ASPHALT DRYER OPTIMIZATION

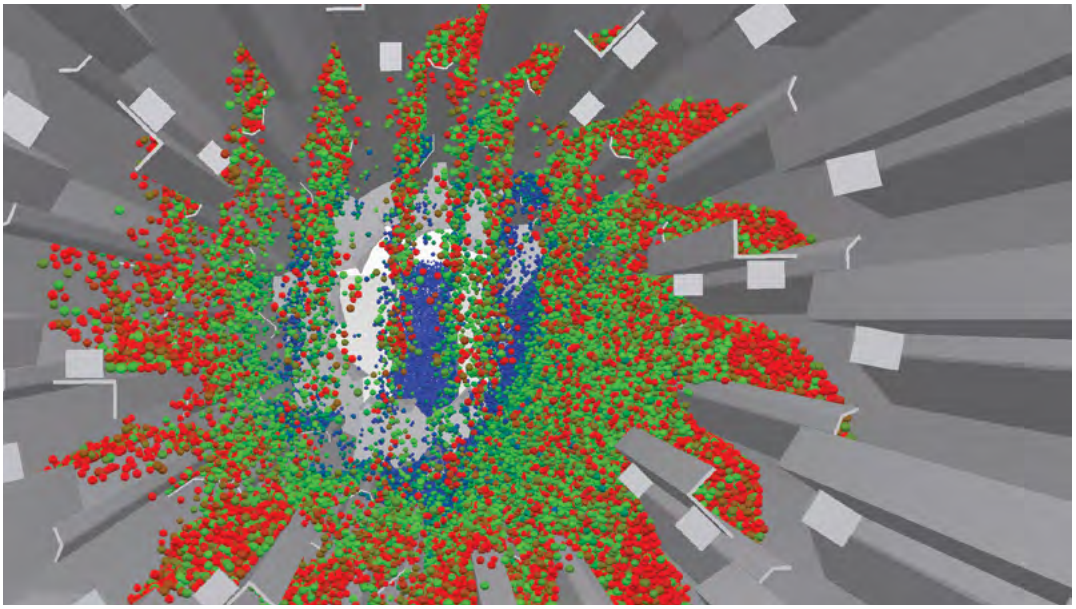
ASTEC EMPLOYS ALTAIR EDEM™ TO REDESIGN AGGREGATE DRYER FOR ENERGY SAVINGS

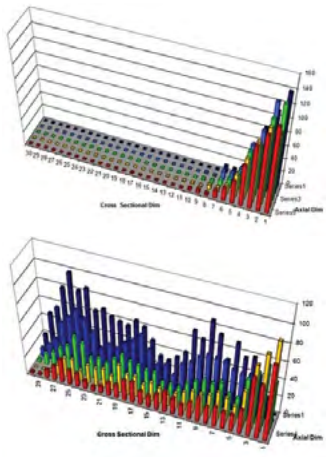
About the Customer

Astec. Inc, a member of the Astec Industries family of companies, is located in Chattanooga, Tennessee. Astec is a manufacturer of continuous and batch-process hot-mix asphalt plants and related equipment and services.

EDEM has become an integral part of Astec's design process, having proven itself to Astec engineers as a valuable design tool.

> "EDEM software gives our engineers a state-of-the-art tool for the development of new equipment and allows us to model each process segment of our hot-mix asphalt plants. Our philosophy has always been to provide our customers with the latest technological edge in asphalt manufacturing, and EDEM helps us meet that goal of continuous innovation.
>
> Andrew Hobbs, Chief CFD/ DEM Engineer, Astec, Inc.





Aggregate veil density: poor distribution before redesign (top) and greatly improved distribution after redesign (bottom)

Their Challenge

In asphalt production hundreds of tons/hour of wet aggregate rock are dried in a rotating drum dryer before being coated with liquid asphalt. The **energy-intensive drying process** ensures that the asphalt will bind to the rock. Inside the drum the aggregate is kept in motion by shaped scoops called flights attached to the inner surface, which produce a "veil" of falling material. Better veiling action improves heat transfer and speeds drying, reducing fuel consumption. Astec wanted to develop a more energy-efficient drum dryer that could also process a wide range of aggregate types, at various tonnage rates. Direct observation of the drum in operation is very difficult so **simulation offered the best opportunity to experiment with new flight designs**.

Our Solution

Astec deployed EDEM to provide a virtual environment for observing and analyzing the effect of flight design and operating parameters on material flow. Astec imported CAD files of the drum dryer into EDEM and generated an aggregate rock DEM Material Model. After model calibration, **EDEM accurately simulated the dynamics of the rocks** being lifted and released by the flighting. Using EDEM's binning function to calculate the number of rocks in a given volume, Astec could quantify the density of the veiled aggregate in a given drum section. By virtually comparing the performance of different flight designs, Astec was able to arrive at a new flight design, called the "V Flight," which **optimized the distribution of rock** during veiling, improving the aggregate drying process.

Results

The new V Flight design is more efficient, reduces drying time, and uses less fuel than previous designs — **making Astec customers more competitive while reducing impact on the environment**. With EDEM, Astec was able to visualize particle flow and analyze particle-particle and particle-equipment interaction in a harsh environment where direct measurement and observation were impossible. Virtual performance testing shortened the design cycle and also improved understanding of aggregate behavior in the drying process. This insight into the process now helps Astec use EDEM to troubleshoot existing dryers in the field, where local aggregate properties can require custom solutions.