D1 (and D2) Stage pH Trials

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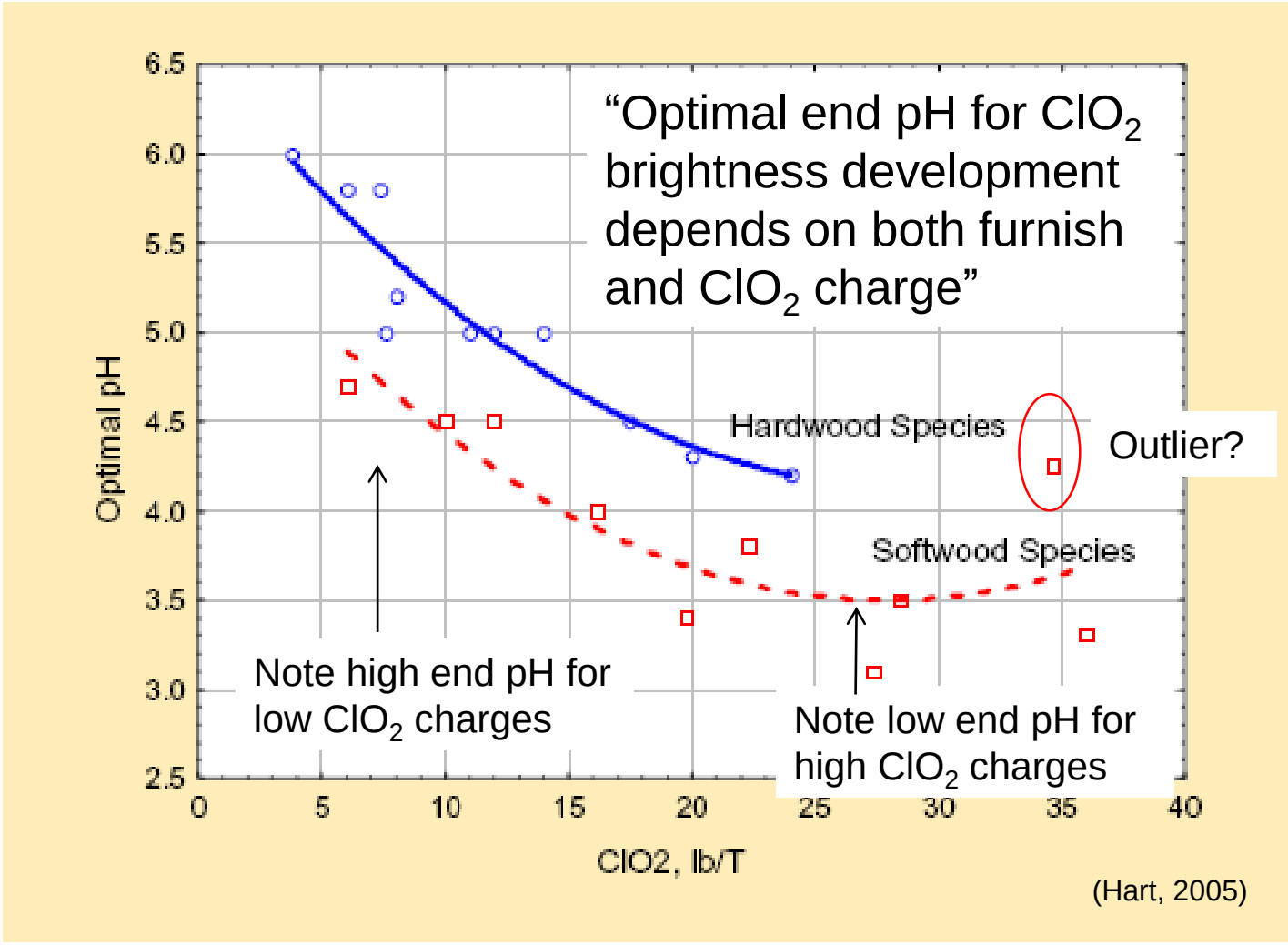
International Paper

