WPC Technology. Global Manufacturing, Markets & Trends

Wood Innovations 2014

Struktol Co. of America
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Struktol Company of America

- Member of the Schill & Seilacher family of companies. Founded in 1878
- Manufacturing in:
  - Stow, OH
  - Hamburg, Germany
  - Böblingen, Germany
  - Pirna, Germany
- Representation in over 100 countries around the world
Struktol Company of America

- Products can be found in plastics and rubber as well as man-made fibers, textiles, leather, paper products, cosmetic products and wood plastic composites.
- Plant in Stow Ohio: Started in rubber additives in 1979 and is where plastics processing additives are produced.
- Approximately 120 employees at this location.
Struktol Company of America

- Additives, processing aids, homogenizer, and coupling agents for:
- PP, PE, PS, PET, Nylon, PC, ABS, PBT, PVC and other polymers.
- Largest sales in Wood Plastic Composites but much growth in polyolefin compounds, engineering plastics, and recycling of all plastics.

Powder forms are also available for most of our additives:
China

- By far largest market outside of USA.

- 2 major consolidations this years. The largest with a mid size one and two mid size companies.

- Chinese production has regained the decreases seen in 2013

- China now has at least 3 manufactures making capstock decking
Europe

- Starting to see capstock production
- Capstock slower to gain acceptance
- A PP/WPC manufacturer in Turkey is out of the WPC business

South Korea

- Govt. spending in WPC in public areas significantly down.
- Peak production in 2011 was estimated at 24,000 MT
- Approx. 30% drop in 2013
- 2014-2015 volumes should be better than 2013 at 17-18,000 MT
Latin America

- Saw significant increases in WPC production. Albeit at much lower relative volumes.
- Mexico: 2 manufacturers
- Colombia: 1 manufacturer set to start up later this year.
- Argentina: Sourcing equipment but may start soon.
- Bolivia: Existing plant due to restart.

Mexico to start capstock trials soon

Middle East

- Capstock becoming more important as UV stability needs to improve
- Lebanon has some production as well as Dubai

India

- India has at least 30 producers
- Still working on specifications
Trends around the world

Latin America

- Focus on products other than decking
- Using materials other than wood flour… coffee bean husks, paper, tetrapak, etc.
- Combining organic and inorganic fillers like ground rubber
Example of LLDPE + HDPE WPC Extrusion Process

WPC+LLDPE + HDPE
Latin America

Tetra-pak
LLDPE Scrap

Agglomerator
WPC + LLDPE + HDPE

Wood Flour-40-60 mesh

LLDPE Scrap

Picture of compounding extruder outlet-no die

WPC + LLDPE + HDPE

Temperatures

65mm extruder
WPC+LLDPE + HDPE

Roofing Profile

Die
Formula contains 55% wood flour and 3.5% TPW426 lubricant

Latin America-Coffee Husks

WPC used for entire house
Latin America
Coffee Husks

Latin America

75% ground rubber (tires)
4.5% Struktol Lubricant
4.5% Struktol Homogenizer
16% Mix of LLDPE, HDPE, PP, Paper
Capstocks

Co-extruded surface layer to protect WPC profiles with high quality raw materials.

Initial rejection of a “plastic” looking capped deckboard in US market has largely been overcome with low gloss surfaces and high quality color effects.

Because of US acceptance of capped deckboard other countries are starting to follow this lead, i.e. China and now Europe.
No Capstock
Eliminating the “plastic” look of some capstocks by reducing shine and using advanced colorants.
Capstock
Capstock

SA1242 Capstock
Capstock

Taber 5 finger scratch and mar tester
Scratch Test
- 1mm Tip
- Values in Newtons

- Regular HDPE Capstock
- Engineered HDPE Capstock
Taber 5 finger scratch and mar tester

Capstock

- Color, UV and other additives can be added by the customer.
Capstock formulations can very flexible

- Custom for specific application or customer.
- Excellent Adhesion to substrate.
- Flame retardant versions.
- Low gloss/High gloss versions.
- Scratch resistant.

SA1221 - Capstock

- Regular Capstock
- SA1221 Capstock with Flame Retardants
Capstock Weathering

Weathering Data: 4,000 hrs. Xenon Arc
Test SCSO-3
PE Based WPC samples
Report No. 8

<table>
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<th>Sample</th>
<th>L*</th>
<th>a*</th>
<th>b*</th>
<th>L*</th>
<th>a*</th>
<th>b*</th>
<th>E*</th>
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<td>0.4</td>
<td>0.1</td>
<td>0.0</td>
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Original | Present | Delta

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Sample L* a* b* L* a* b* E* C* H*
Top View

Capstock - Missing UV
Low Cost Lubes for WPC

SA1114 – Low Cost Lube

- Darker color is still acceptable in WPC
- For core-stock part of profile where color is not an issue.
SA1149

- Darker color is still acceptable in WPC
- Originally designed for use in core part of capstock profiles where color is not an issue.
- In reality darker color has minimal impact on color of final profile.

HDPE/WPC-
Pine wood flour 60%
4%
Lubricant