



***Reducing Energy in a
Hydrocyclone Plant***

by:

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-Remove the Hydrocyclones!

***At GL&V,
we do not believe this is an option...***



Know your Debris!

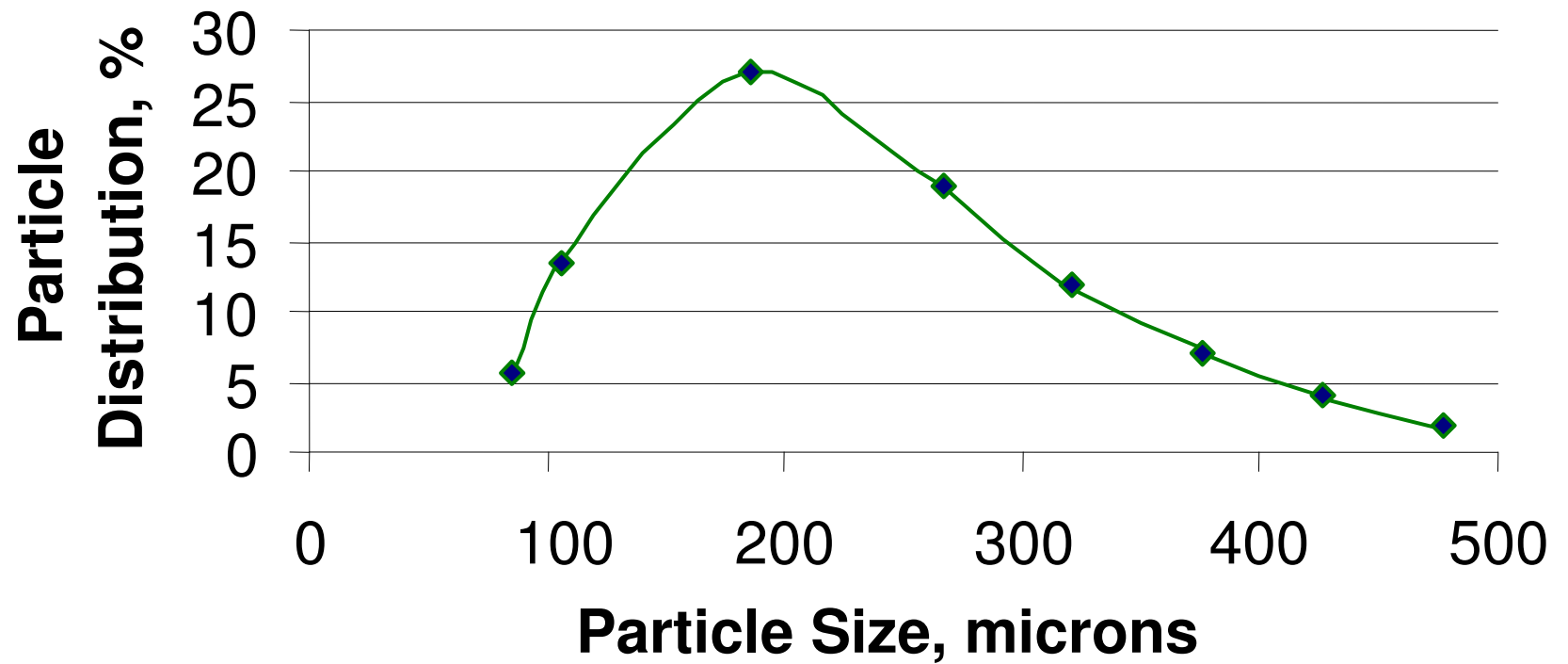
CLEANER THEORY



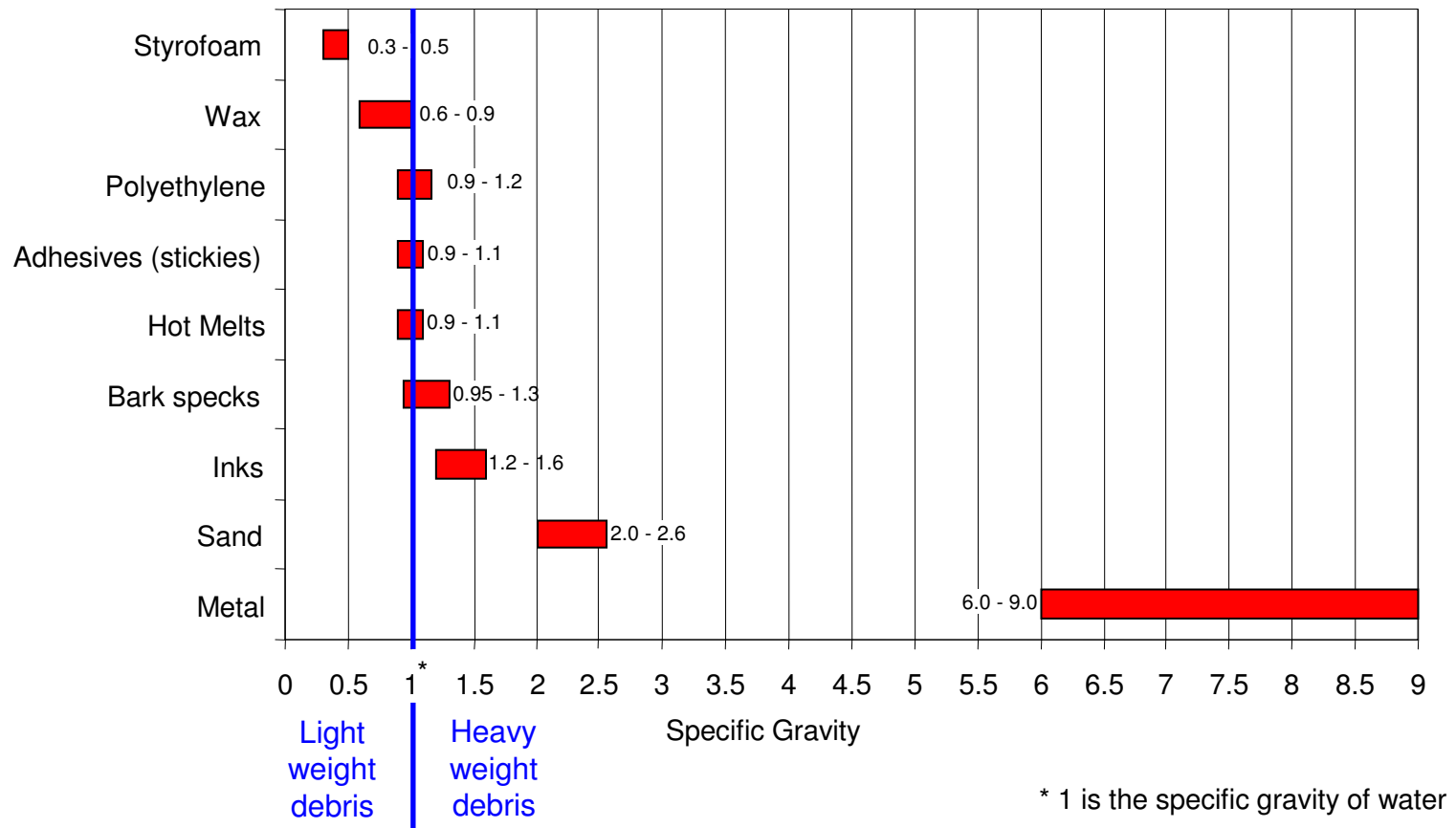
Why install Cleaners in Pulp and Paper Systems?