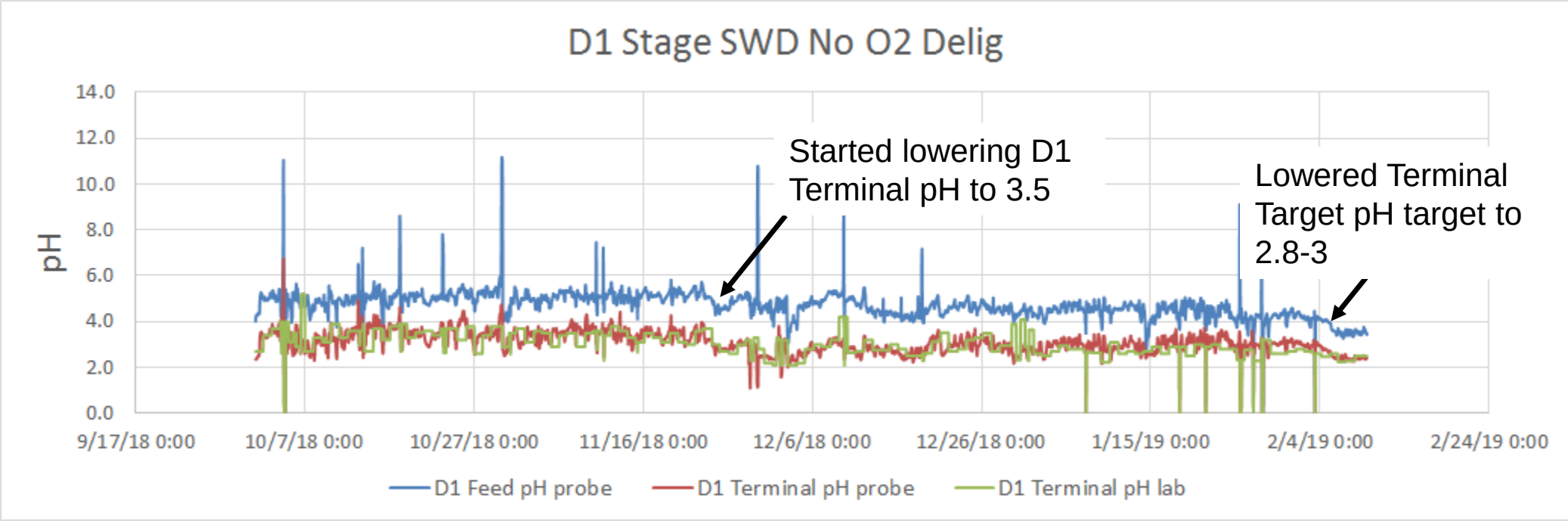
What is Optimum Brightening Stage pH?



(Hart, 2005)

What is Optimum Brightening Stage pH?

- Why did we start lowering the D1 pH that had Terminal pH Target 4.0?
- 1) ClO2 usage on this D1 stage was at times, very high, where Target should be 3.5 according to work by Hart. According to Hart work, pH should be 3.5-4.
- 2) ClO2 very acidic, requiring a lot of caustic to get to Terminal pH Target 4.0



What Did this Look Like at pH 4?

