The Problem

On an annual basis, the U.S. recycles:

- 85 million tons of iron and steel
- 5.5 million tons of aluminum
- 1.8 million tons of copper
- 2 million tons of stainless steel
- 1.2 million tons of lead
- 420,000 tons of zinc

All of this metal is shredded in a process where a shredder grinds the materials into fist-size pieces.

While shredders efficiently breakdown all types of metal, they also generate lots of heat, dust, and debris. The excess heat can cause reduced efficiency, increased emissions, an increase in wear, and even damage to the shredder itself. Other issues, such as excess dust and debris in the air, are not only irritating and annoying, but can be subject to heavy fines from regulatory agencies.

The Standard Solution

Both of these issues have traditionally been addressed with one solution -- injecting water or foam into the grinding housing to both reduce the heat and help control the dust. On the shredder tested, a combination of raw, local well water and a foaming agent are injected into the main housing of the shredder. While current applications of this method have shown some success, the shredder still runs at temperatures in excess of 140°F with a lot of dust in the surrounding area.
Momar’s Solution

While the standard solution has shown moderate success for many years, the use of Momar FlameFreeze and Momar DustNot F80, (a FlameFreeze fortified dust suppression product) are designed to improve shredder box performance by:

- Increasing the heat capacity of water – thereby reducing water usage
- Providing a higher-lubricity foam – thereby extending the life of shredder wear surfaces
- Producing a stronger, film-forming foam – thereby improving dust encapsulation
- Providing anti-oxidant properties that reduce spontaneous combustion – thereby reducing blue smoke emissions
- Reduces electrostatic energy on treated surfaces – thereby reducing explosions
The Test

Momar tested two of its products, FlameFreeze and DustNot F80, against a competitor’s conventional foam over a three day period. All three products were used in the same shredder while shredding the same type of material: 70% automobiles and 30% home appliances. The weather conditions were similar each day. The shredder boxes were ambient temperature prior to each round of testing. The same chemical feed system was used for all three products, and the chemical dilution rates and feed rates were identical throughout the testing.

Rotor temperature data was gathered every 15 minutes for one hour with a thermal imaging camera. See the examples below:

Below is a chart of the data gathered:

<table>
<thead>
<tr>
<th>Time (Minutes)</th>
<th>Day 1 Competitor’s Foam</th>
<th>Day 2 Flame Freeze</th>
<th>Day 3 DustNot F80</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rotor Temperature (ºF)</td>
<td>Rotor Temperature (ºF)</td>
<td>Rotor Temperature (ºF)</td>
</tr>
<tr>
<td>0</td>
<td>91</td>
<td>87</td>
<td>85</td>
</tr>
<tr>
<td>15</td>
<td>141 (see pic above)</td>
<td>88 (see pic above)</td>
<td>94</td>
</tr>
<tr>
<td>30</td>
<td>141 (see pic above)</td>
<td>102</td>
<td>102</td>
</tr>
<tr>
<td>45</td>
<td>147</td>
<td>107</td>
<td>117</td>
</tr>
<tr>
<td>60</td>
<td>150</td>
<td>115</td>
<td>118</td>
</tr>
</tbody>
</table>

The data was then graphed, see next page.
Results

As the graph clearly demonstrates, when using the competitor’s foam, the temperature of the shredder box increased 50ºF in only fifteen minutes and nearly 60ºF within an hour.

At the same dilution rates and feed rates as the competitor’s foam, the Momar products were able to maintain much lower operating temperatures. With both FlameFreeze and DustNot F80, the temperature increased less than 10ºF in the first fifteen minutes and only rose 30ºF during one hour.

In addition to a lower operating temperature, the following observations were made regarding dust levels, static, smoke, and noise:

Dust levels were only marginally improved over the competitor’s product when using DustNot F80. Dusting levels showed significant improvement while using Flame Freeze. The improvement was so great that it was remarked upon by the shedder’s operating crew.

During this study, no noticeable difference was observed in smoke levels, static, or noise, but over a longer period of time with more data and more sophisticated data gathering techniques, lab testing supports that improvements in these areas would be seen.