AI Trailblazer

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Optimizing for Excellence: Balancing cost, quality and sustainability

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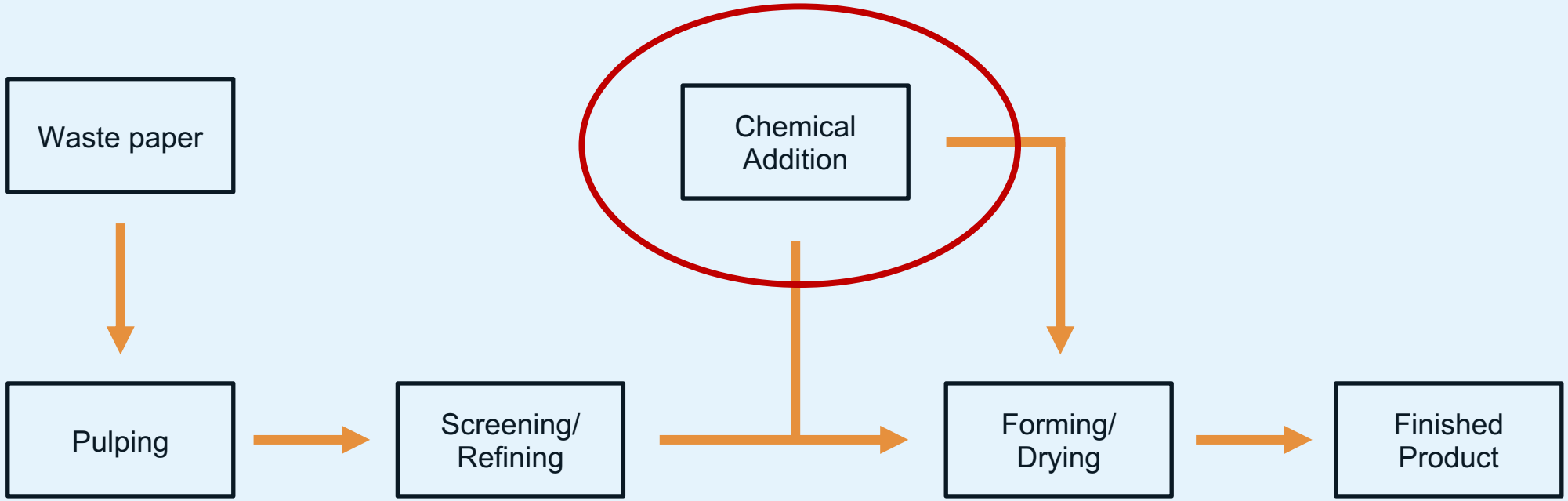
Pratt Industries

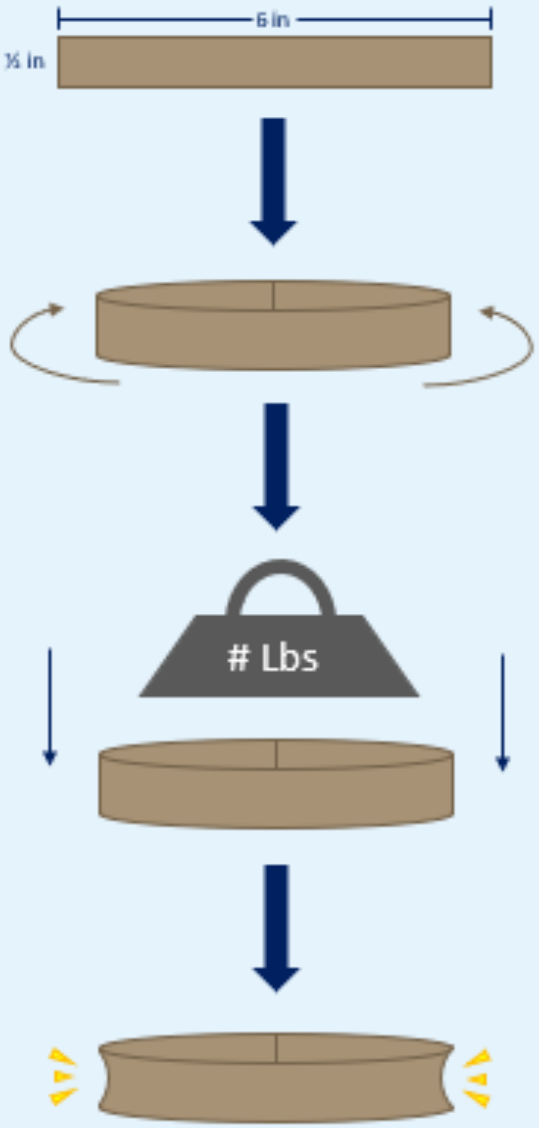
- Georgia-based company founded over 30 years ago
- World's largest, privately held 100% recycled paper and packaging company
  - Operates an extensive vertically integrated recycling company to supply six of the most modern, cost-effective paper mills in the country
- Dedicated to the sustainability of the environment, our customers, and our employees.