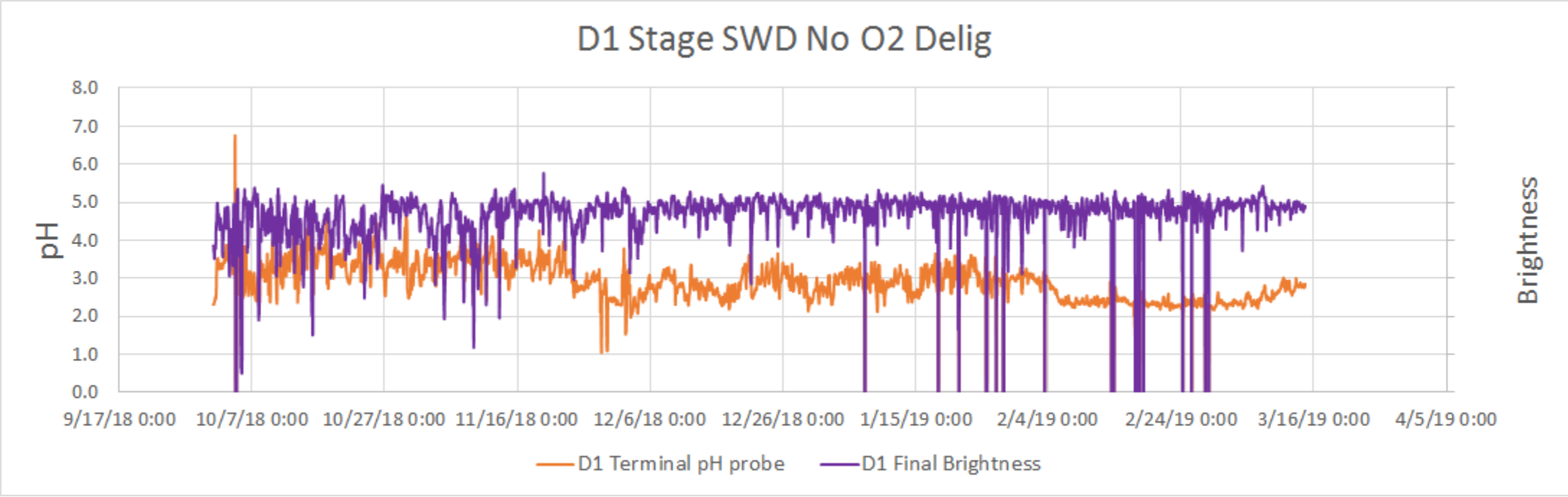
Brightness was barely at target, high residuals, but without the associated high residual smell

Other Reasons to lower D1 pH

- Mill also had downgraded pulp due to shive counts, therefore pH 3.5 or below would be more favourable.
- Price of caustic has increased dramatically. At this mill, because of ClO2 solution pH, at times there was more caustic was being used in the D1 and D2 stages to target the theoretical optimum than there was going to the Eop Stage.

The Question is – what would this do to D1 Brightness?

- Before running trial, I used due diligence to look at historical data when pH was lower and did not see a drop in brightness. Therefore felt confident in going to lower pH.

