Characteristics and Advantages of Mayzo TPR Products

Phil Jacoby

V.P. of Technology

Outline

- What is a TPR additive?
- Advantages of TPR Blends
- Examples of Different Blend Systems and Different Additive Forms on Product and Process Stability
    - Melt Blends and Concentrates in Polyolefins
    - Phenolic/Phosphite blends in PP
- Dusting and Blocking Issues
- Conclusions

What are Mayzo's TPR Products?

- **Highly loaded and pre-dispersed pellets of antioxidant, UV, HALS, OB and pigments in a thermoplastic elastomer (example SIS rubber)**
- **Free flowing**
- **Dust free (no dust from stabilizer. Pellets are dusted to prevent blocking)**

Advantages of TPR Products

- **Increased Processing Efficiencies**
  - **Reduced handling time**
  - **Increased product dispersibility in twin screws & sigma mixers**
  - **Compatible with standard antioxidant metering equipment**
  - **Minimal screw slippage**
  - **Dry and dust free (small amount of dusting agent is used on pellets to keep them from blocking)**
  - **Compatible with other SIS thermoplastic elastomers such as Kraton 1161, Zeon 3620, Enichem ST-190, and Dexco Vector 4113**

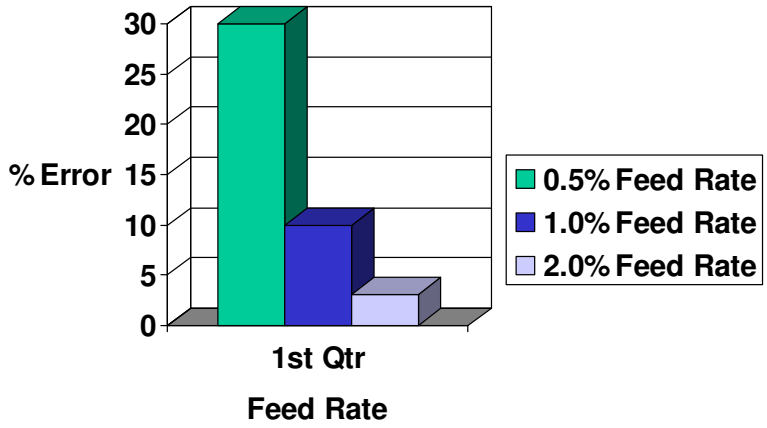
Advantages of TPR Cont.

- **Can be used in conventional extruders and mixers to achieve a uniform dispersion of the antioxidant in adhesive and plastic resins**
- **Accurate Dispensing in Loss-In-Weight Feeders (I.e. K-tron)**
  - **Uniform size & shape**
  - **Pellets durable enough for air conveying without break-up**
  - **High melt resistance – non-bridging and non-blocking**