The Recycled Papermaking Process

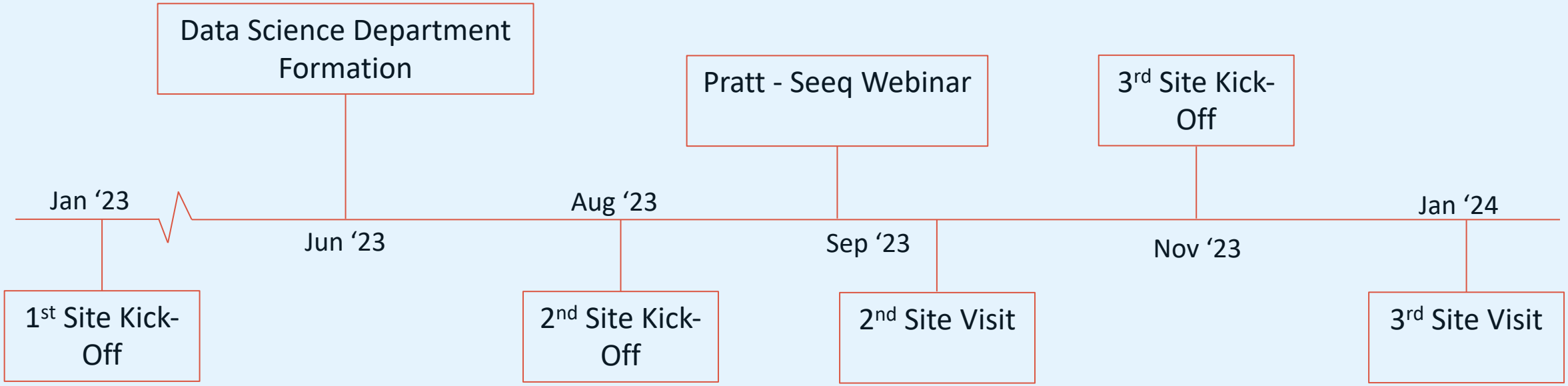


Ring Crush

- Ring crush tests the perpendicular compression strength of the paper (i.e. strength when stacked as a box)
- Additives that impact strength can be applied
  - In the paper slurry (dry strength)
  - On the paper surface (starch)
- Each paper type has a certain value that must be targeted to balance quality and cost



