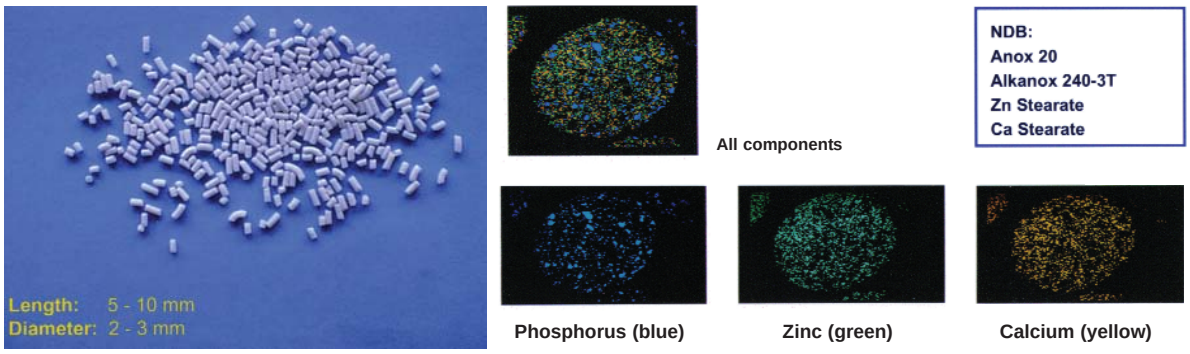

***Figure 1* — Form and dispersion of non-dust blends; and (right) cross-section of components in NDBs** (these are scanning electron microscopy views)

Some New Developments in Additive Blends

By **Tim Cooper**
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Introduction

For some years additive suppliers have sought for new ways to differentiate their products. With the development of few real new chemistries in additives, and the increasing trends towards more environmentally acceptable product forms, additive suppliers have introduced new multifunctional additive blends. Great Lakes has been a pioneer of this concept, which they call Non Dust Blends (NDB).

What are Non-Dust Blends?

Non-dust blends are physical mixtures of stabilizers and other components – i.e. a full package in one blend. These mixtures are then formed as required into single pellets or pastilles which can be easily dosed with the minimum of effort and loss.

These blends range from two-component stabilizer mixtures to multi-component blends containing up to seven or eight different components within a single granule (see Figure 1 *above*).

The incorporation of additives via NDBs results in many benefits, but include:

- Low dusting, more friendly on workers and the environment
- Excellent flow on dosing and minimal additive loss
- High melting rate
- Better dispersion
- Incorporation of additives normally fed with difficulty
- Improved additive performance

NDBs can also be masterbatched in the same way as single additives, and minimize the errors which can occur when several additives have to be dosed into a formulation. Apart from the low dusting aspect, which was why the forms were developed initially, many technical improvements have been found, some of which can be seen in the following examples.

New blends for agricultural films

NDBs resulted in a quantum leap forwards in reducing dust in the production of agricultural films stabilized with nickel quenchers. However, a more important finding was the improved processing of nickel stabilizers, resulting in a more even distribution of the stabilizer in the film when comparing the same stabilizer levels added via NDB against those added as powders.

Why does this benefit exist?

The answer can be seen in **Figure 2**. The left and middle panes show the DSC melting points of the pure benzophenone UV absorber and nickel quencher. The latter melts in the region of 275°C, and as a powder never reaches this point during extrusion.

The right-hand pane shows the melting point of the NDB, and as a result of alloying of the additives, the blend melts at a much lower temperature.

This results in much improved dispersion of the additives in the finished film, compared to adding the traditional powder forms. *(→ Continued overleaf)*

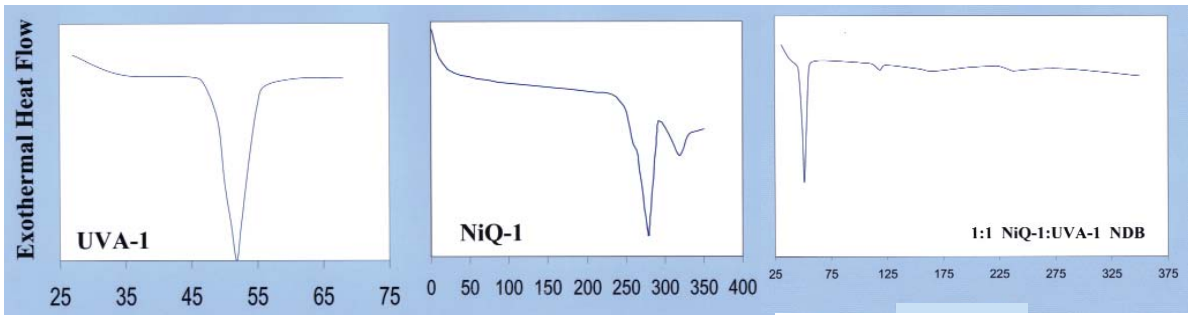

***Figure 2* — Melting points of benzophenone UVA, nickel quencher and 1:1 blend**

Some developments in additive blends

From page 26

New blends for nucleation and clarification of polypropylene

Another range of additives which benefit from addition by NDB are nucleating agents. These are substances added to crystalline polymers to modify the rate of crystalisation on cooling, thereby modifying the properties of the finished article in terms of strength and clarity.