- To exploit differences in specific gravity, size and shape between fibers and contaminants.
 - To compliment barrier separation devices which remove contaminants based on size and shape.
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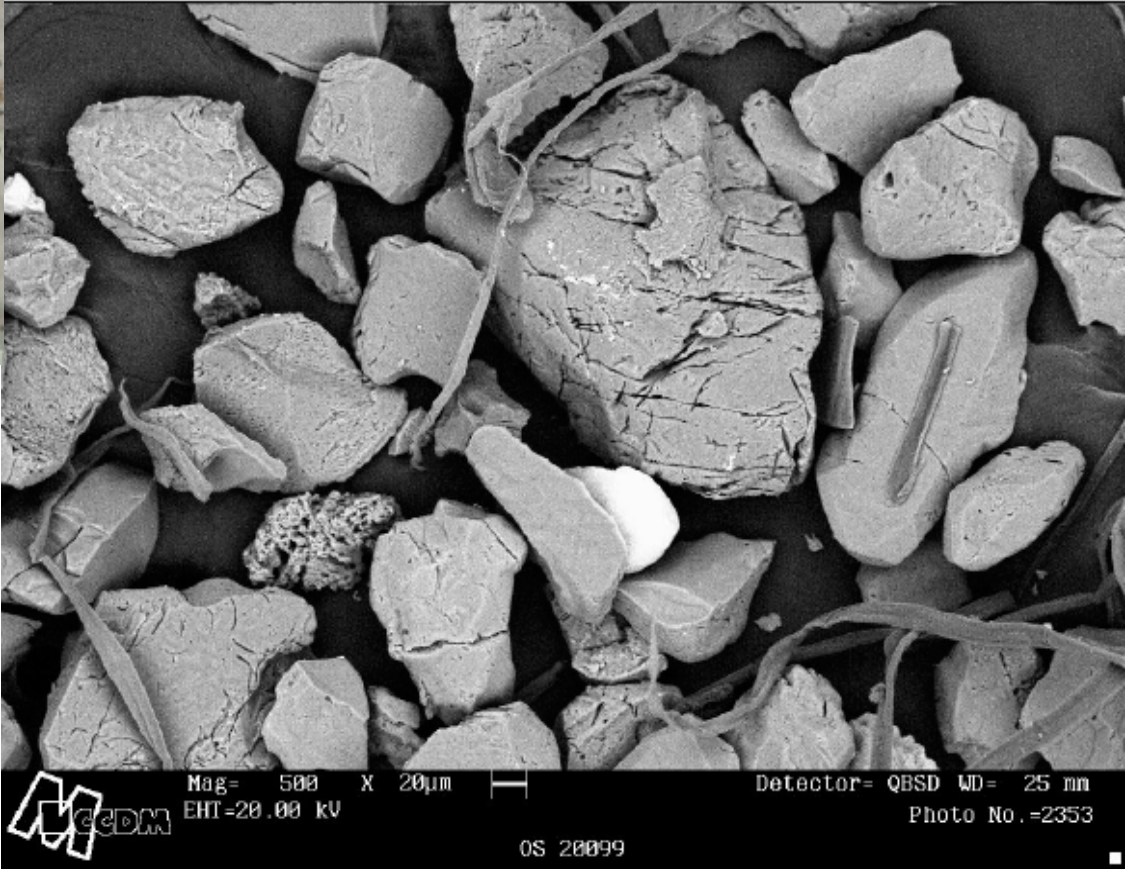
PARTICLE SIZE DISTRIBUTION



Specific Gravity of Contaminants



UNWANTED PARTICLES



Other ways to reduce energy in hydrocyclones:

- Targeted Particle Removal
 - Lower Pressure Drop Operation
 - Higher Consistency Operation
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- Targeted Particle Removal
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Know your Debris!



Cleaner Diameter vs. Removal range

Heavy weight types

20" and larger

Unbleached, coarse separation, reject, chips

15"

After pulper, recycled, high-consistency pulp

10"