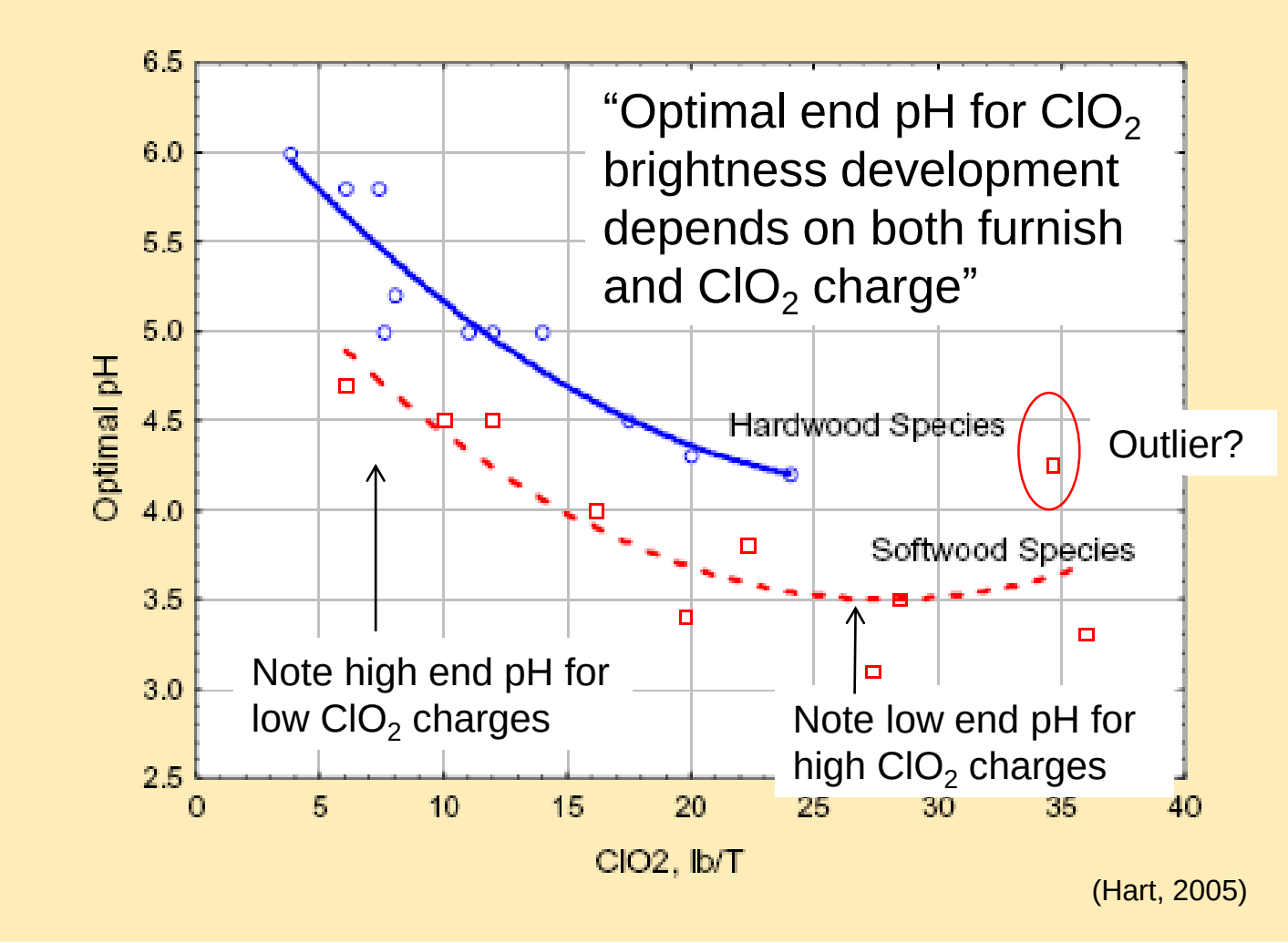


Results

Results	Lower D1 pH trial
Brownstock Kappa	2% lower
Brownstock Kappa COV	32% higher
D1 Brightness	1.8 units higher
D1 Brightness COV Reduction	50%
D2 Brightness	0.25 units higher
D2 Brightness COV Reduction	25%
D1 NaOH Reduction	86%
Total ClO2 Reduction	3%

