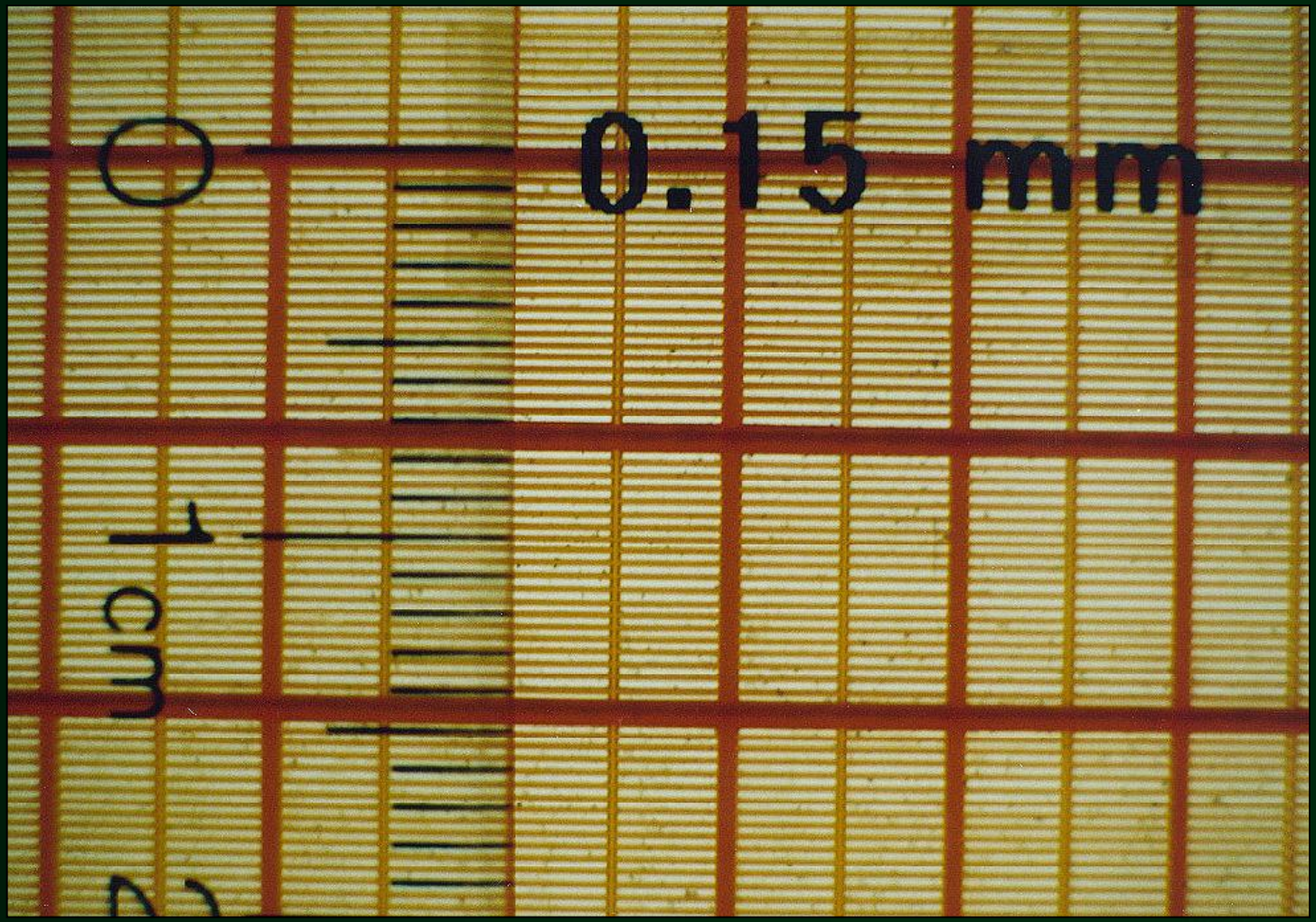
Stack Sizer Screen

- Derrick Corporation's Newest Wet Sizing Technology – Combination of Linear Motion with the use of Derrick High Open Area Polyurethane Screen Panels
- High Efficiency Separations
- High Tonnage Rates
- Minimal Operator Involvement