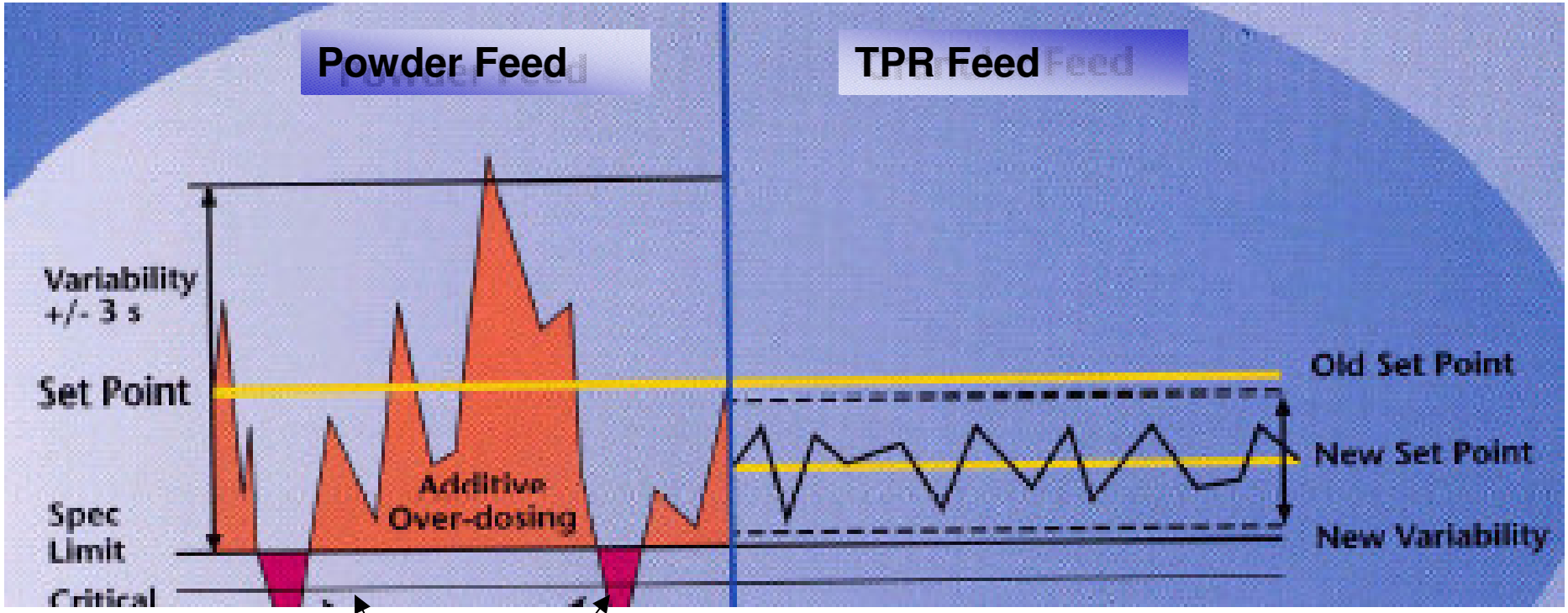
Free Flowing TPR Pellets

Reduced Variability

- Variability decreases with increasing concentration from 30% @ <0.5 Conc. To under 3% @ 2% Conc.
- Lower Powder Loading = Higher production variability



Reduced Variability with Loss in Weight feeders



Health and Safety Advantages for TPR Products

- **Reduced Health Hazards**
  - **Caused by dust inhalation**
  - **Caused by prolonged skin contact**
- **Reduced Fire and Explosion Hazards**
  - **Caused by electrostatic charge build-up – no powders**

Summary of Current TPR Products

TPR Grade	AO Package & Loading	Rubber
BNX 5010 TPR	50% BNX 1010	SIS
BNX 1225 TPR	45% BNX 1225	SIS
TM 65054	Proprietary blend of AO's and pigments	SIS
MPM 2501	Proprietary blend of pigments	SIS

Mayzo can custom tailor to meet your specific needs.

Note: BNX 1225 is a 50:50 blend of BNX 1010 and Benefos 1680

Examples of TPR blends in various polymers. (benefits are analogous to other polymers)

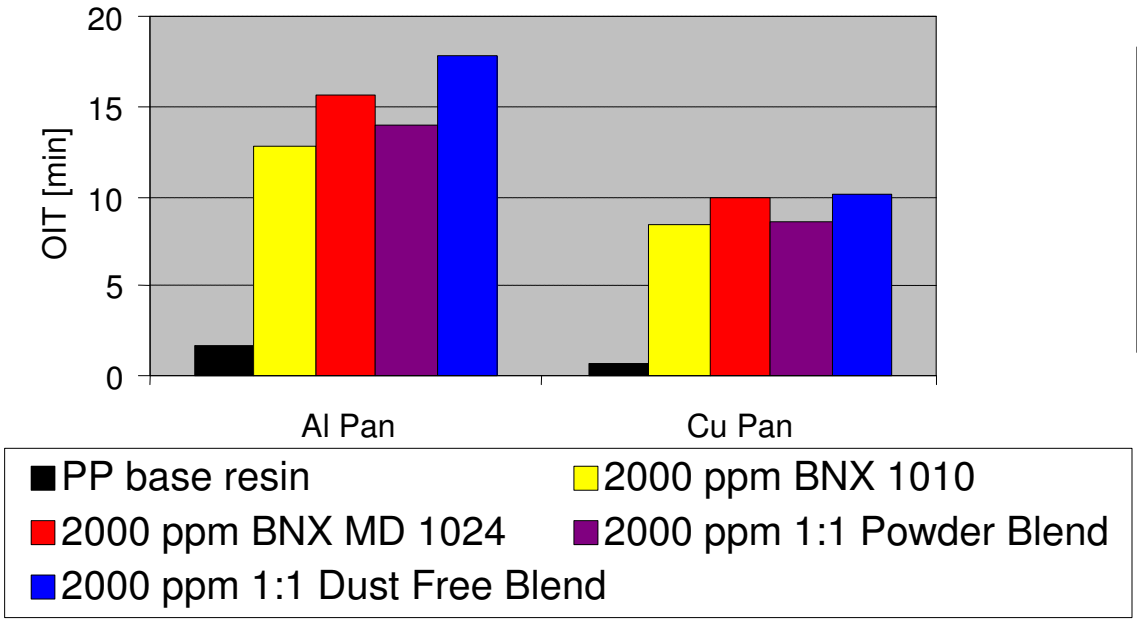
- More efficient use of antioxidant as shown in OIT
- Greater processing stability
- Reduced additive usage.