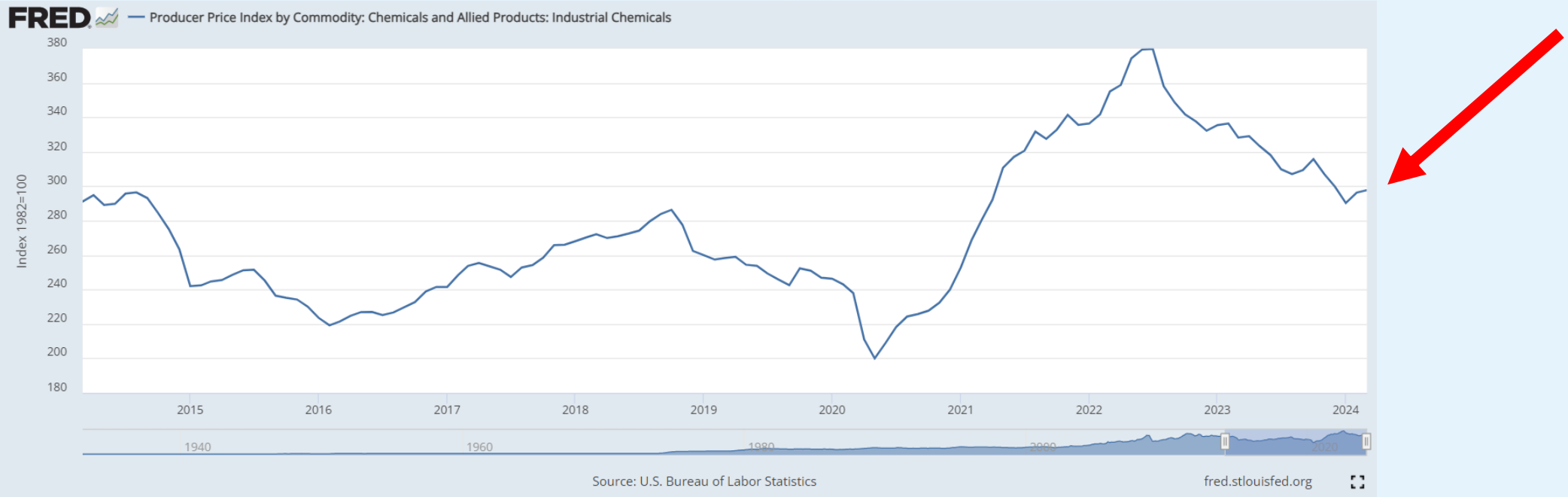
The Progression of Seeq within Pratt



Challenge

Reduction of Manufacturing Costs

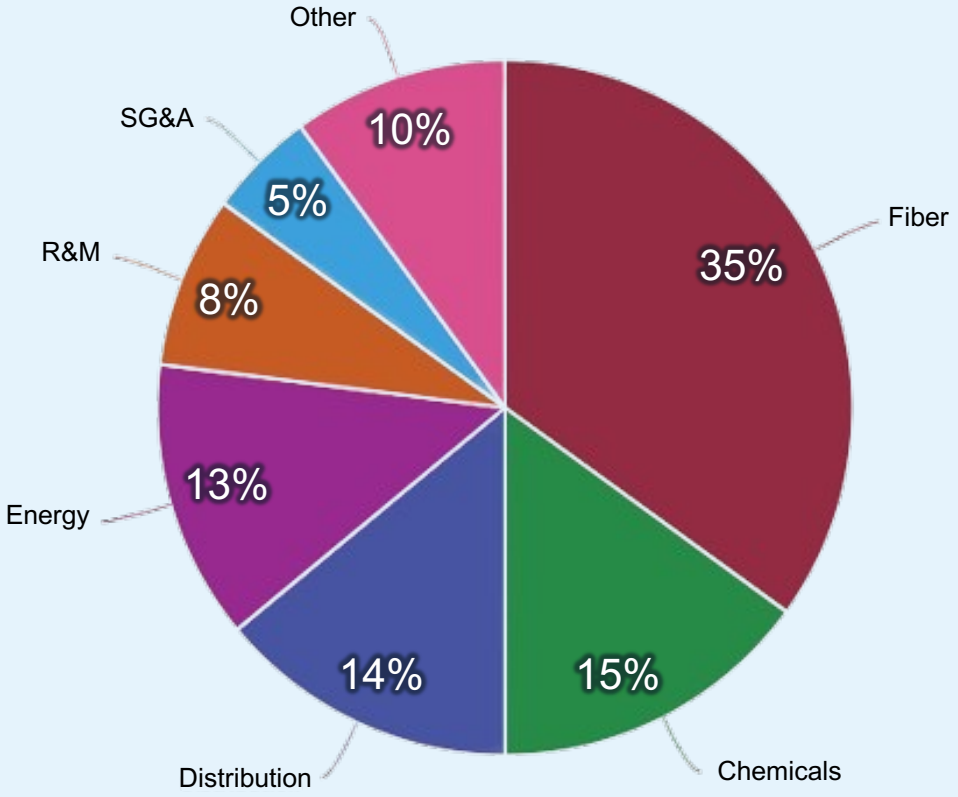
- The cost of production and materials rises every year, so we are looking for ways to mitigate the effect of this inflation
  - Industrial chemical costs have increased significantly when looking at the past decade



Source: FRED. (2024, April 11).

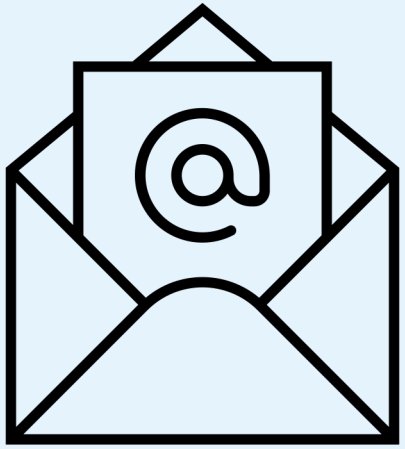
Reduction of Manufacturing Costs

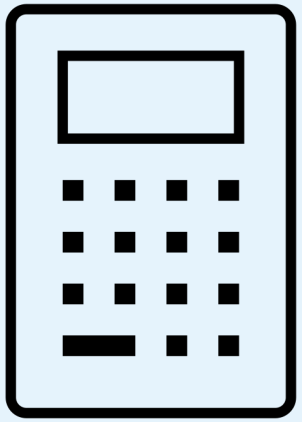
- Customer satisfaction is vital in any business model.
  - Maintaining product integrity while controlling cost is a delicate balance.
- Due to high variability in the process, the chemicals and strength additives required can fluctuate, even while producing the same product grade
  - Less uniform process control, causing variables to be constantly monitored and adjusted
  - The additives are one of the top expenditures for a paper mill
- Without trackable metrics, optimization is hard to quantify