Principle of Operation



Fine Polyurethane Screen Surfaces



Fine Polyurethane Screen Surfaces

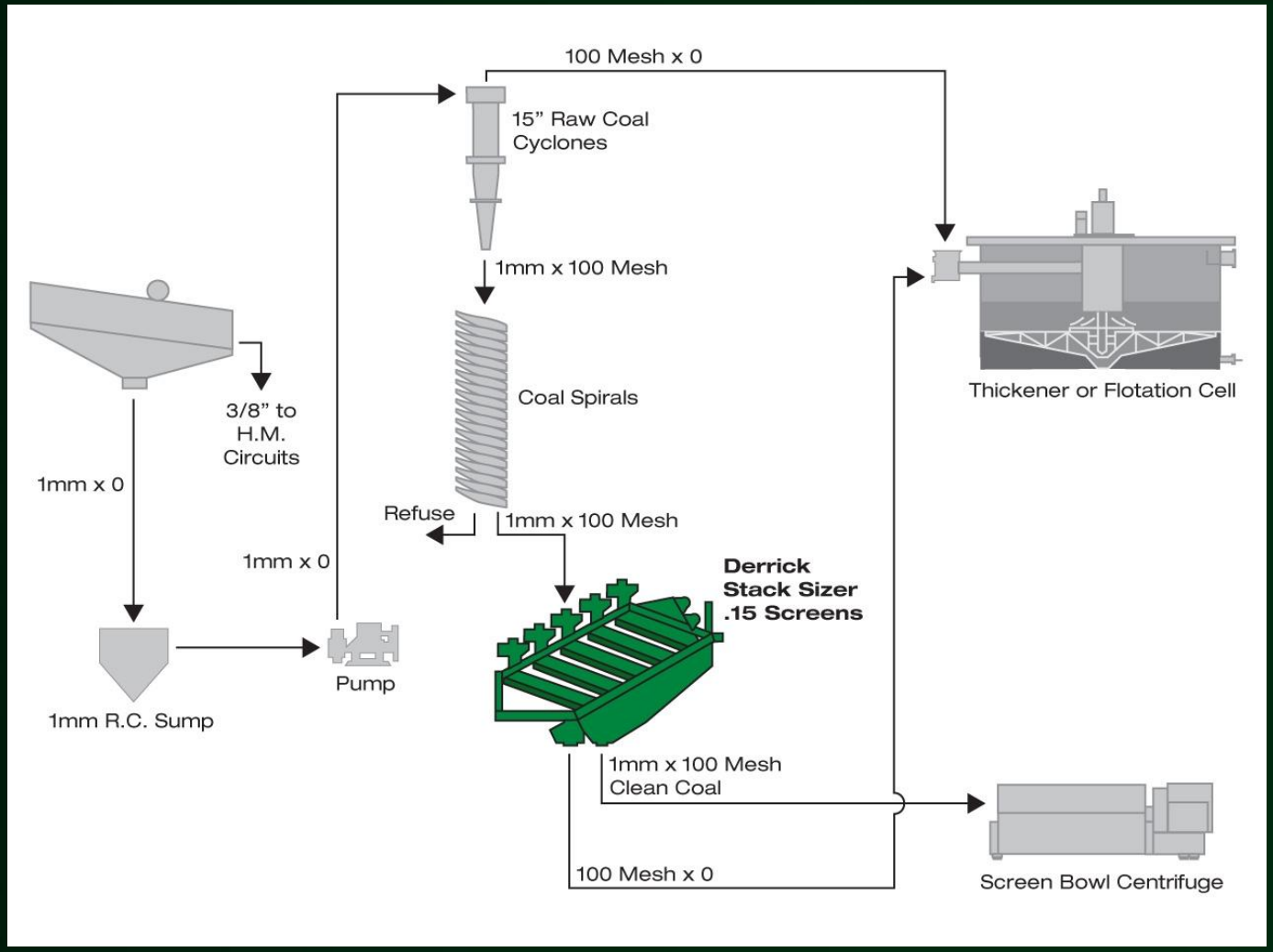
- Panels currently used in coal sizing applications: 180, 150, 100 and 75 µm
- Panel Life - 12 to 24 months
- Panels now available for coal sizing applications: 63, 53 and 45 µm

