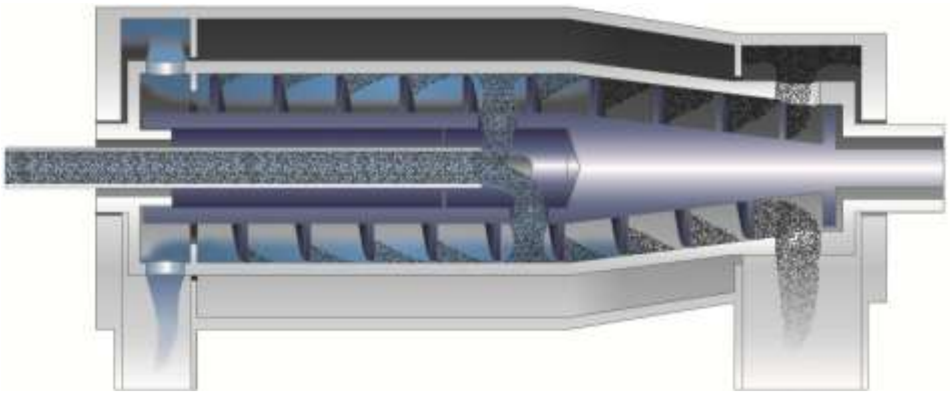

Title: Centrifuge Optimization

Decanter Centrifuges for Municipal Sludge Dewatering

Decanter Centrifuges for Sludge Dewatering
Topics

WELCOME TO DECANTER CENTRIFUGE OPTIMIZATION!

This seminar shall be a practical guidance to centrifuge optimization.

Topics are:

- Theory of Operation
- Process Parameter Adjustments

Any questions will be answered at the end of this presentation.

Duration: 30 minutes with 15 minute question and answer
Audience: Operations and maintenance personnel

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THEORY OF OPERATION

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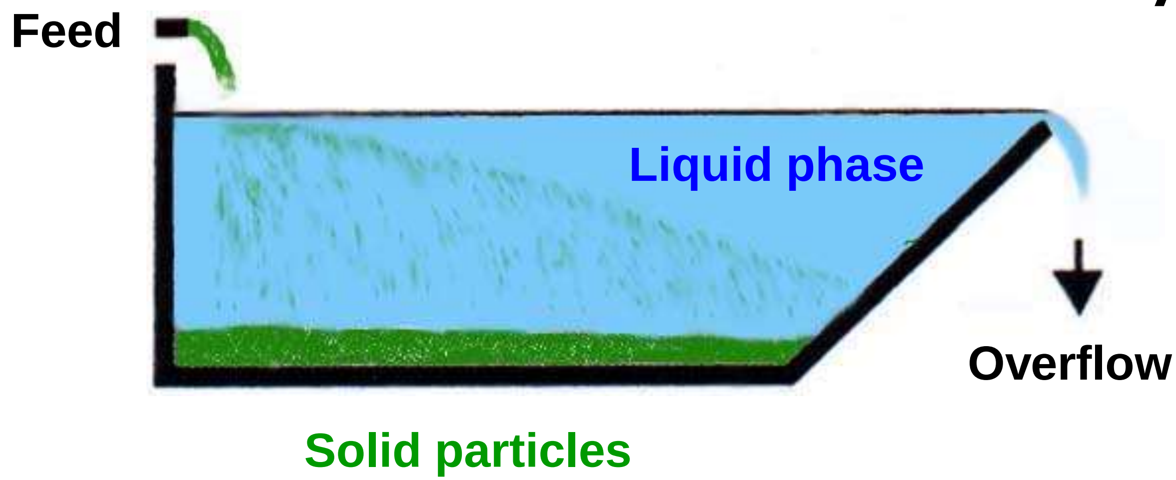
Topic #1: Theory of Operation

Operating Principals

The Solid-Liquid Separation Theory

Gravity Decantation

At 1 G



Between effluent feed and overflow, solid particles sink to the bottom by gravity. Therefore, at the overflow, a clear liquid is recovered.

