This analysis correlates key product attributes (descriptors) with product margin (EBITDA)

KPIs:

Calculate adjusted EBITDA/products/volume from either: 1) eliminating products from 2019 production if ‘Sort by’ = ‘Low EBITDA’, 2) adding products to an empty production schedule if ‘Sort by’ = ‘High EBITDA’

Charts:

EBITDA by Product Family Bubble Chart: Products are grouped by family then rank ordered according to EBITDA. Bubble size is by order volume (kg)

Product Descriptor Violin Chart: Distributions for selected descriptors are shown in a violin plot. Read more about violin plots [here](<https://en.wikipedia.org/wiki/Violin_plot>)

Descriptor Sunburst Chart: Displays product breakdown for a given descriptor selected in the violin plot. Read from inner to outer rings, the ‘pie’ slices in each ring depict the volume break down for that level in the pie in terms of order numbers; classes of product become more specific moving from the inner to outer rings. Color code indicates EBITDA for products described by that level in the pie. Outer rings can toggle width/thickness attributes on and off

Controls:

Families & Descriptors: select families/descriptors upon which to perform analysis/visualization

Visualization Tab:

Presets: Interactive allows user selection of various settings, Opportunities 1 & 2 show margin opportunities in the Shrink Sleeve and Cards Core families, respectively

Sort by: if set to ‘High EBITDA’, range bar is sorted from positive to negative correlation with EBITDA; if set to ‘Low EBITDA’, range bar is sorted form negative to positive correlation with EBITDA

Number of Descriptors: range bar selects sorted descriptors. Selection updates plots and KPIs with products described by those descriptors.

Toggle Violin: overlays selected products onto the EBITDA by Product Family chart

Analytics Tab:

Find Opportunity: Algorithm calculates % EBITDA increase by eliminating products according to family/descriptor selection. Table is returned that is sorted from high to low % EBITDA increase.

These can be selected by the range bar in the side panel, which can be sorted by whether they correlate with high or low EBITDA. A violin plot of EBITDA values is constructed of each descriptor which is a method of plotting distributions. It is similar to a box plot, with the addition of a rotated kernel density (kde) plot on each side. **The benefit of the kde is to visualize the density of the data without obstructing key outliers** *(ex: 200-400K EBITDA outliers in 2D Coil Coating and Base Type 153/07)*

Clicking on a distribution in the violin plot expands the sunburst chart to its right. A sunburst chart is a way of representing hierarchical data structures. In this case it is showing the product breakdown for a given descriptor. For instance, products with base types of 202/14 fall within the Construction category, with PVC polymer, ZZZ treatment, and OP color. The bandwidths that lie on each ring indicate the production volume fraction for that given descriptor while color indicates the average EBITDA for all products described by that section of the sunburst *(ex: in the default view, highest EBITDA base type 202/14 products have a width of 955 while lowest EBITDA have a width of 400 and each of these count for 1 production run out of 23 for this product group).* Thickness and width can be toggled on the sunburst chart for clarity.

Descriptors in the violin plot are overlayed onto the EBITDA by Product Family chart. In this way, product descriptors can be evaluated within the broader portfolio *(ex: toggling the best/worst rank selector above will alternate highlighting the high margin and negative margin products within each family, respectively).*