Application Data

Stabilization of Polypropylene W&C - OIT of Dust Free Blend vs Powders

Formulation: Polypropylene + BNX 1010 / BNX MD 1024 Powder and Dust Free Blend

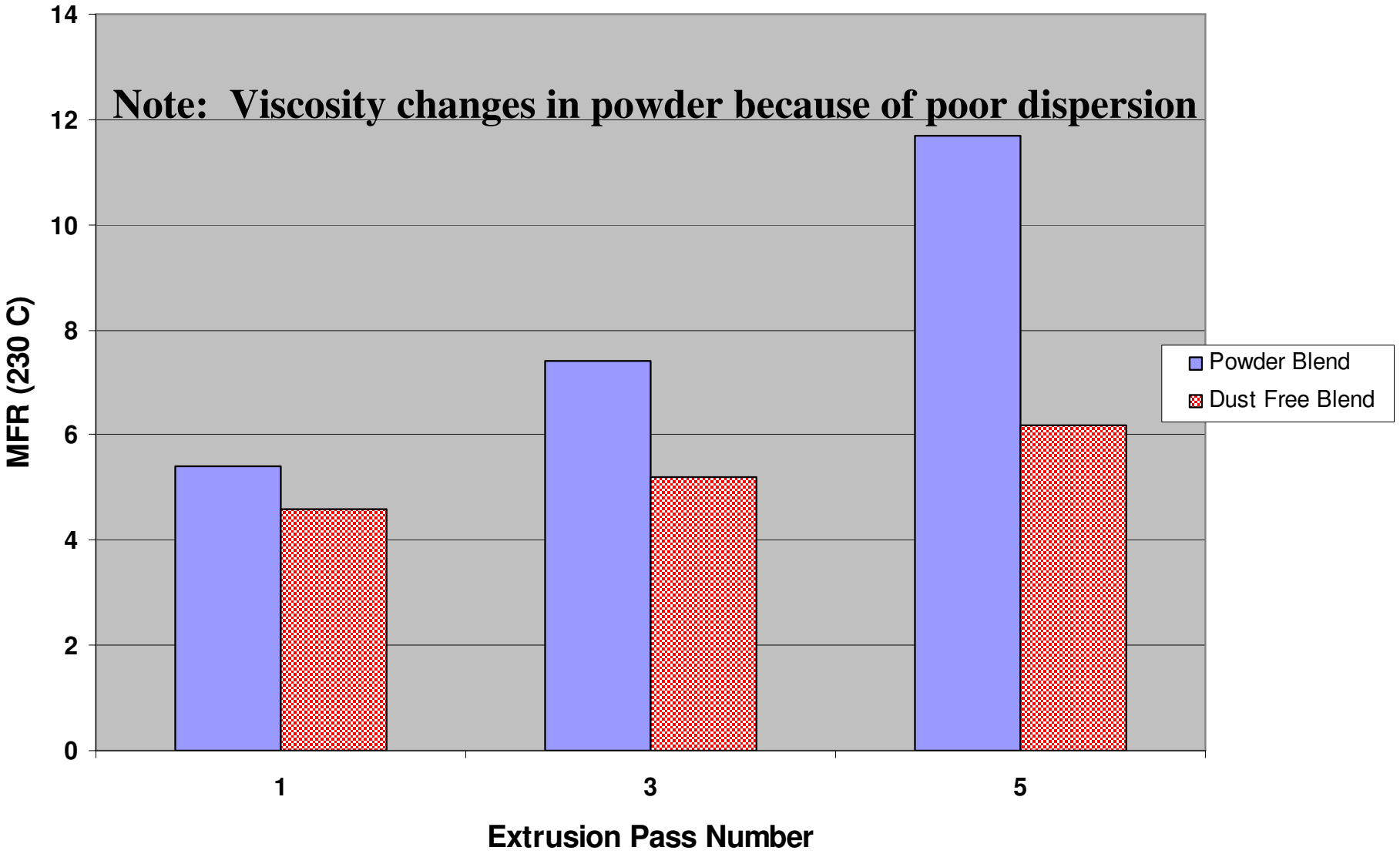
Test Method: Oxidative Induction Time (OIT) in Al and Cu-pans at 210°C