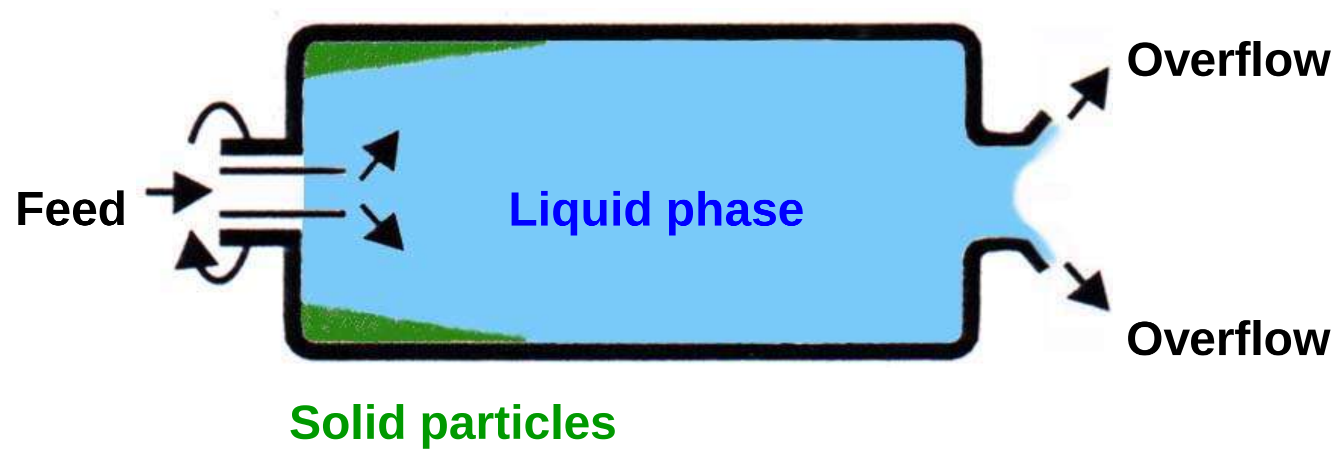
Topic #1: Design Considerations

Operating Principals

The Solid-Liquid Separation Theory

Centrifugal Separation

At 3000 G

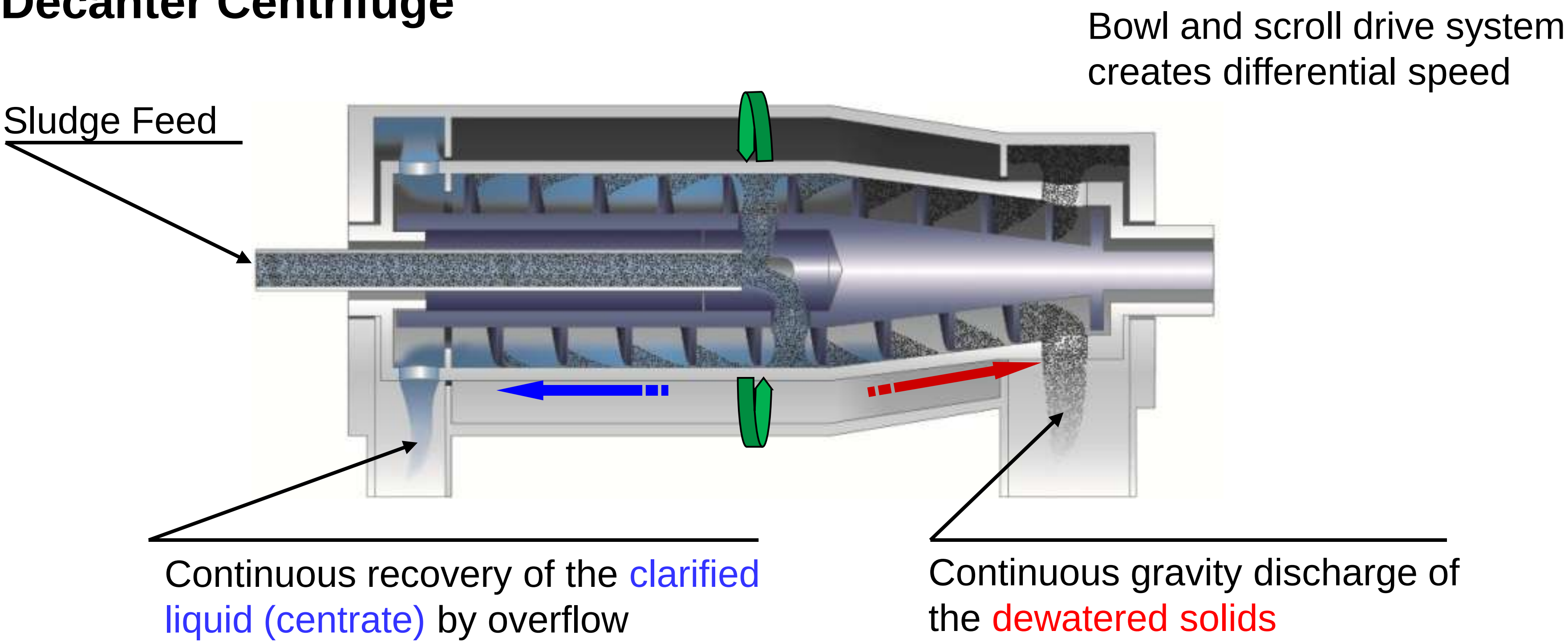


Same principle as the gravity decantation and with a rotation on an axis providing an increased centrifugal force, which **accelerates** the natural sedimentation.