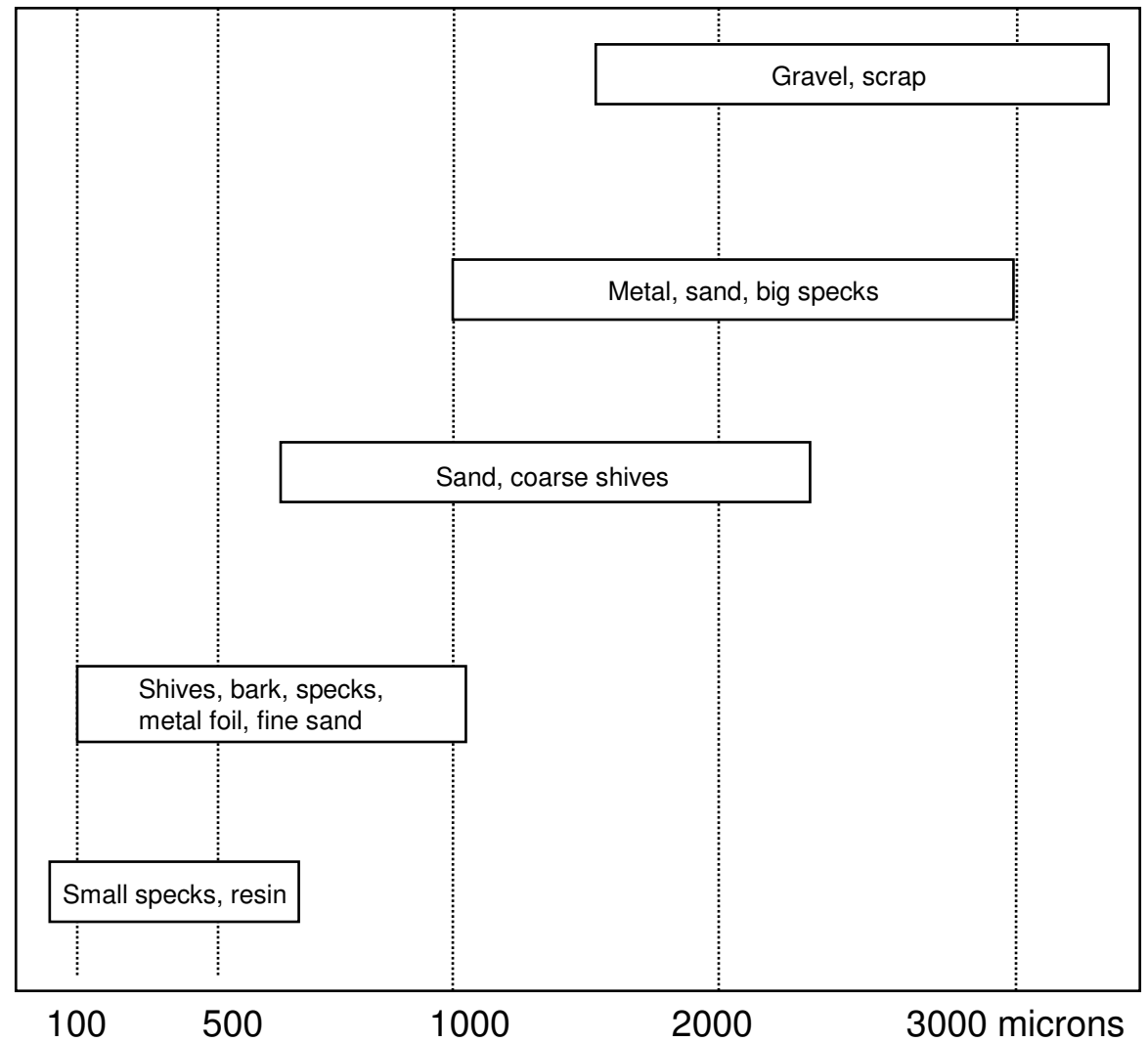
Reject, final stage, coarse OCC, scrap waste, domestic wastes, brown stock

5 - 6"

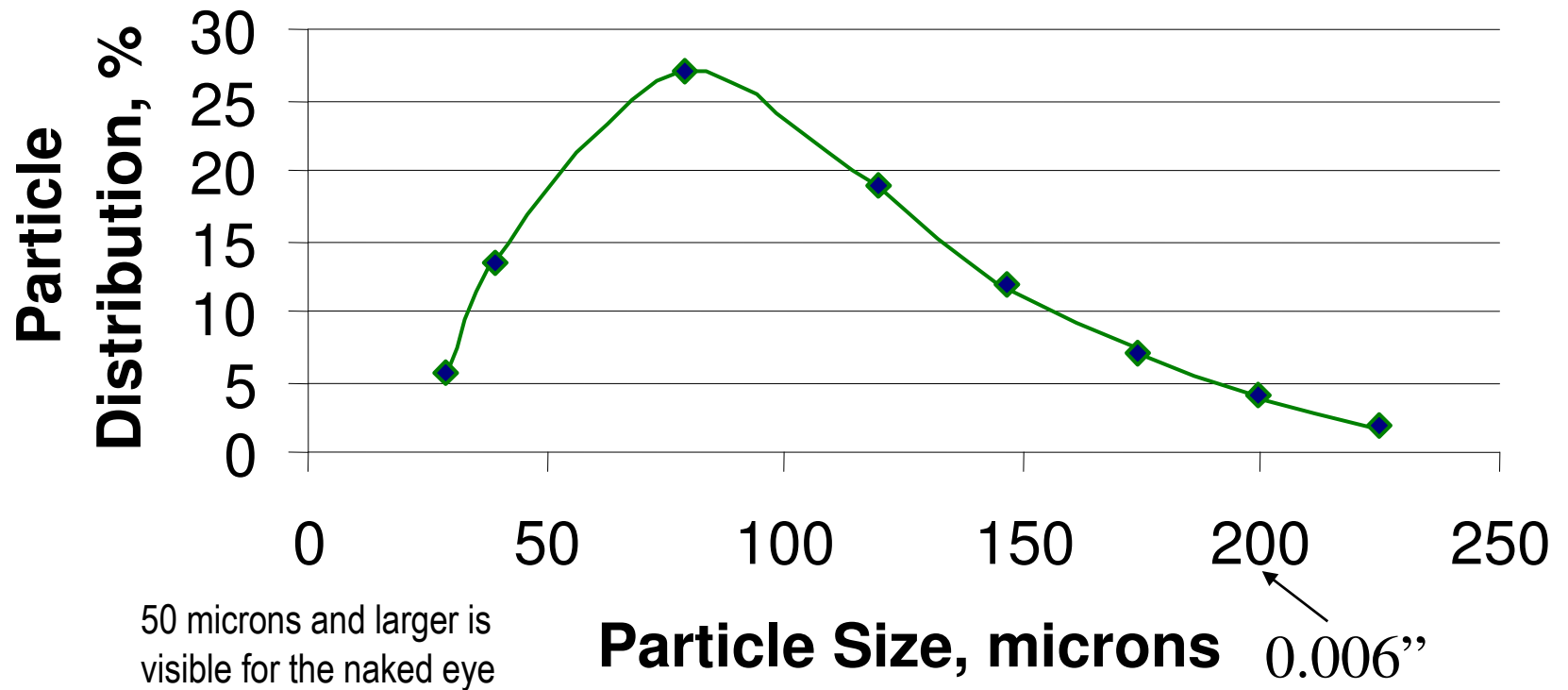
PM, screening department, recycled fiber, OCC, pulp preparation, grass, bagasse, CTMP, ground pulp