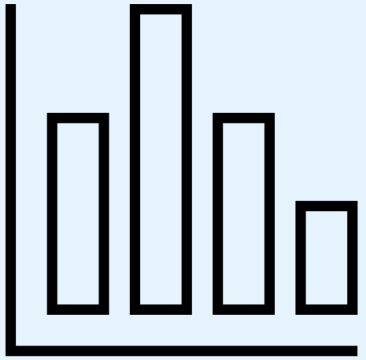


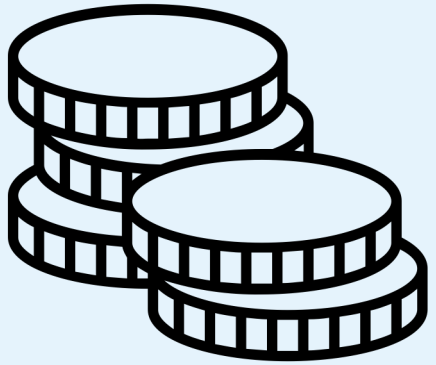
Solution

Optimization Package









Quality Alerts

Cost Calculator

Shift Comparison

Phase Breakdown

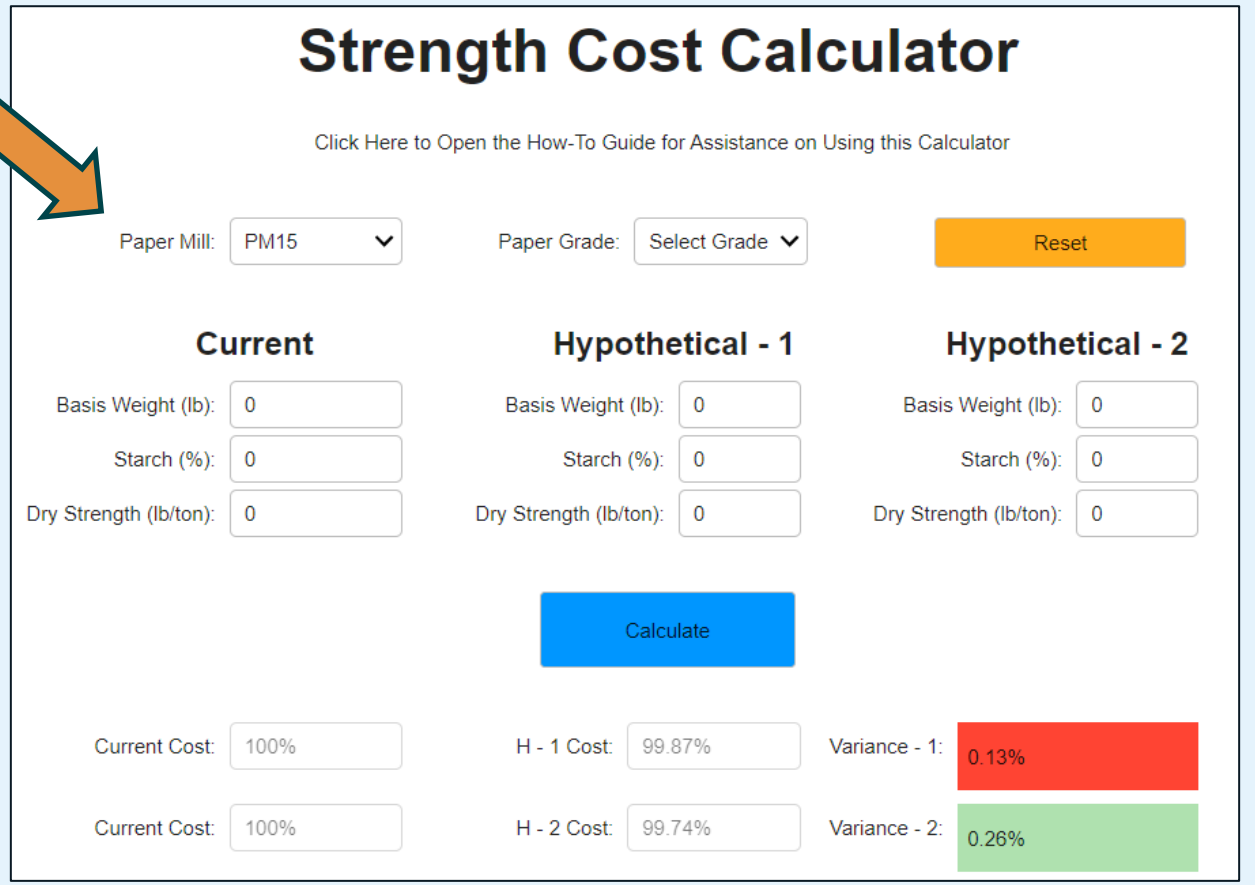
Step #1- Recognition → Step #2- Guidance → Step #3- Application → Step #4- Evaluation

Step #1 – Recognition

- Seeq email alerts designed to alert necessary parties that
  a) Paper is at spec → no alert is needed
  b) There is room to optimize → decrease chemical usage
  c) Tests are failing → increase chemical usage
- Alerts are dynamic, understanding the current paper grade to utilize correct specification values
- Helpful when management presence is limited (nights, weekends, holidays)

Step #2 – Guidance

The background formulas are site and grade specific



Step #2 – Guidance

- Capsules created for the longest consistent grade runs (solids % or DS)
- Totalized the spend per minute during individual runs
- Specific additive spend averaged among 3 runs