Topic #1: Design Considerations

Operating Principals

Decanter Centrifuge



A scroll scrapes continuously the centrifuged sediments.

The clear effluent is evacuated on the opposite side.

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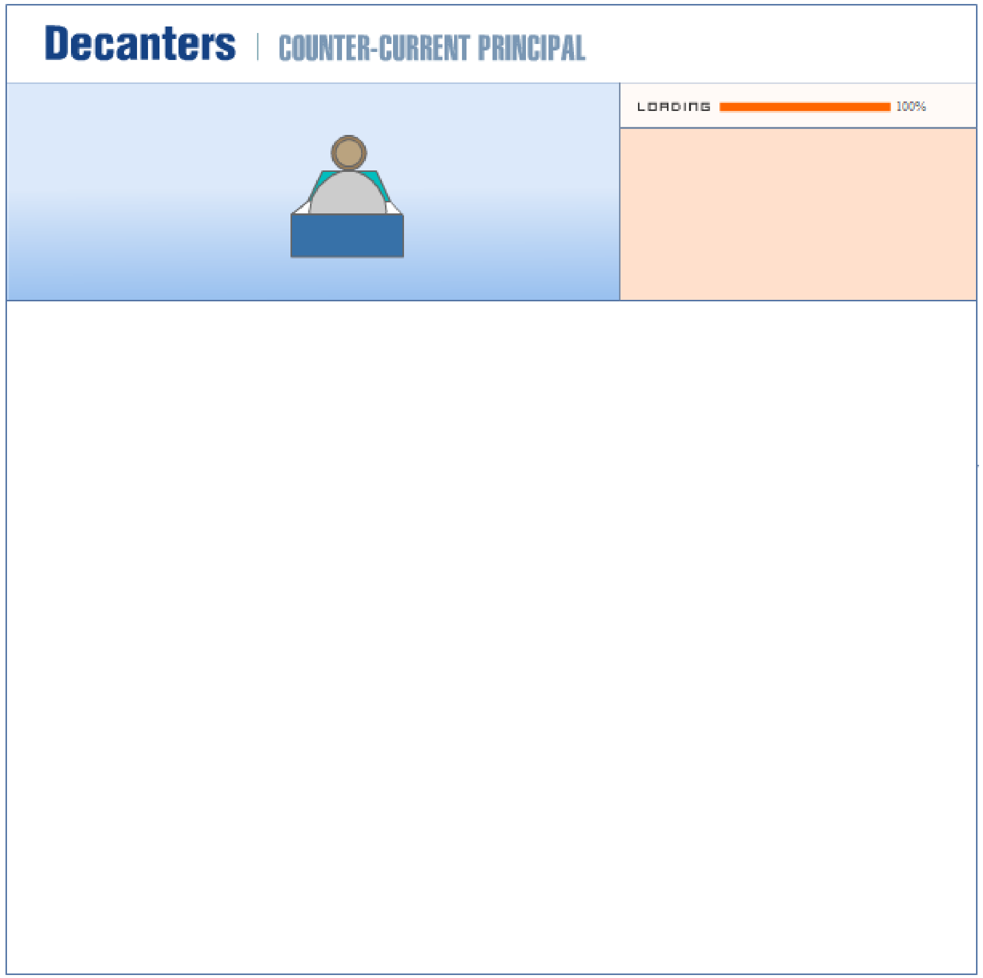
Topic #1: Design Considerations

Operating Principals

Counter-current Operation

Animation



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PROCESS PARAMETERS AND ADJUSTMENTS