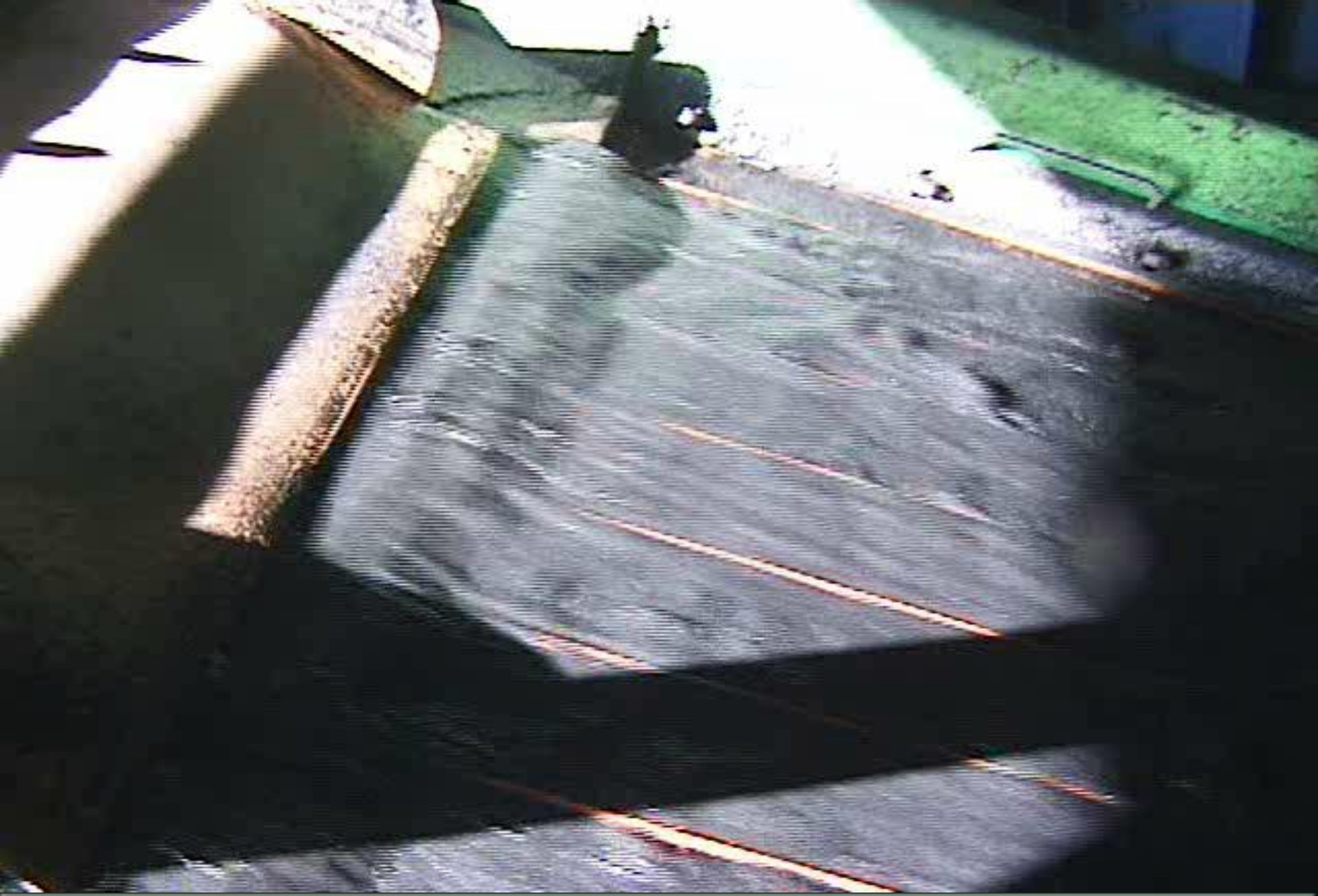
Stack Sizer Applications in the Coal Industry