Step #2 – Guidance

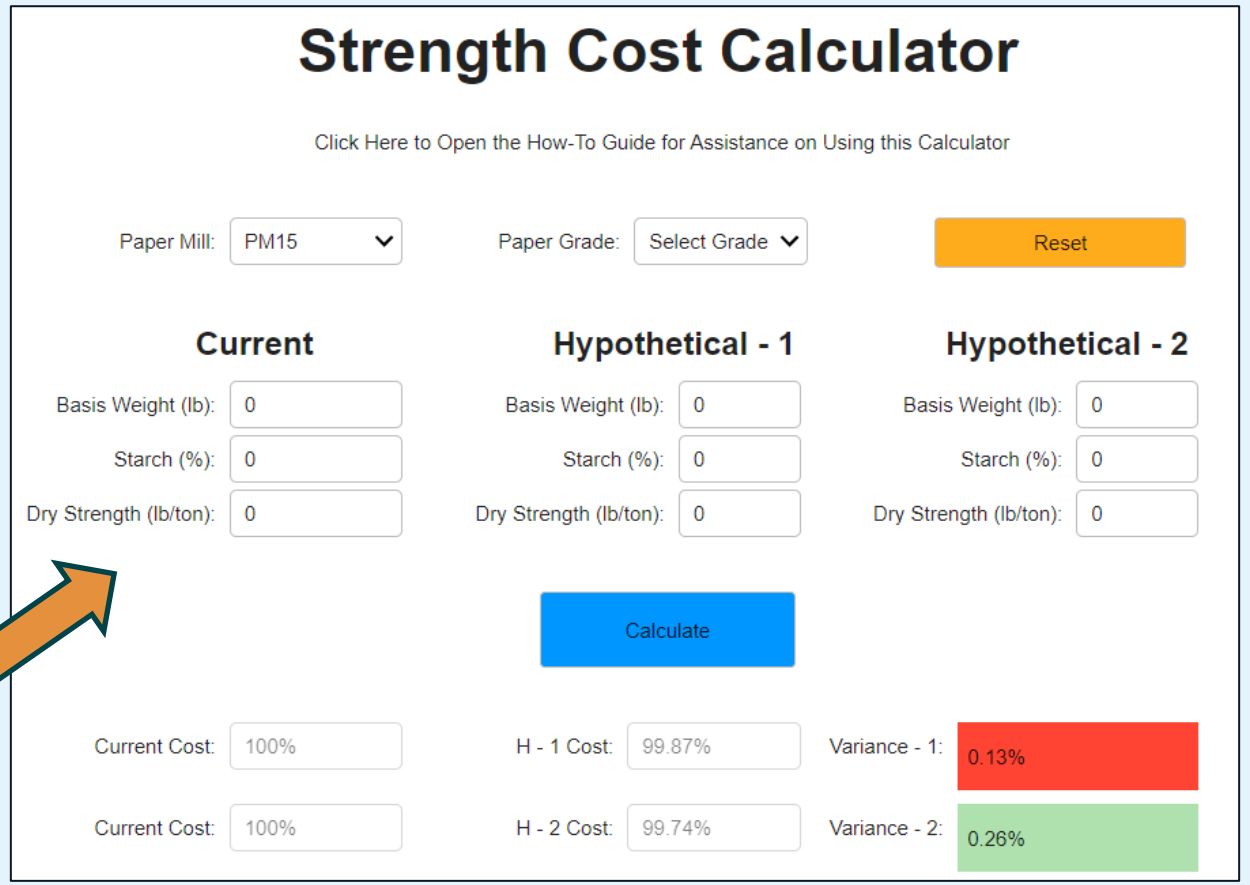
- Appropriate cost values are added to the dictionary and can be recalled by the calculator to evaluate the cost of the hypothetical additive scenarios
- This allows everything (site, grade, additive) to be dynamic and completely customizable

```
mill_product_costs = {
    'Select Mill': { 'Select Grade': {'Basis Weight': 0, 'Starch': lambda x: 0 * x - 0, 'Dry Strength': lambda x: 0 * x + 0},
```

Step #2 – Guidance

The background formulas are site and grade specific

The 2 hypothetical columns allow for the analysis of 2 different additive changes compared to the current machine set-up



Step #2 – Guidance

Current		Hypothetical - 1		Hypothetical - 2	
Basis Weight (lb):	0	Basis Weight (lb):	0	Basis Weight (lb):	0
Starch (%):	0	Starch (%):	0	Starch (%):	0
Dry Strength (lb/ton):	0	Dry Strength (lb/ton):	0	Dry Strength (lb/ton):	0

Current		Hypothetical - 1		Hypothetical - 2	
Basis Weight (lb):	Value A	Basis Weight (lb):	0	Basis Weight (lb):	0
Starch (%):	Value B	Starch (%):	0	Starch (%):	0
Dry Strength (lb/ton):	Value C	Dry Strength (lb/ton):	0	Dry Strength (lb/ton):	0

Current		Hypothetical - 1		Hypothetical - 2	
Basis Weight (lb):	Value A	Basis Weight (lb):	Value A	Basis Weight (lb):	Value A
Starch (%):	Value B	Starch (%):	Value D	Starch (%):	Value B
Dry Strength (lb/ton):	Value C	Dry Strength (lb/ton):	Value C	Dry Strength (lb/ton):	Value E