- Pond Level
- Polymer Dosage
- Throughput
- Torque
- Differential Speed

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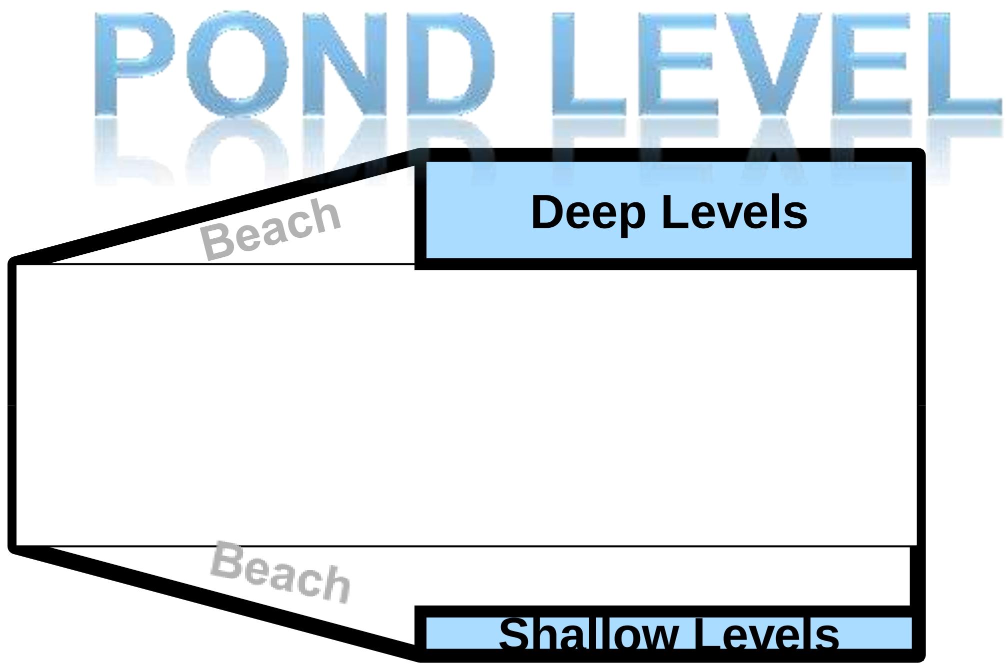

- Pond level adjustment control the liquid level inside the centrifuge.
- Deep pond level settings allow more room for liquid clarification but generally result in a some what lower cake dryness.
- Shallow pond levels do not allow for as much liquid clarification but generally result in a some what higher cake dryness.
- Pond level setting is determined by the solids settling rate. This can only be confirmed by full scale testing at a minimum of three (3) set points.
- Field testing has shown increases in cake dryness values from 1 to 2 percent.

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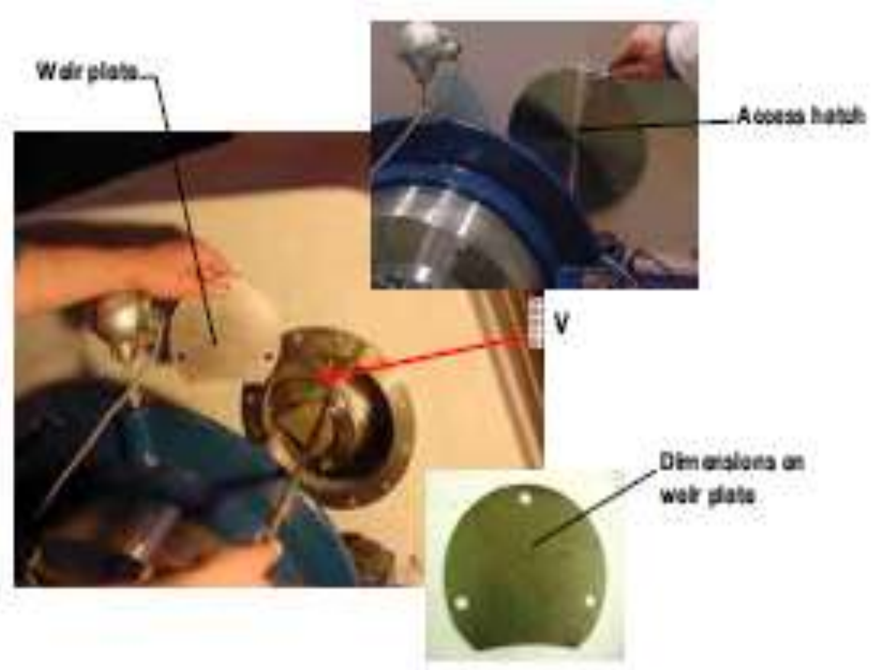

Weir plate adjustment should take less than 2 hours.

*Safety Warning: Weir plate adjustment requires a centrifuge to stop and power cut –off (lock out / tag out).

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POLYMER DOSAGE

- The correct polymer can make the most dramatic difference in centrifuge performance.
- Small scale jar testing with multiple polymer manufactures and multiple polymers is a must before full scale testing.
- A few polymers should be selected for full scale testing and tested at a minimum of three (3) dosages each.