- Additive Effect when using a 1:1 Powder Blend in PP

- Performance Enhancement (Synergy) when using 1:1 Dust Free Blend in PP

Melt Flow Stability Powders vs Blends in a Phenolic/Phosphite Stabilized PP

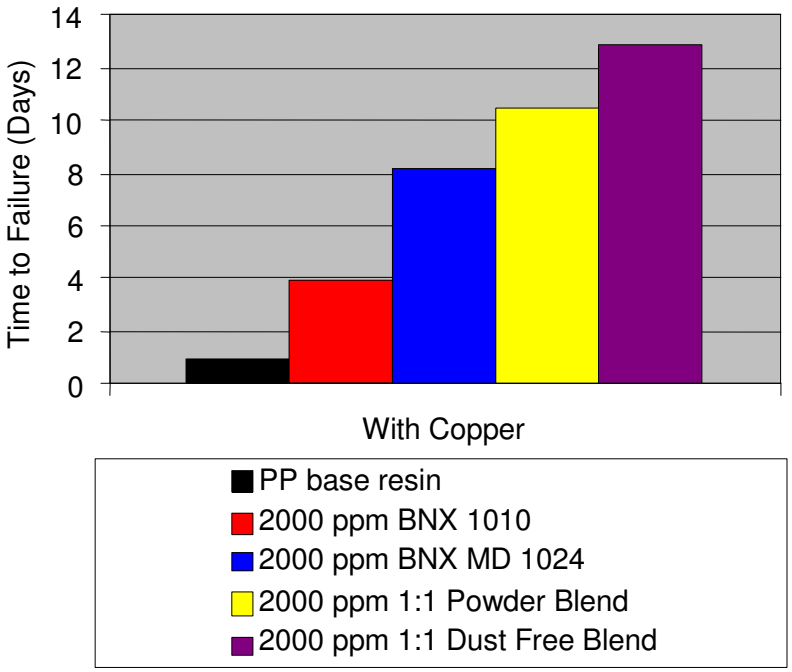


Application Data

Stabilization of Polypropylene W&C - Oven Aging of Pre-Blends vs Powders

Formulation: Polypropylene + BNX 1010 / BNX MD 1024 Powder and Dust Free Blend

Test Method: Oven Ageing at 150°C of 1 mm plaques containing Copper



- BNX MD 1024 > BNX 1010

- BNX 1010 / BNX MD 1024 Blends are Synergistic

- Performance Enhancement when using 1:1 Dust Free Blend

Dusting and Blocking Issues for TPR's

- **The SIS rubber received by Mayzo contains <= 1% precipitated amorphous silica as a dusting agent**
- **After compounding to make the TPR this silica is no longer available, and additional dusting agent must be added**
- **The blocking of TPR pellets has been an ongoing problem for Mayzo, especially during the summer months and when full gaylords sit for extended periods of time**

Current Dusting Agents Used in TPR's

Material	Packaging	Dusting Agent
BNX 1225 TPR	50 lb bags stacked in Gaylord	0.5% micronized PE
BNX 5010 TPR	900 lb Gaylord	1.25% micronized PE
BNX TM65054	50 lb bags in carton	2% Aluminum Trihydrate
MPM 2501	80 lb drums with inner PE liner	0.3 % micronized silica

Conclusions

- **The use of pre-blends gives more accurate additive dosing and simplified additive handling**
- **TPRs (Pre-blends) assure the proper ratio of synergistic additives and dispersion throughout the polymer**
- **Pre-blends result in improved processing stability.**
- **With TPR's you can optimize additive loadings resulting in:**
  - **Less off spec**
  - **Less variability**
  - **Improved Processing**
  - **Saving $$$**