Step #2 – Guidance

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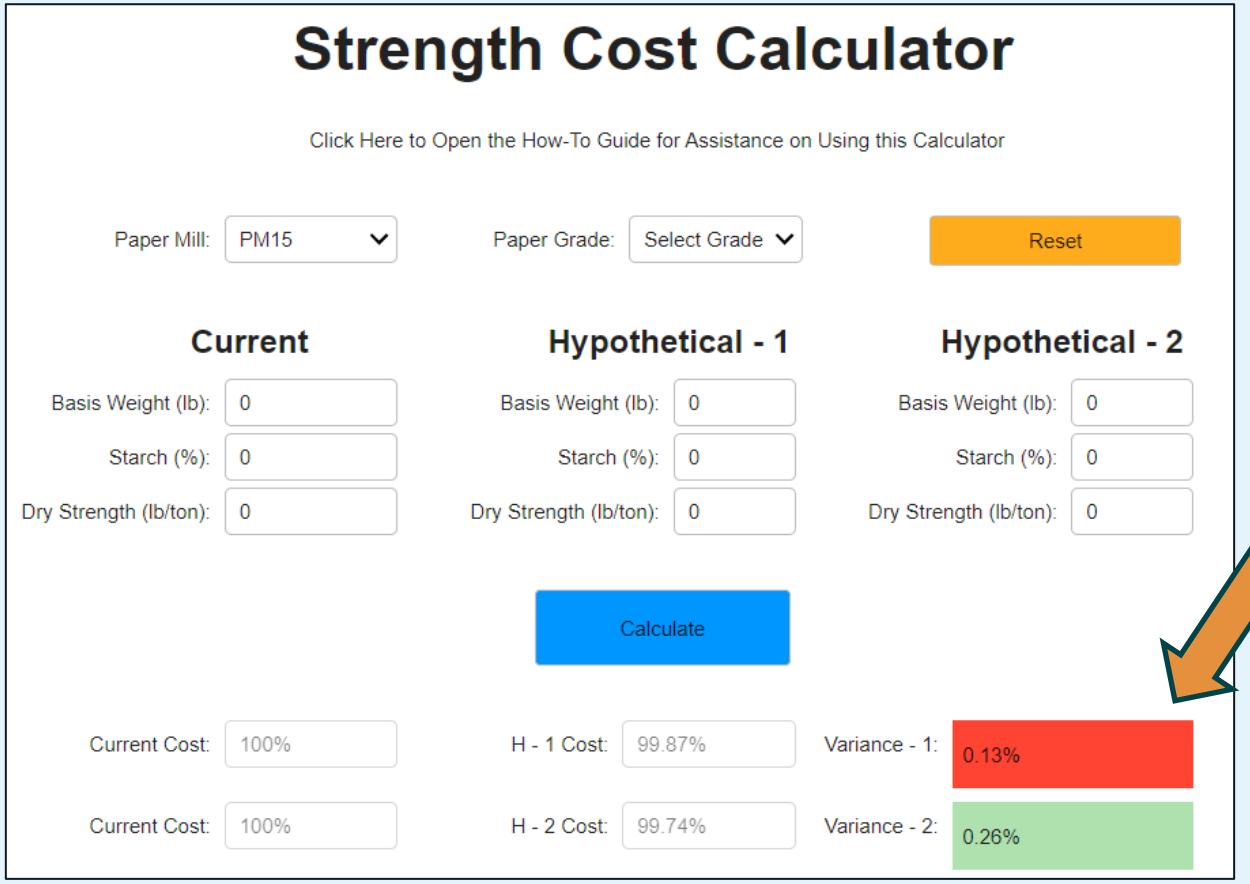
The 2 hypothetical columns allow for the analysis of 2 different additive changes compared to the current machine set-up



Once calculated, the option that saves the most money will be highlighted in green