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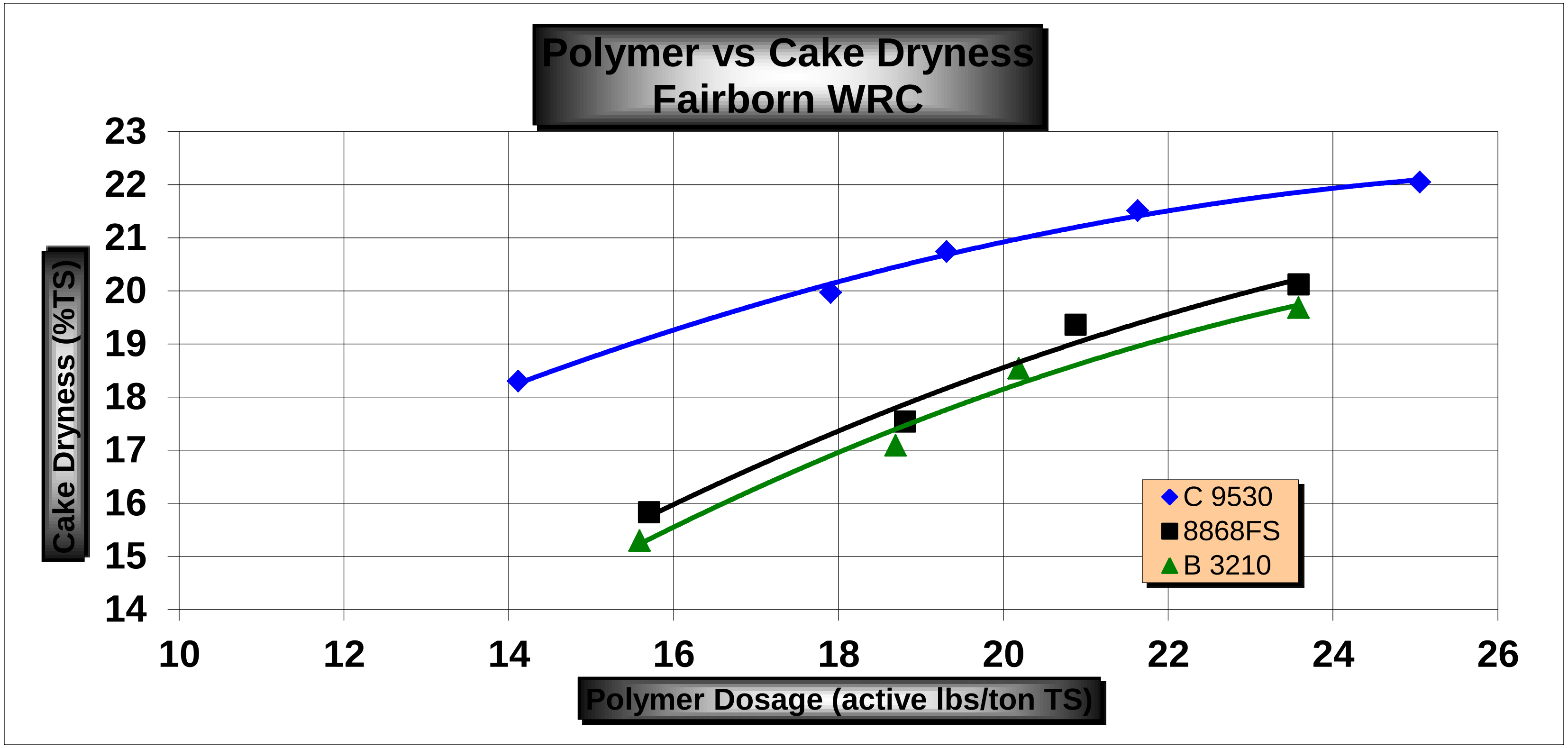
This Graph represents the results of three (3) different polymers tested at various dosages. It is evident that Polydyne C 9530 produced the best results. The highest cake dryness achieved was 22%TS with a dosage of 25 active pounds per ton TS.
It is typical for the cake dryness to increase with the increased polymer dosage until it reaches a point of “over dosage” and the increase in cake dryness diminishes.



*example graph from onsite field testing.

