A Data Analytics Approach to Reducing Scrap Rates For ThermoFisher Scientific

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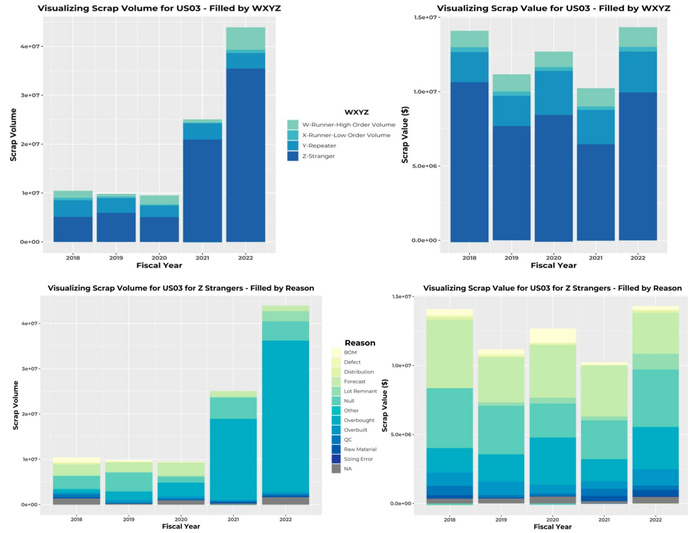
Project Description

Thermo Fisher Scientific Inc. is a leading supplier of scientific instrumentation, reagents and consumables, and software services. They manage a large portfolio of unique stock keeping units (SKU). Customers often order SKUs in large quantities so large production batches are generated. Products often are discarded as SCRAP because they are no longer economically worth the inventory holding cost. This project attempts to lower Thermo's overall scrap costs which is valued at tens of millions of dollars annually.

Fiscal Year	2018	2019	2020	2021	2022	2023
Value	$43M	$326M	$47M	$72M	$86M	$10M

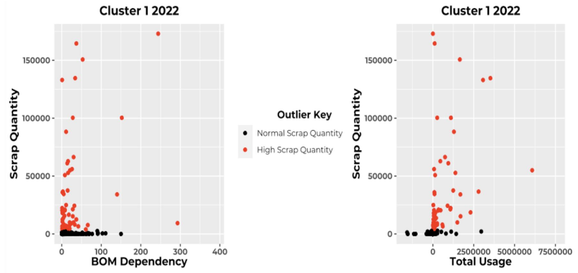
Initial Approaches

1. Identify SKUs with the highest scrap value and quantity
2. Relate scrapped SKUs to their usage (i.e., demand) to determine proportionality
3. Analysis of specific variables on groups of SKUs to discern any useful trends



Streamlining Scrap Complexity: Our Final Strategy Using Clustering

K-Means Scrap Quantity Clustering: Utilizing a quantitative clustering algorithm, we grouped diverse SKUs based on shared characteristics. The aim was to identify SKUs within the same cluster that exhibit similar scrap quantities. Outliers were determined by calculating Q3 + 1.5 * IQR, designating any SKU with a scrap quantity above this threshold as an outlier. To prioritize our efforts, a table was created listing the outlier SKUs with the highest opportunities for scrap reduction cost.

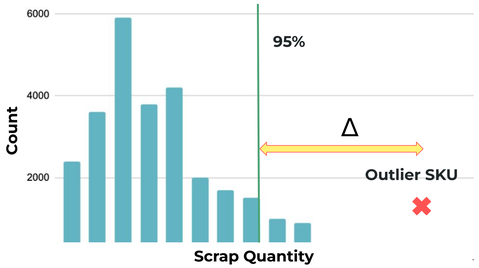


The table on the right shows the top outlier SKUs from cluster 1 of 2022 and ranks them by financial opportunity. Financial opportunity is the unit cost value of each SKU multiplied by delta. It is essentially how much money ThermoFisher could save if they reduced their scrap for each of these outlier SKUs to fall within the 95% range of the non-outlier SKUs

SKU Number	Unit Cost	Delta *	Financial Opportunity **
100015737	$ 18.71	8,177	$153,006
100040578	$ 1.80	48,993	$87,996
PPC1007	$ 0.82	32,333	$26,607
100022824	$ 1.99	10,740	$21,335
100021400	$ 1.14	18,676	$21,300
...	...	...	...

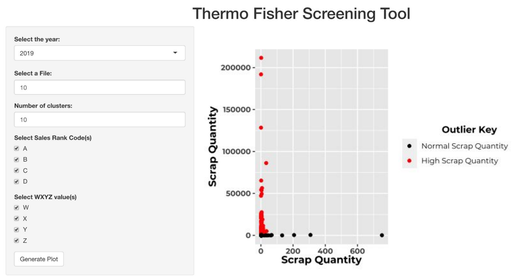
Delta: Understanding How to Quantify Outliers

We defined delta as the difference between an outlier SKU's scrap quantity and the 95% point of the non-outliers. Initially, we calculated the delta by subtracting the mean scrap quantity of non-outlier SKUs from the outlier SKU's scrap quantity. However, we realized that the skewed distribution of non-outlier SKUs was affecting the average value, leading to excessively large delta values. To address this, we took a more conservative approach. Our goal was to quantify the scrap reduction needed for the outlier SKUs to fall within the 95% range. This approach ensures that these SKUs remain on the higher end of the scrap spectrum but are no longer considered outliers, reducing their impact on ThermoFisher.



Future Tool for Screening

1. A dynamic tool to pinpoint abnormally highly scrapped SKUs
2. Will automatically create clusters based on the data being uploaded
3. Thermo Fisher can choose settings to cater towards their preferences
4. Helps ThermoFisher save time and resources rather than manually clustering



Cluster	Potential Savings for Top 10 SKUs	1% Savings	5% Savings	15% Savings	25% Savings
1	$384,732	$3,847	$19,237	$57,710	$96,183
2	$293,959	$2,940	$14,698	$44,094	$73,490
3	$282,018	$2,820	$14,101	$42,303	$70,505
...	...	...	...	...	...
Total	$7,777,899	$77,779	$388,895	$1,166,685	$1,944,475

Potential Savings Table

The table above provides insights into potential savings achievable through various percentages of scrap reduction within the top 10 outlying SKUs in each cluster.