Uncountable uses artificial intelligence to reduce formulation development time and foster innovation for a polyurethane foam manufacturer.

CUSTOMER SPOTLIGHT
NYSE-Traded Specialty Materials Company
($1B+ Market Cap)

Our customer's objective was to develop a new flexible foam product that matched a specific stress-strain curve while maintaining other density and rebound properties. All previous experiments by the R&D team, which excluded ingredient exploration and partial-factorial DOE's, had yet to reach desired performance.

Key Results
- **4x reduction** in testing time and **3x reduction** in experimentation
- Identified formulation which met end-customer's requirements

Polyurethane foams are complex and volatile formulations

- Uncountable's challenge: 24 possible ingredients to select for final formulation
- While optimizing over 10 physical properties were measured on each sample
- Worked with formulators to understand effects of individual ingredients, constraints on the formulation space, and R&D leadership their customer's requirements

**We use artificial intelligence to reduce test iterations**

STEP 1: Ingest historical recipe and experimental data while setting the objective function for the new material.

STEP 2: Build custom machine learning model that learns ingredient interactions and use artificial intelligence to suggests the best possible formulations.

STEP 3: Incorporate experimental results from initial suggestions to continuously improve the model and produce better formulations to minimize experimentation.

Uncountable helps R&D team meet customer goals in a fraction of the time

Uncountable was challenged to do a head-to-head comparison with the scientist's development method. In contrast with 90 formulations run by the scientist, Uncountable suggested just two rounds of formulations. To start, Uncountable leveraged the scientist's general foam expertise to more effectively search the large ingredient space in a first round of 20 formulations. In the next round, Uncountable's model used AI to predict property performance from the first 20 experimental results, and recommended a set of 10 formulations. In the end, the best performing experiments from Uncountable's 30 formulations surpassed the top experiments from the scientist's 90 formulations.
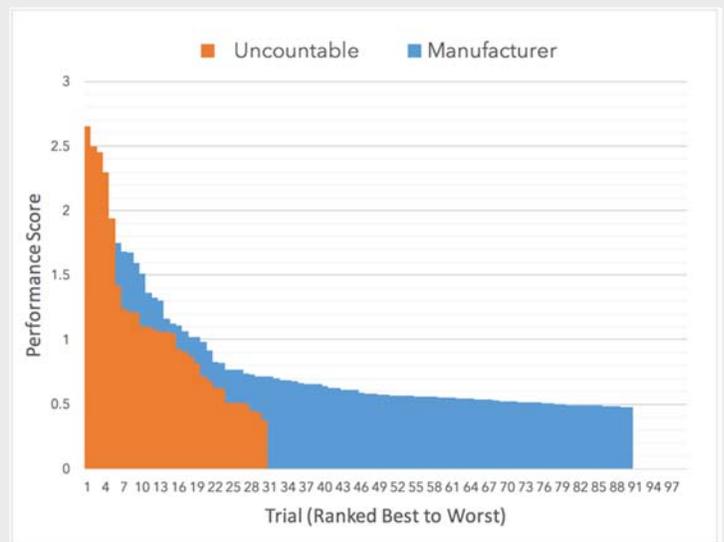
The performance score used a preference function for force-compression, density, and rebound results to compare the overall performance of a single experiment.