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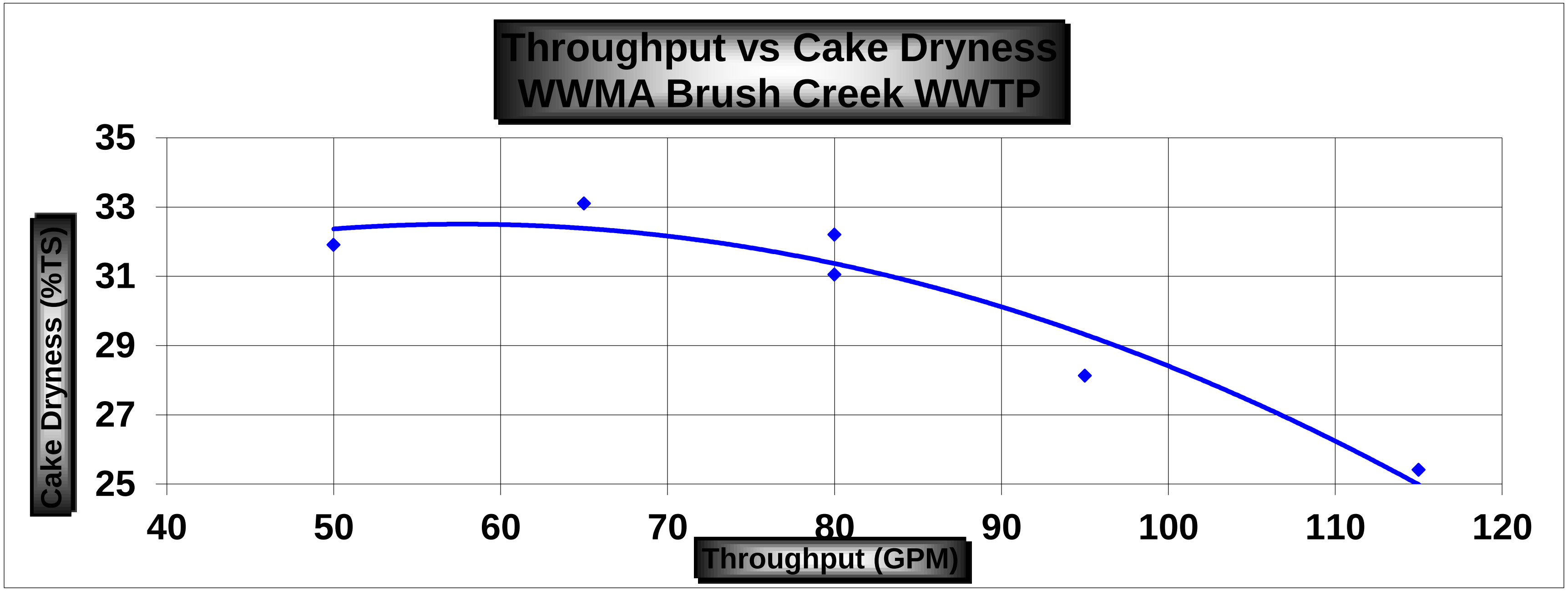
THROUGHPUT

The throughput graph depicts the relationship between throughput and cake dryness. As the throughput is increased the differential speed between the bowl and scroll must be increased to maintain the solids capture rate. This reduction in sludge retention time causes the cake dryness to decrease as seen in the graph.

This graph is also helpful in illustrating that the sludge flow can be operated between 50 an 80 GPM without a significant decrease in performance.