3" and less

Pulp mill bleached grades, PM high-grade fine paper, recycled mills

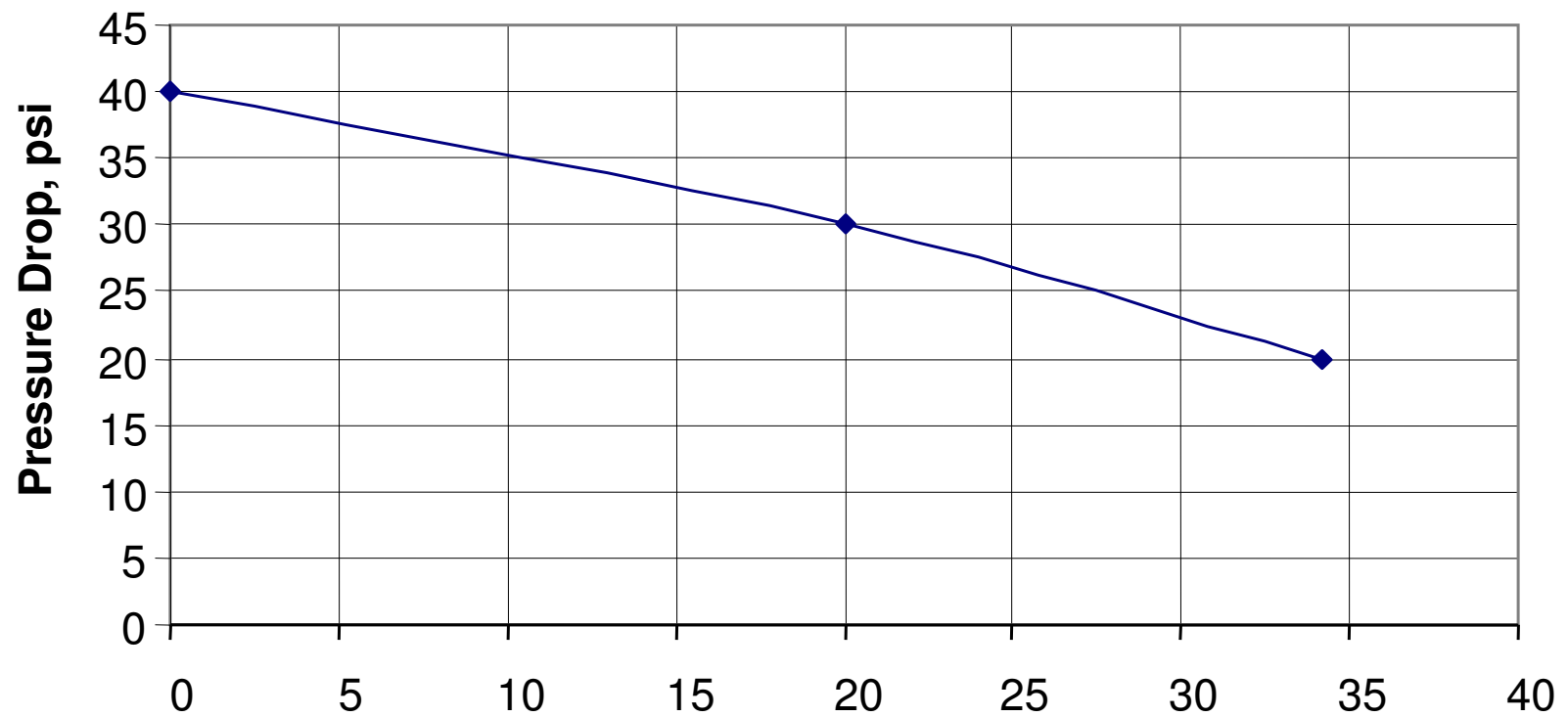


PARTICLE SIZE DISTRIBUTION



- Lower Pressure Drop Operation
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Energy Savings at Reduced Pressure Drops



Energy Savings, %

Based on reducing the pump head from 125 to 100 / 80 ft respectively



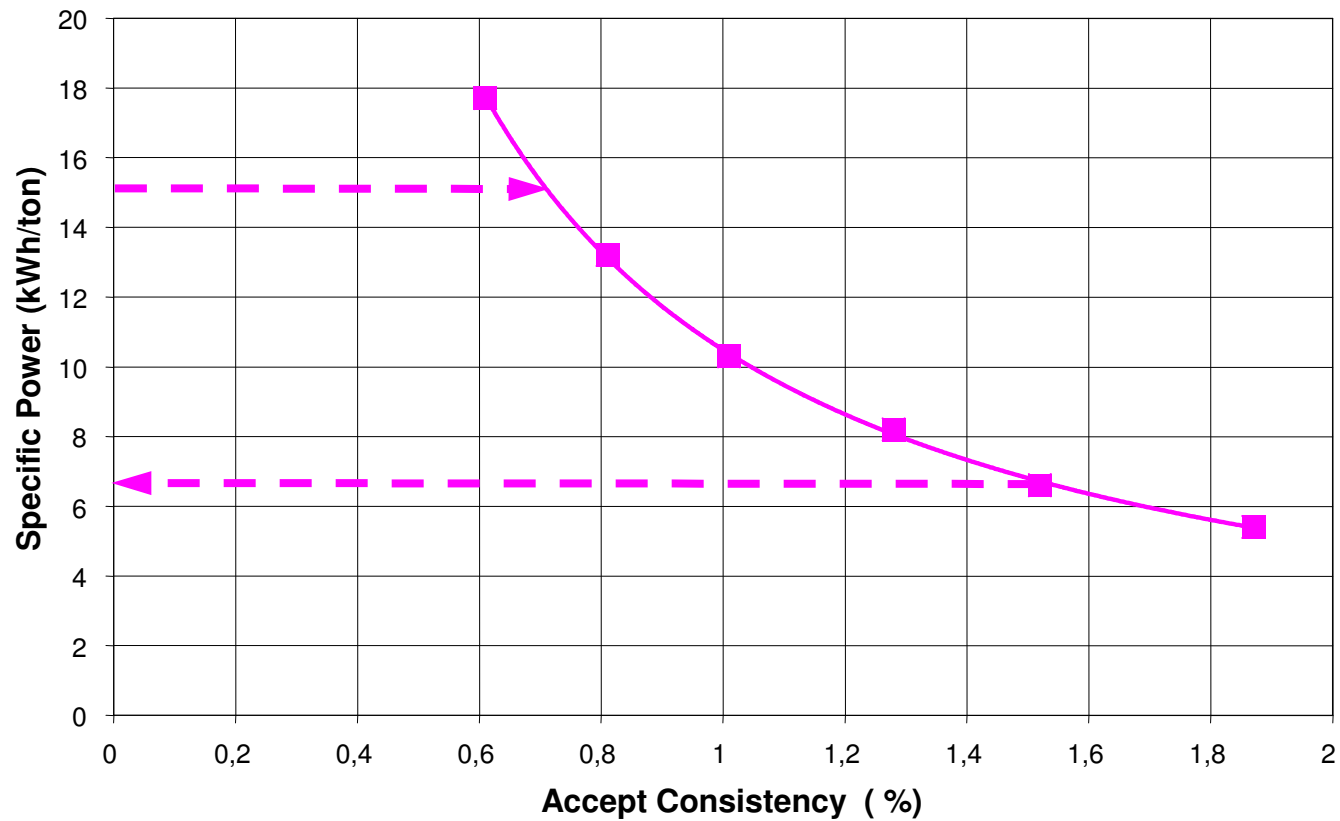
Some Recent Installations:

- **Kruger Trois-Rivieres, Canada**
Bauer 623's operated at 45 psi replaced by Clp 700 cleaners operated at 21 psi. Estimated energy savings: 32%
 - **Kruger Trois-Rivieres, Canada**
Bauer Bauer 606-110P operated at 35 psi replaced by ELP 606H operated at 20 psi. Estimated energy savings: 19%
 - **Confidential Customer, Maine**
Bauer 623's operated at 43 psi replaced by ELP BigShot cleaners operated at 22 psi. Estimated energy savings: 29%
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- Higher Consistency Operation
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Specific Power Consumption

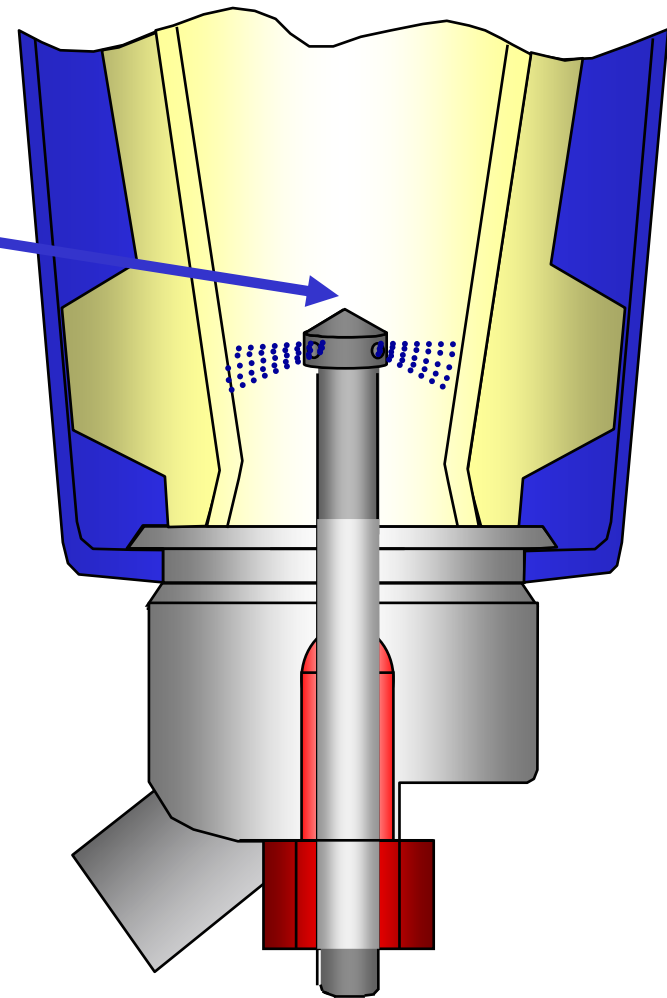
3-Stage System Specific Power usage
Production 480 ADMTPD



Problems operating hydrocyclones at elevated consistencies:

- Runnability
 - Reject plugging
 - Efficiency
-

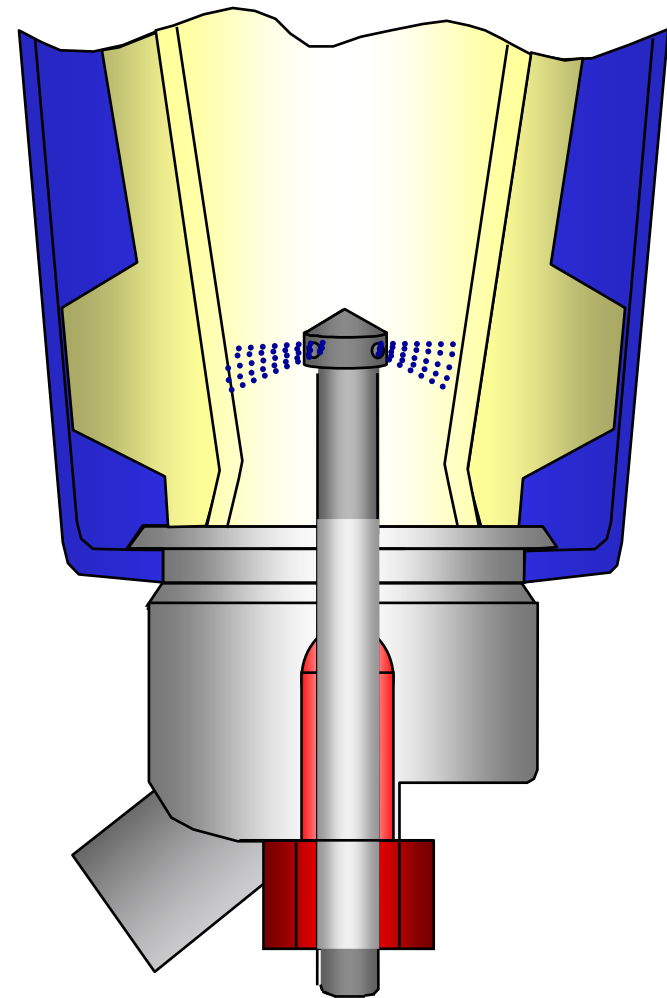
With the re-introduction of Bottom Vortex Dilution Technology in the 1990's, the tendency to plug the reject at higher consistencies are reduced as the thickened reject is diluted.