Fine Sizing Coal at 150 micron (100 mesh)

Removal of High Ash/Sulphur Fraction from Clean Coal Spiral Product

Typical Clean Coal Spiral Product Screening Flow Diagram





Coal Feed onto 100 micron Urethane Panel

Action of Stack Sizer Repulp Trough

Coal Sizing on 100 micron Urethane Panels

Clean Coal Spiral Product Application Installation Photos

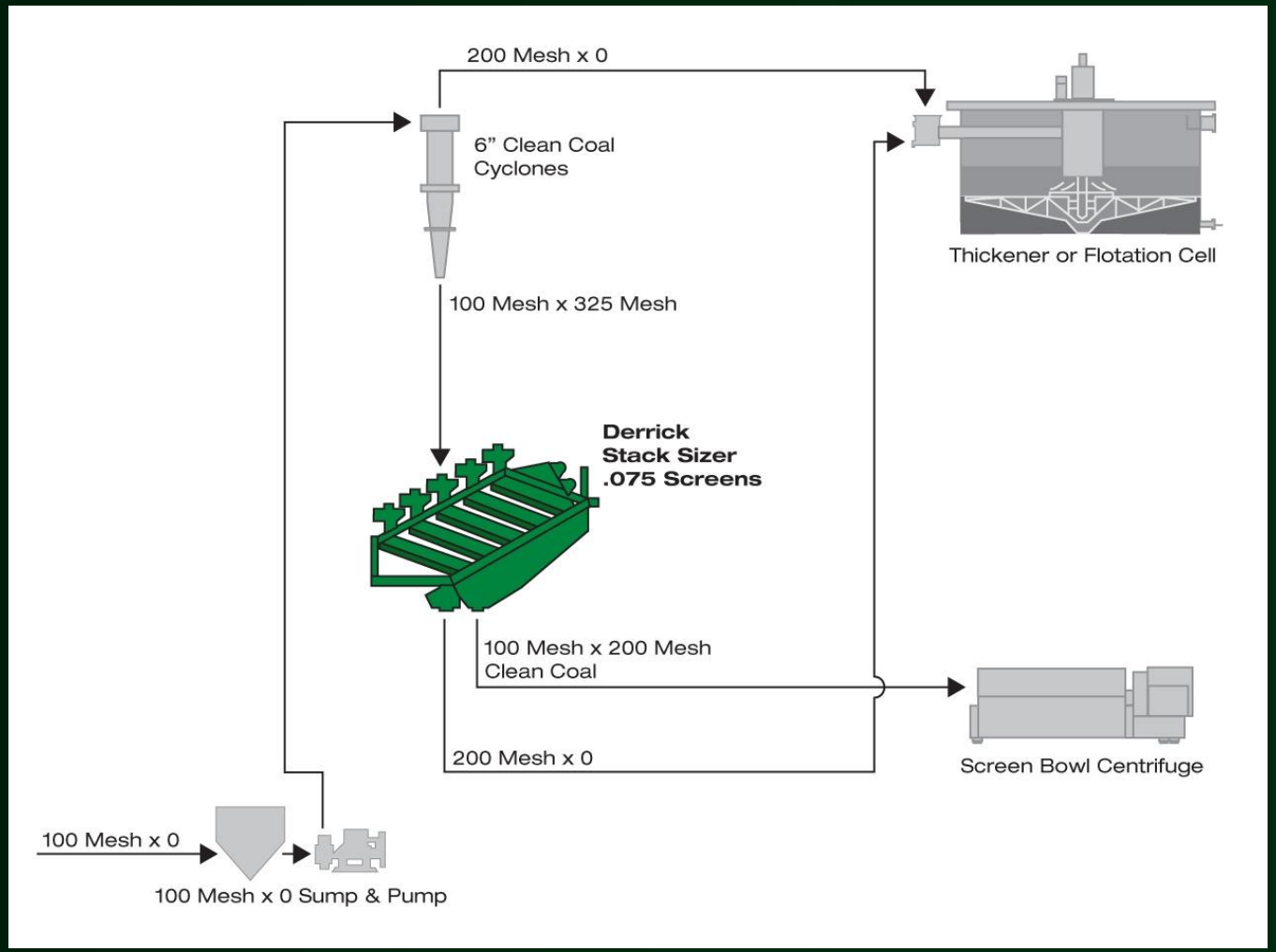
James River Coal Company
Kentucky, USA


LEE CO #6
LEE CO 7

Fine Sizing Coal at 75 micron (200 mesh)

Removal of -75 micron Fraction from 152mm (6”) Hydrocylcone Underflow

Typical 6” Hydrocyclone Underflow Screening Flow Diagram



6” Hydrocyclone Underflow Application Installation Photos