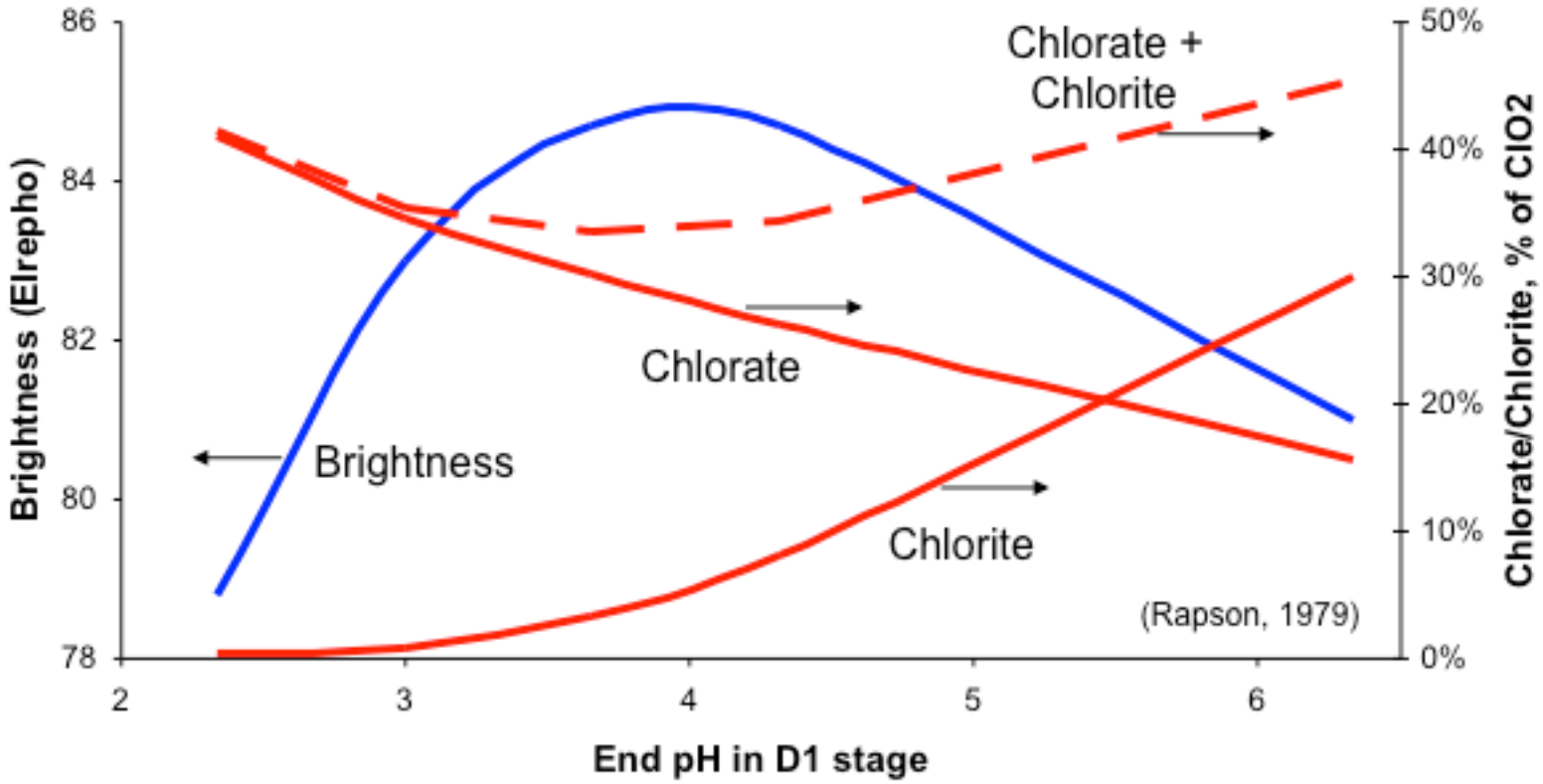
- Similar Reduction on D2 Stage, from pH 4.5 to 3.8 had 26% reduction in D2 Buffer Caustic

So, does this chart apply to all pulp?



(Hart, 2005)

So, does this chart apply to all pulp? Rapson shows large drop in brightness below pH around 3.2



Recommendations

- Follow the Chart “loosely”
- This chart never recommends pH less than 3.5, even at very high ClO2 charges, but brightness development curve shows pH range can be quite forgiving. Look at your average ClO2 dosage to determine optimum pH (lower ClO2 dosages = higher optimum pH and higher ClO2 dosages = lower optimum pH)
- Look at the vat, look at the colour
- Could this mill have simply reduced ClO2 to get the residual lower? No – there was always a drop in brightness
- Suspected much higher sodium chlorate concentration than Rapson work shifted the curve for this mill.