But it does not really address the efficiency, in fact it can hurt the performance of the hydrocyclone.

Also, oversized debris will actually have a harder time leaving the cone as the passage is restricted by the dilution tube!

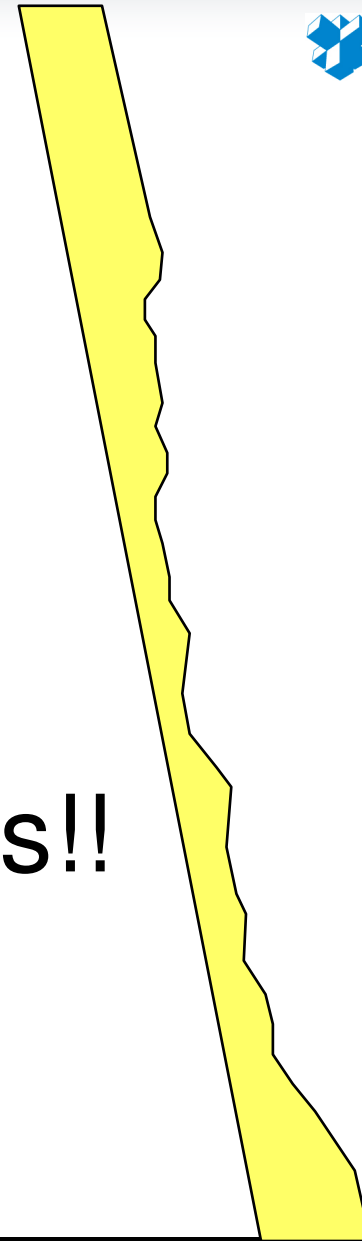
PS. This technology was patented in 1953!





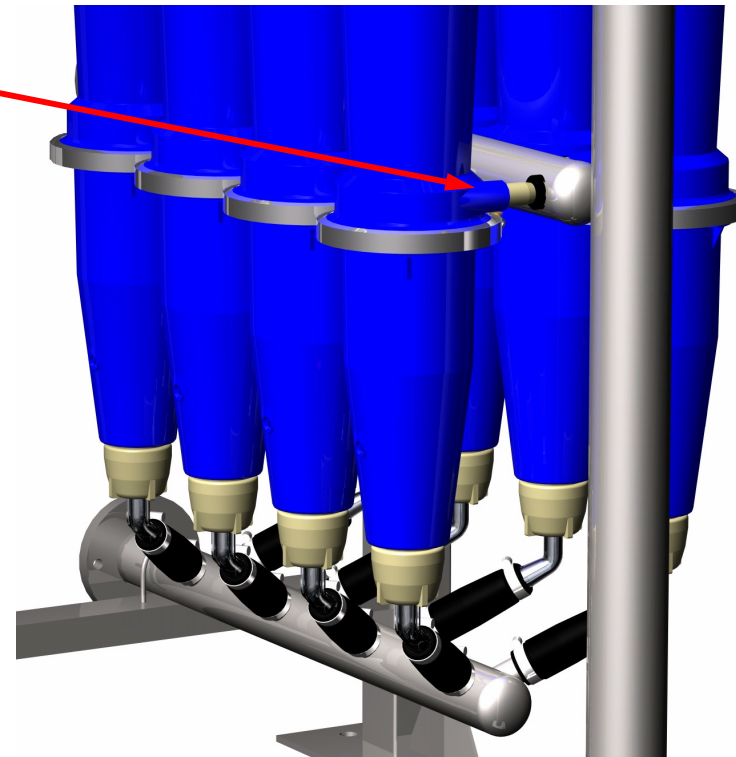
Using Bottom Vortex
Dilution Technology
wrong increases lower
cone wear dramatically!

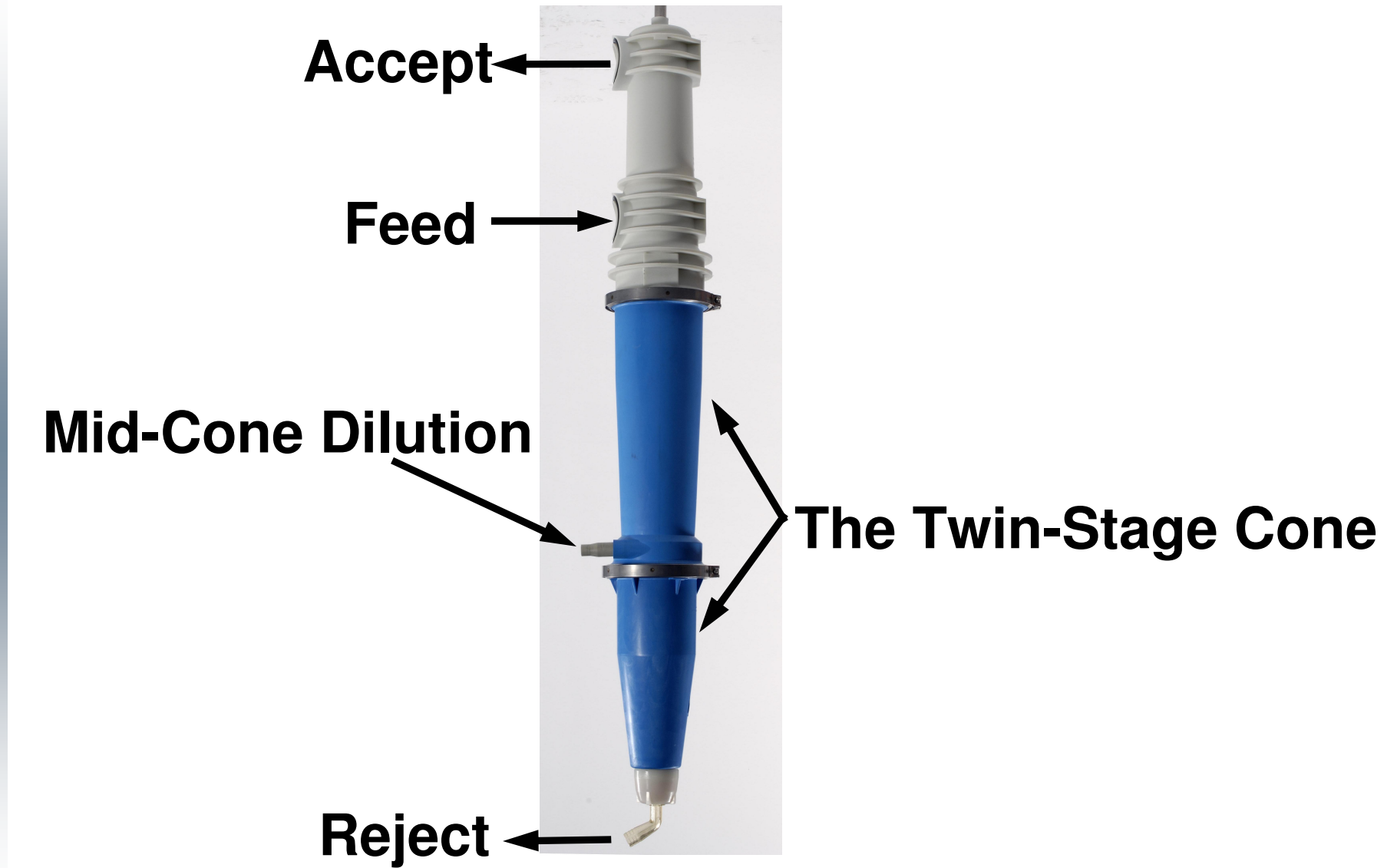
And that is good for us!!
More \$\$\$\$\$\$