Step #2 – Guidance

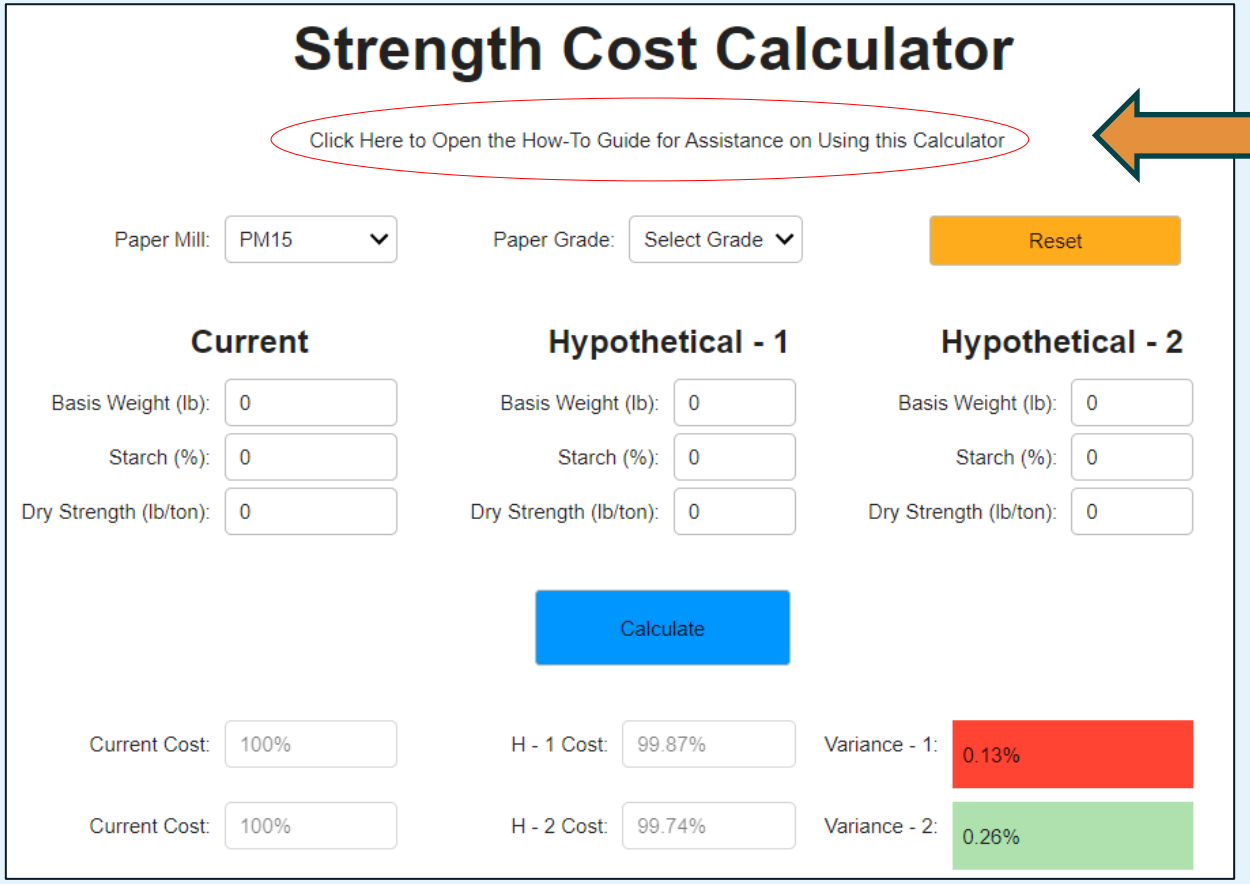
- The cost variance is a comparison of both the hypothetical to the current and the hypotheticals to each other
- The cost values are turned into percentages to keep additive cost ambiguity
- The green/red highlighting is a quick yes/no indicator to drive the optimization

$$Variance\ \# = \frac{Current\ \$\ -\ Hypothetical\ \$}{Current\ \$} * 100 = X\%$$

Step #2 – Guidance

The background formulas are site and grade specific

The 2 hypothetical columns allow for the analysis of 2 different additive changes compared to the current machine set-up



A link to the How-To guide is always available

Once calculated, the option that saves the most money will be highlighted in green

Step #2 – Guidance

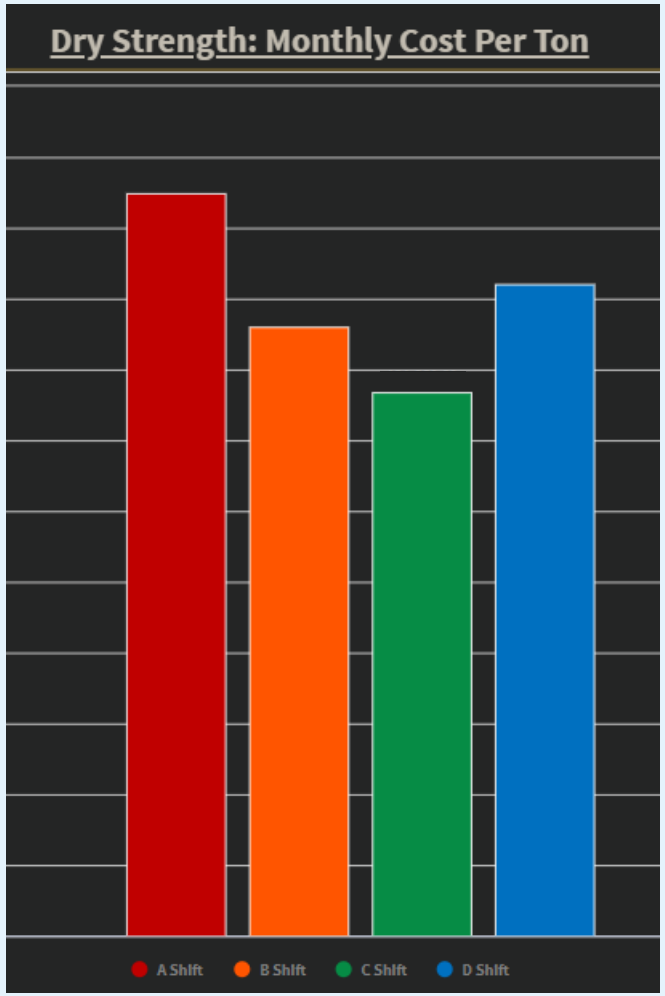
- Building guides for all our projects helps to increase interest and support
- Tools are built for different departments with varying levels of Seeq knowledge
  - Many unique input blanks, multiple calculation functions, etc.
- Answers are readily available and time seeking out an expert is no longer needed
  - Can be referenced anytime (nights, weekends) and can be referenced any number of times