Kentucky & Illinois, USA


DERRICK
CORPORATION

Discussions

Classification vs Fine Clean Coal Ash

– The presence of high ash ultrafine coal and clay increases the fine clean coal ash. H.M circuit sometimes needs to be compromised.

–Removal of high ash ultrafine coal and clay will decreases the fine clean coal ash . The higher the classification efficiency, the cleaner the fine clean coal.

Discussions

Plitt Partition Model:

$$E_{uc} = 1 - \exp\left[-0.693\left(\frac{d}{d_{50c}}\right)^{m}\right]$$

Whiten Partition Model:

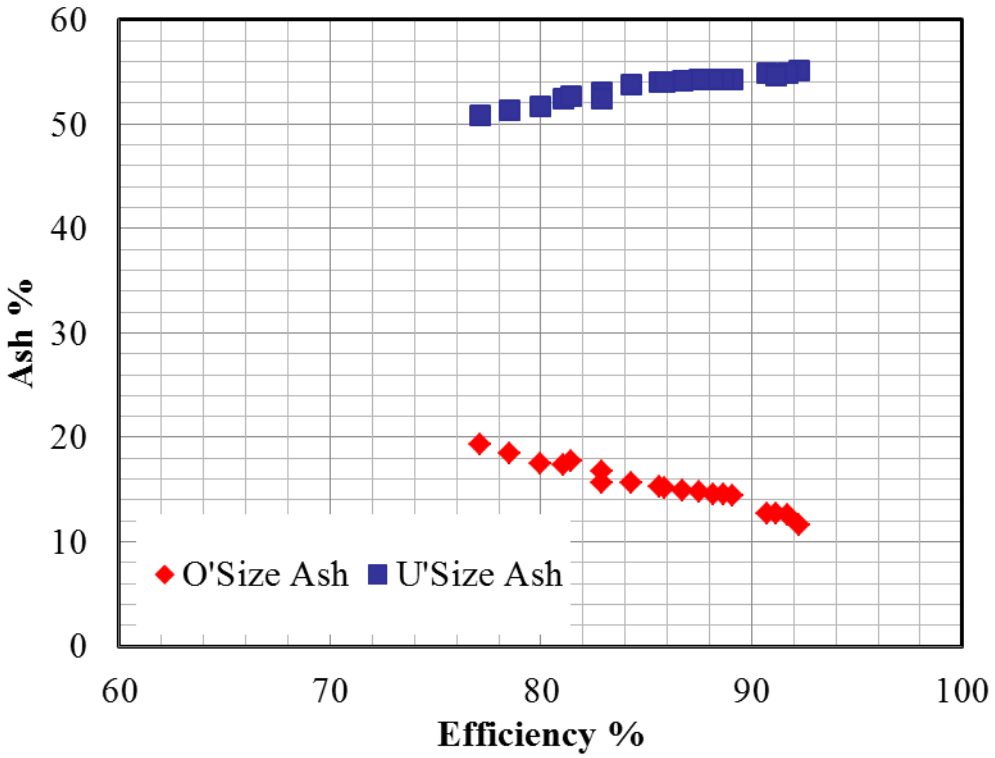
$$E_{oa} = C\left(\frac{\exp(\alpha) - 1}{\exp(\alpha X) + \exp(\alpha) - 2}\right)$$