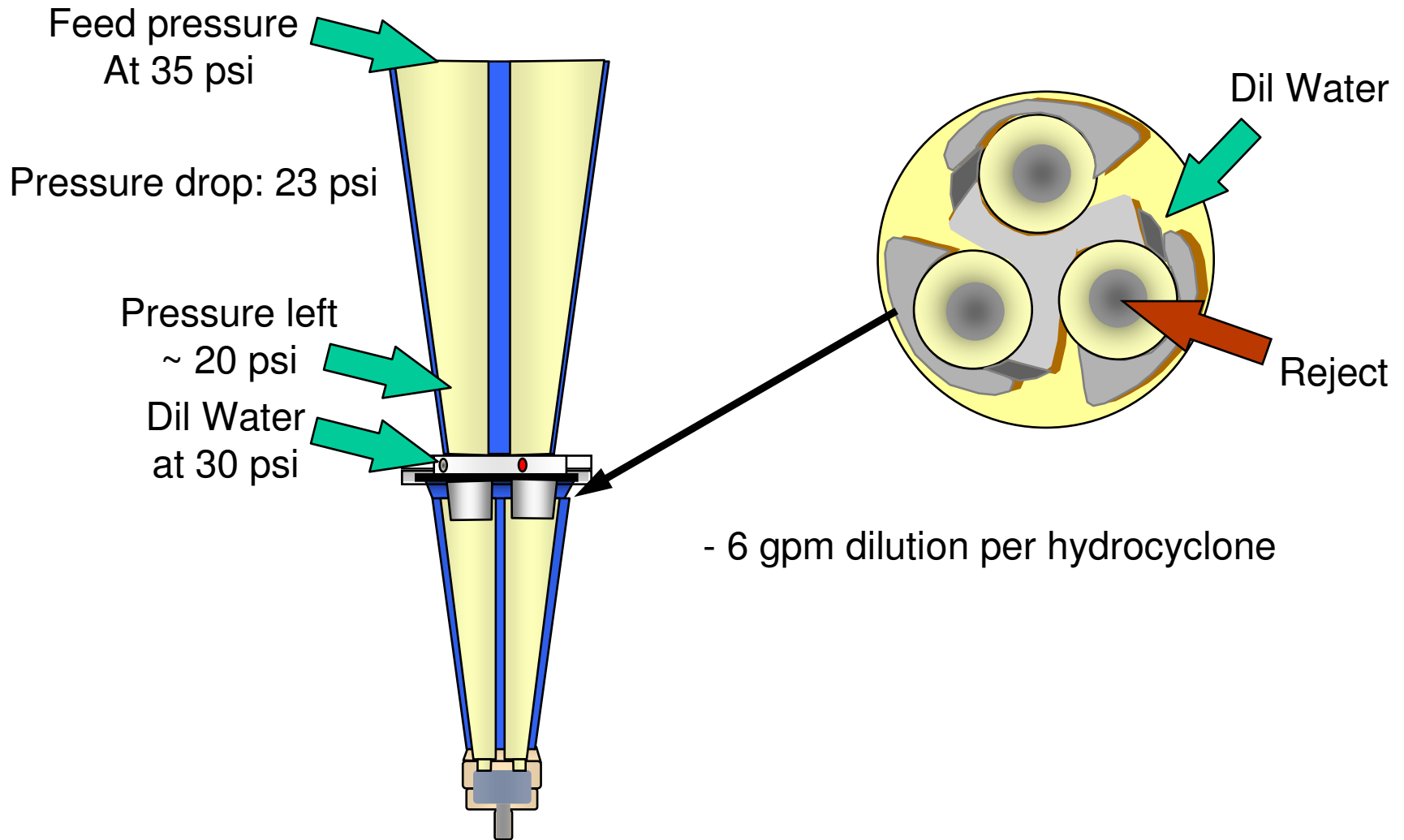
Introducing Mid-Cone Dilution Technology

The Mid-cone Dilution Technology takes Bottom Vortex Dilution Technology one step further as it not only dilutes the reject - minimizing fiber thickening, but it also re-energizes the stock.