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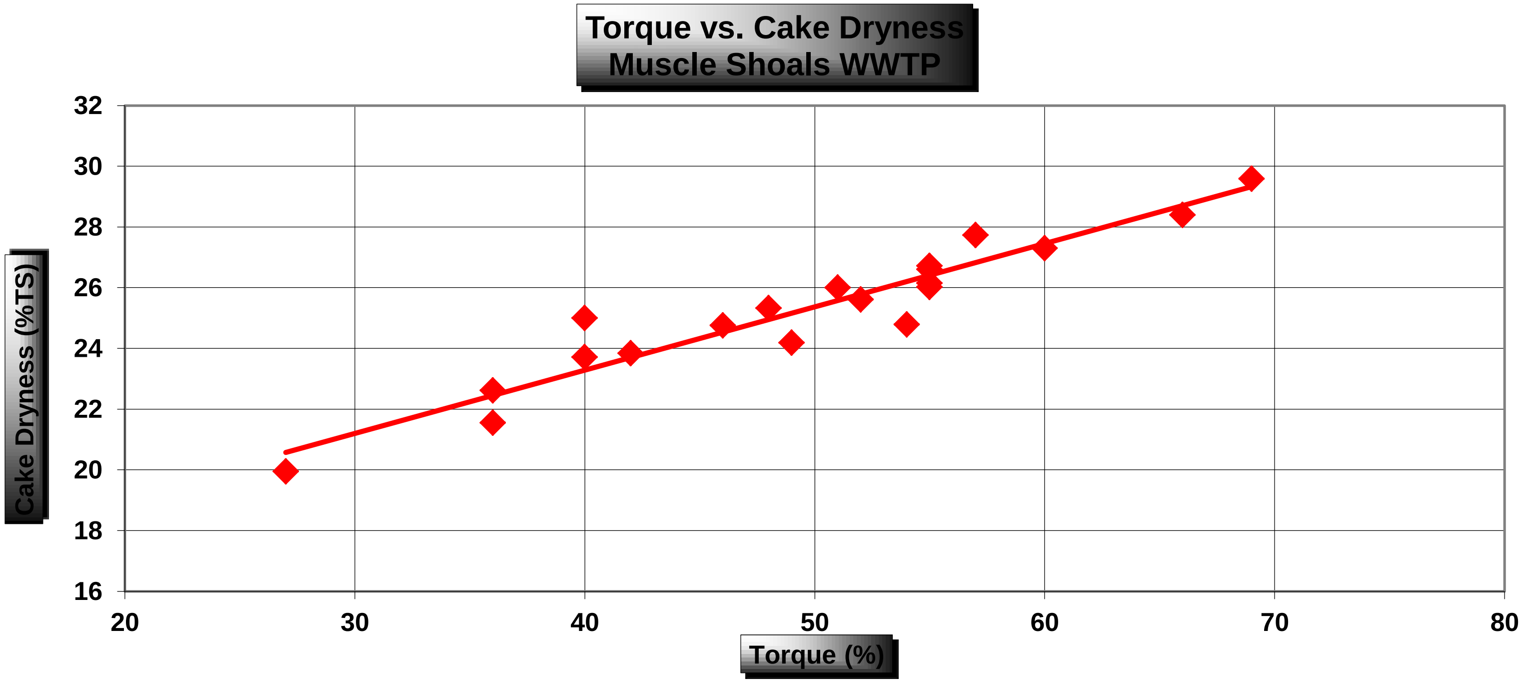
TORQUE

This torque graph portrays how torque relates to cake dryness. As the cake dryness increases, it requires more torque to convey or scroll the cake up through the conical section and out the cake discharge ports. Graphs such as this one can be very helpful because they can give an immediate estimate of cake dryness based on the torque read out.



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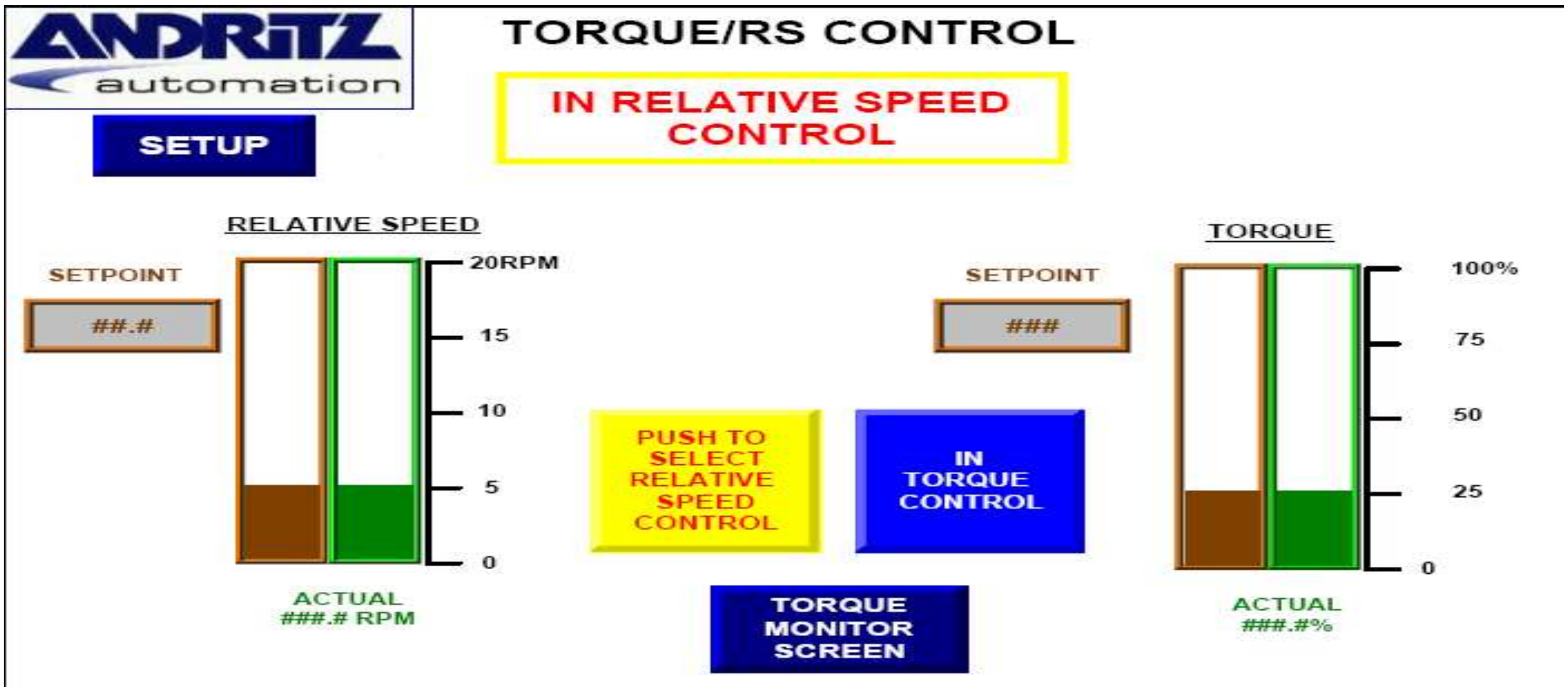
DIFFERENTIAL SPEED