Modified Finch Partition Model:

$$E_{uc} = \left\{\left[1 - R_f\left(\frac{d_0 - d}{d_0}\right)\right]\right\}\left\{\left[1 - \exp\left(-0.693\frac{d}{d_{50_c}}\right)^{m}\right]\right\} + R_f\left(\frac{d_0 - d}{d_0}\right)$$

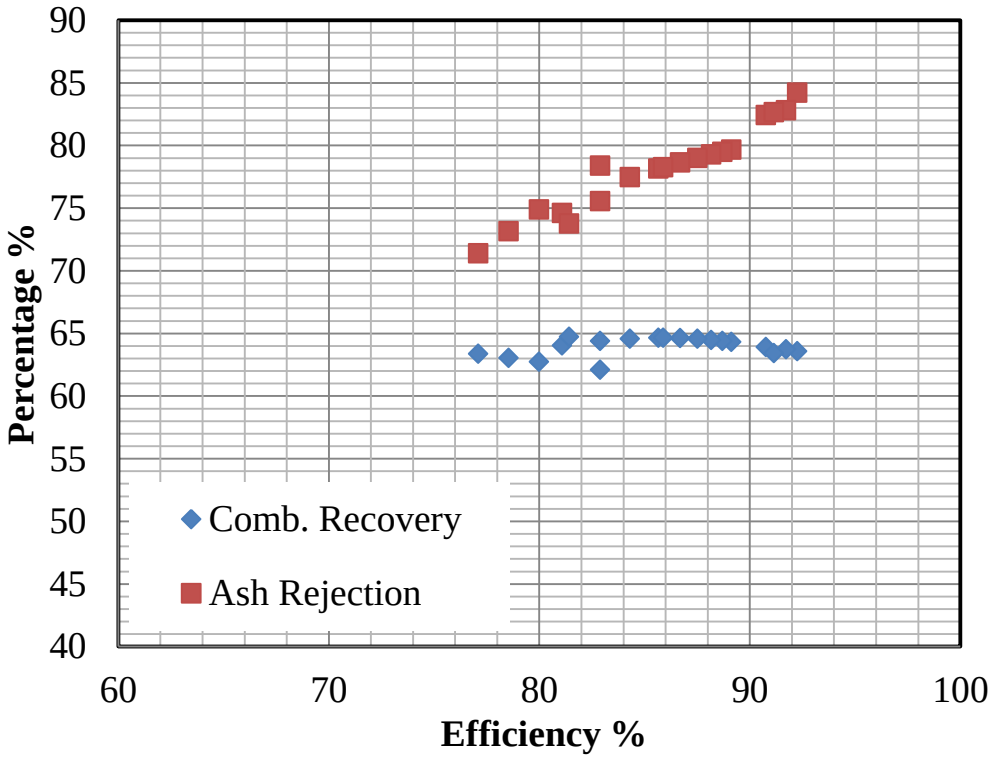
Discussions

Simulation Results:



Discussions

Simulation Results:



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