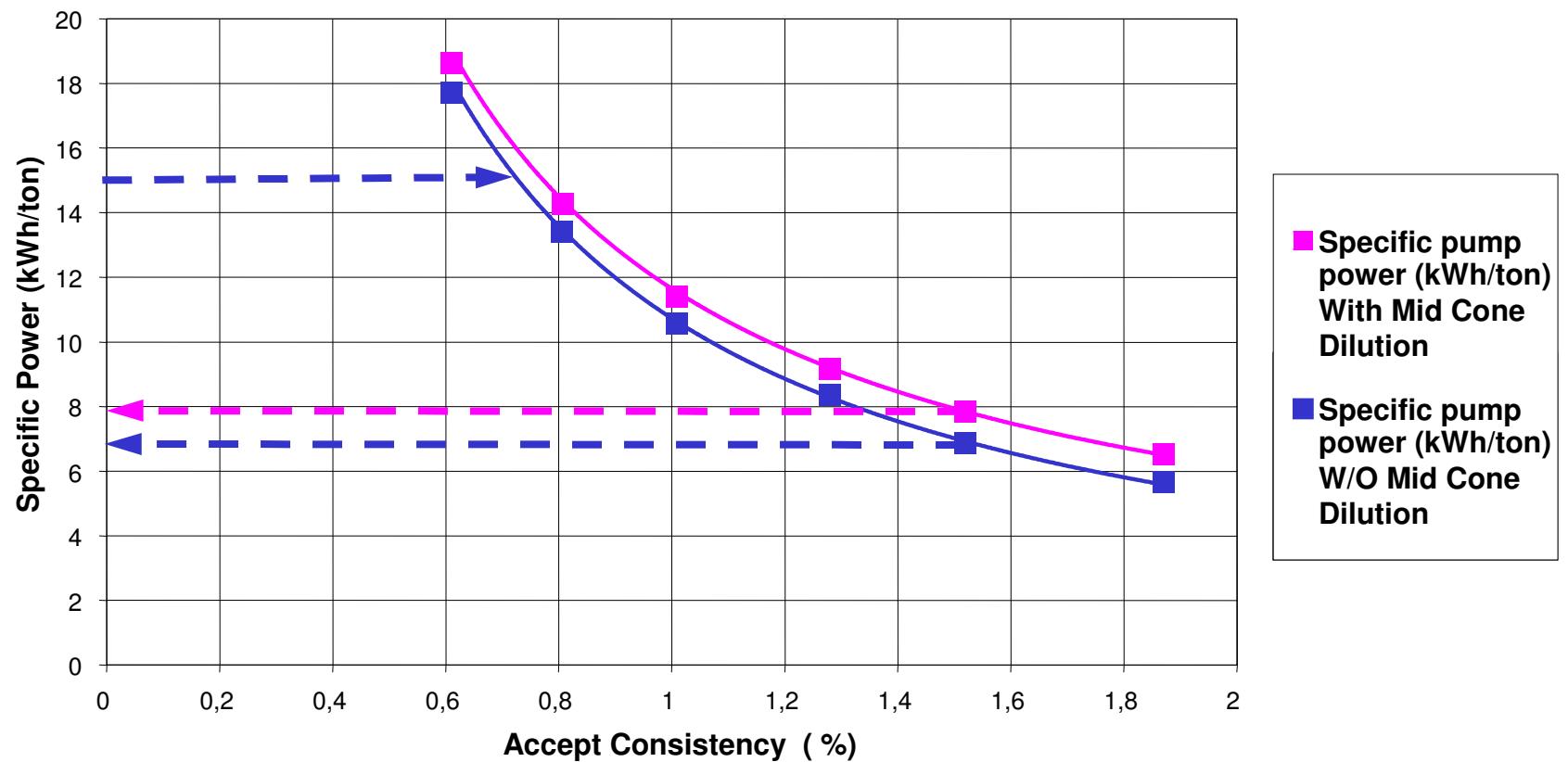


Mid-Cone Dilution Technology



Specific Power Consumption

3-Stage System Specific Power usage
Production 480 ADMTPD



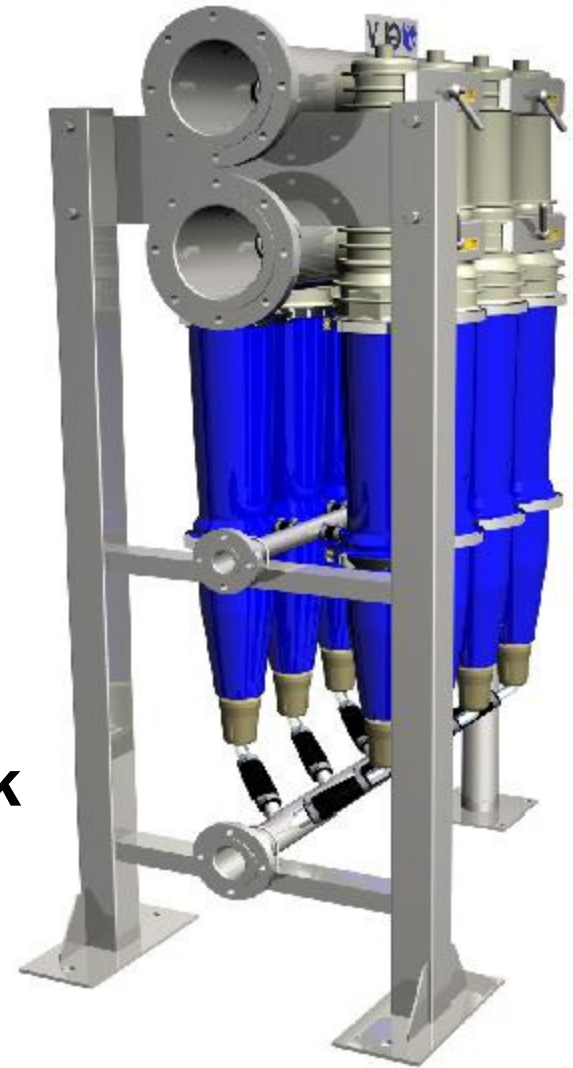


Some Recent Installations:

- **Sonoco Products Company, Richmond, VA**
Overloaded Clp 700 system upgraded by Celleco Twisters.
Estimated energy savings: none as consistency and pressure drop the same. Clp 700 system was overloaded
 - **Lincoln Paper & Tissue, Lincoln, ME**
6" Bauer (operated at 0.7%) replaced by Celleco Twisters.
Estimated energy savings: 25%
Please note that it was due to pressure drop, same consistency after replacement!
 - **Georgia Pacific Allo, Spain**
New line operated at 1.5%
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**SatelliteBank
with
8 cleaners**



Reduced Energy Consumption due to High Consistency Operation...

- The energy saving, operating at an elevated consistency is due to the significantly lower hydraulic flow requirements.
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Summary:

Saving Energy in a Hydrocyclone plant can be done by:

- **Replacing old high pressure drop cleaners**
 - **Increase the consistency in the hydrocyclone plant**
 - **Using the right product for the right debris**
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