Differential speed is adjusted automatically based on the torque set point that is entered.



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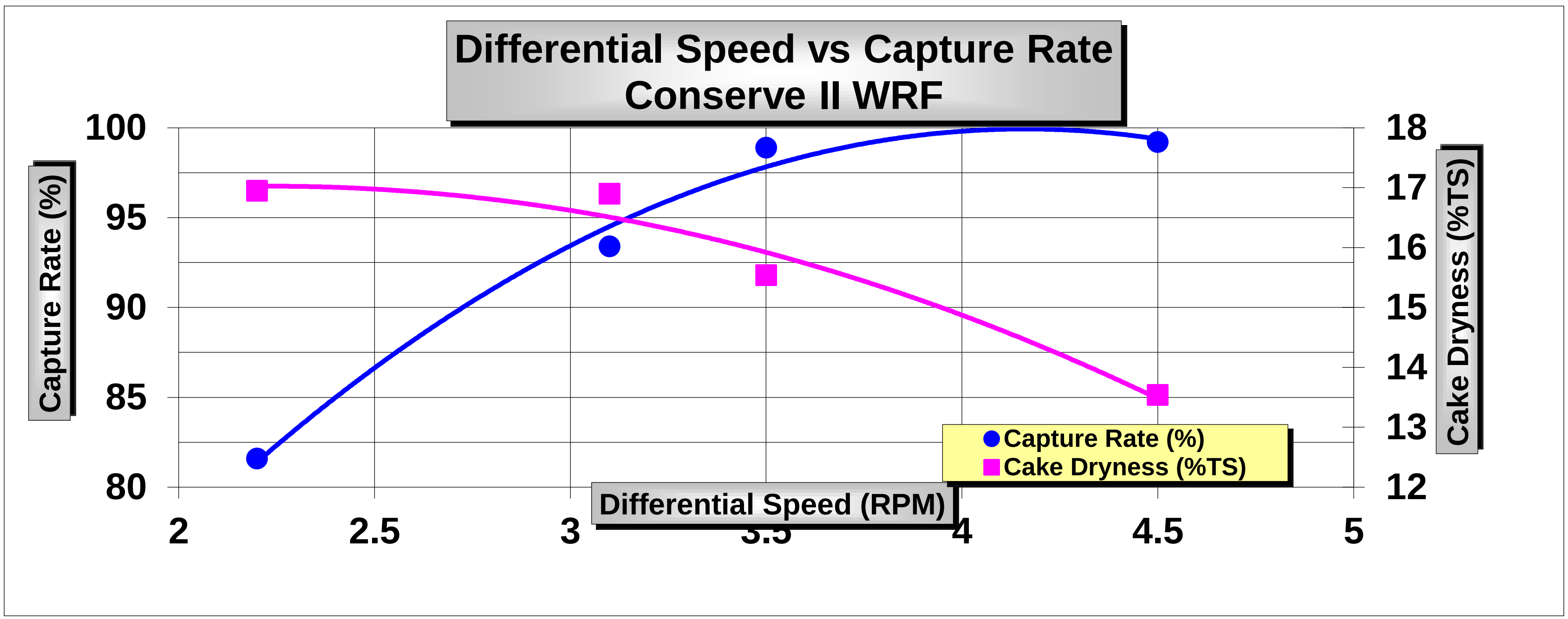
DIFFERENTIAL SPEED

Capture rate graph: represents the effect that the differential speed has on the capture rate and cake dryness. When the differential speed is increased the capture rate increases and the cake dryness decreases. When the differential speed is decreased the capture rate decreases and the cake dryness increases.



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