Step #3 – Application

- A two-part dashboard that monitors both savings and quality
- The shifts are monitored individually to measure their level of implementation
- Data transparency utilizes the inherent competitive nature of the shifts, pushing for better optimization
- Top performing shift earns a reward for the month
  - Rewards include lunches or prizes
  - This creates buy-in, motivation, and positive reinforcement
- Shifts that need improvement can receive targeted assistance

Step #3 – Application

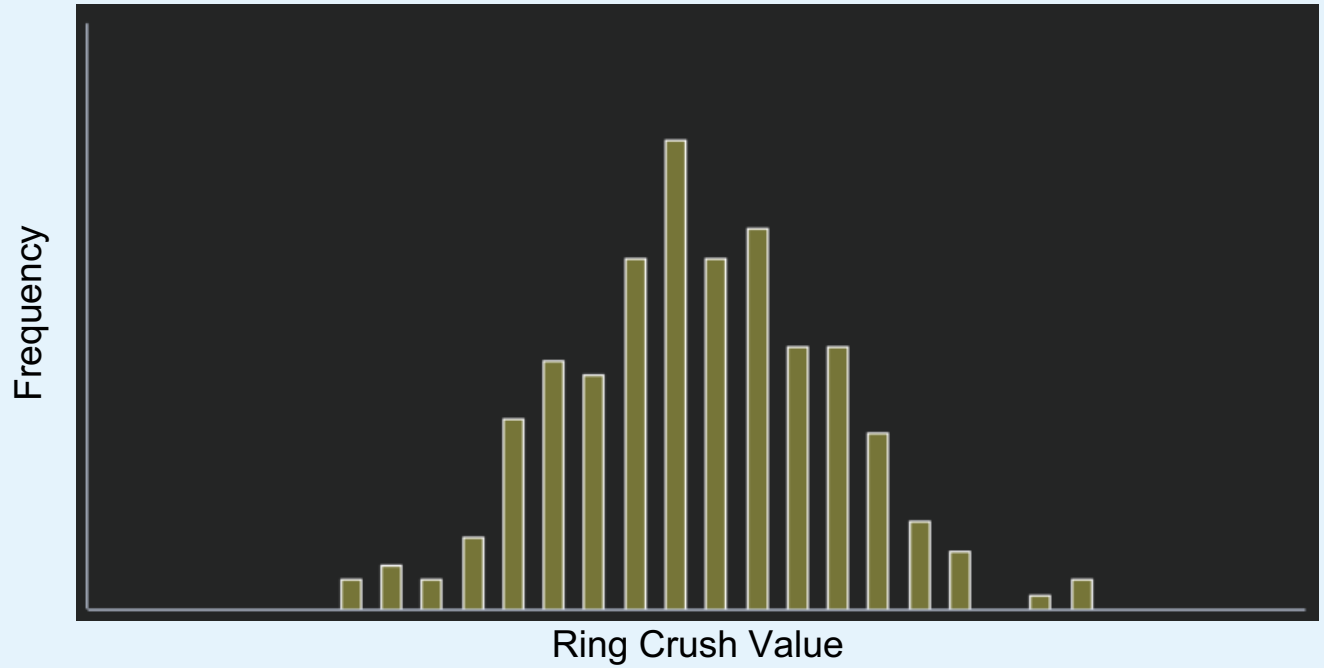
- Shift Comparison Dashboard
- Displays costs of Dry Strength, Starch, and Basis Weight per shift, per month.



- Effective usage of the tools is quantified by shift spend
- Spend data is normalized on a per ton basis which allows for consistent and fair comparison

Step #3 – Application

- To ensure product integrity, the specification values are tracked to ensure the process isn't over-optimized
- Finished product quality should not be a casualty of optimization
- Ring Crush values follow a normal distribution
  - Any deviation from this bell curve suggests errors in testing



Step #4 – Evaluation

Divided the past year into three distinct 5-month blocks to analyze the financial impact of both Seeq and the optimization package.

Phases:

- Phase 1: Pre-Seeq Introduction [January 1, 2023 – June 1, 2023]
- Phase 2: Post Process Change [June 1, 2023 – November 1, 2023]
- Phase 3: Post Optimization Package [November 1, 2023 – April 1, 2024]

The phase spend is quantified by the spend on starch, dry strength, and basis weight since that is what the optimization package is targeting.

Results

Preliminary Savings

- Initial analysis shows the optimization package has yielded a savings of 3-5% on our most produced grade.

- These savings were a result of
  - Timely alerts on when there is room to optimize
  - Effective decision guiding tools
  - Real-time dashboard displaying cost reduction efforts
  - Rewarding top performers

- With further analysis, the savings from all grades will be totaled.

Moving Forward

- Applying these methods to other mills will help to offset the rising market for all locations.
- Continue to expand upon these tools with machine efficiency metrics
  - Downtime
  - Feed-up time
  - Production speed
- Continue to push these tools and others like…

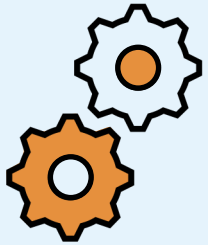
Project Portfolio

Mobile Safety Applications

Chemical Totalizer

Budget Estimator

SDS Database



Process Centerlining

Automatic Ordering System

Questions?

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