To function efficiently, particle size, but more importantly excellent dispersion, are critical. **Figure 3** shows how the use of a third generation clarifier results in 10-20% better clarity in PP random copolymer when added in NDB form at the same level as traditional addition methods.

New blends for wire and cable

In wire and cable, the antioxidants added are expected to confer long life, extraction resistance and often application at elevated temperature. The use here too of NDBs has brought about improvements in all these aspects.

Consider for example the improved oven ageing performance shown in **Figure 4**. Here, a PP cable compound was oven aged at 150°C in contact with copper and the time measured to failure. The benefits of adding the blend of antioxidant and metal deactivator in the form of an NDB over the straight powder blend are evident.

Why? Again the answer lies in the alloying of the additives in the NDB form.

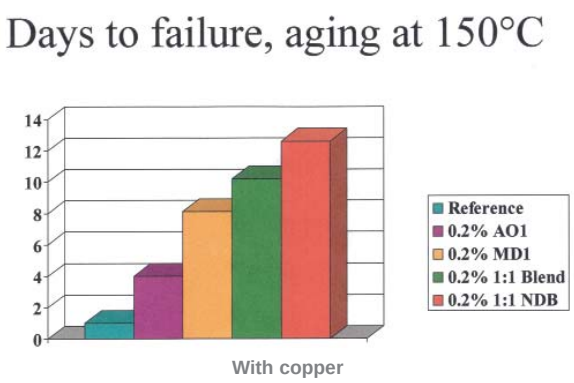

***Figure 4* — Benefits of improved stabilization in contact with copper due to NDB**

Conclusions

The foregoing represent just a few examples of where new additive forms are bringing not only an improvement in environmental and handling benefits for workers, but also technical improvements in the performance of the additives themselves.

For further information please contact Doug Jones or Tim Cooper at Chemfit Speciality Chemicals on **011 918 1900**.

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2) *Benefits of No Dust Blends (NDBs): The Performance of Clarifying Agents*, Brian Johnson, Klaus Keck-Antoine and Robert Lee, Polypropylene 2001

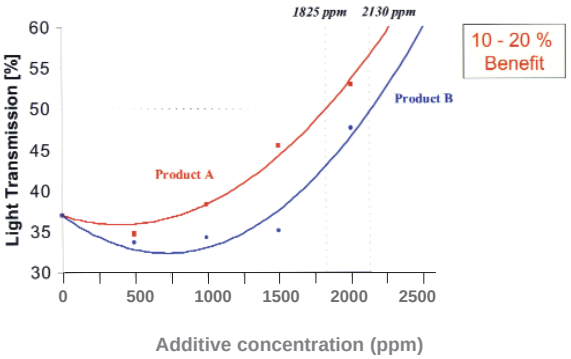

***Figure 3* — Benefits of NDB on clarity of PP random copolymer**

3) *Benefits in PE Applications via the Use of One-Packs*, Brian Johnson and Klaus Keck-Antoine, Polyethylene 2001

4) *Stabilizing Agricultural Films: a Question of Balance*, Plastics Additives and Compounding July/August 2003. ❑

***Great Lakes launches halogen-free flame retardant for PP* — Great Lakes Chemical Corporation has launched Reogard® 2000 intumescent flame retardant, a cost efficient, halogen-free solution for polypropylene and other polymers. Reogard 2000 is ideally suited to applications that demand a highly efficient, halogen-free flame retardant such as extruded building parts and plastic components for electrical applications subject to the UL94-VO flammability standard. Reogard 2000 is free from 'milky' water baths during extrusion and the production of ammonia odour, which can be a concern. In addition, the UL94-VO standard is achieved with Reogard 2000 at significantly lower flame retardant load levels in the PP homopolymer resin than the load levels normally required for competitive systems. Reogard 2000 also offers superior physical properties such as higher impact strength and a higher heat distortion temperature (HDT) than other intumescent flame retardants. The higher HDT means the polymer can be removed from the mould earlier, thereby reducing the cycle. Delamination, when the surface layers start to separate from the polymer during moulding, does not occur even at temperatures up to 210°C. In addition, as Reogard 2000 is partially melt blendable, it can be compounded at lower temperatures offering potential energy savings. (www.fr.greatlakes.com)**