



WELLMAN, INC.

Post Consumer Nylon for Automotive Applications in Emerging Markets

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True or false: A pop quiz

T or F Automotive will be one of the fastest growing market segments in the BRIC / emerging market countries.

T or F The lower the cost and price of the vehicles, the faster the market will grow in each country.

T or F We have traditionally used plastics to replace metals as a way of reducing cost.

T or F There is concern today about the rising cost of plastics due to the rising cost of oil since the cost of plastics are tied directly to the cost of oil.



Two concerns about the cost of plastics in the future

- (1) The obvious concern is about the cost of feedstocks since benzene, cyclohexane, butadiene and other basic chemicals that are the building blocks for plastics all come from oil, and the price of these chemicals all track the price of oil.

- (2) The not-so-obvious concern that might be even bigger is that the Middle East has finally discovered “value added.”
 - (a) Why ship oil around the world and have others produce these chemicals when they can be produced in the Middle East for “value added?”

 - (b) As a result of this new thinking, the whole chemical industry is in the process of moving to the Middle East.



That is why we are seeing headlines like this:

- Dow-Aramco will have a \$22 billion joint venture on line by 2012 to produce 300 petrochemical products in Saudi Arabia
- Exxon Mobil-Qatar will have a \$3 billion joint venture on line by 2012 to produce a wide variety of petrochemicals in Qatar

So plastics will be more tied to the Middle East and OPEC in the future than today.

The sheiks will get richer faster due to value-added.

Grow auto industries faster: Decouple the cost of plastics from the cost of oil.

- (1) One approach has been to try bio-plastics from renewable sources like corn, but:
 - (a) these products are still way too expensive
 - (b) they normally do not have high enough heat resistance for under-the-hood applications
 - (c) today there is fear they will drive up the cost of food in the future and add to global starvation.

- (2) However, there is a second low cost approach that Wellman is already using that:
 - (a) essentially decouples the cost of nylon and polypropylene (the two big under-the-hood plastics) from the cost of oil.
 - (b) has no connection to the Middle East

What is that second approach?

Use post-consumer carpet as the raw material for injection molding resins.

- (1) Collect the used carpet from homes, offices, and hotels
- (2) Sort the carpet by type:
 - (a) Nylon 66
 - (b) Nylon 6
 - (c) Polypropylene
 - (d) other
- (3) Remove the nylon from the carpet by a special patented process
- (4) Extrude the nylon into injection molding resin by adding mineral, glass, or other additives.
- (5) Sell this nylon injection molding resin to injection molders in the BRIC countries who make car parts.



For example:

Here are three nylon under-the-hood automotive applications that are in production in Wellman resin that use 100% nylon carpet as the raw material:

- (1) The Volkswagen cam cover, produced by Mann & Hummel
 - (2) The Ford air cleaner housing, produced by Visteon
 - (3) The GM fan and shroud, produced by Bosch
- All three are different Wellman mineral/glass molding resins each tailored for that particular application.
 - All three meet the same auto specifications as virgin or chemical based resins from major virgin nylon producers.

All three are lower in cost than virgin!

But is there enough used carpet out there as a raw material?

The Carpet America Recovery Effort at www.carpetrecovery.org (called CARE) is an organization dedicated to recycling carpet:

- (1) they estimate that the USA landfills 5 billion pounds per year of carpet today.
- (2) They estimate that the 5 billion pounds per year will become 6 billion pounds per year in five more years.
- (3) There is enough nylon carpet thrown away every year in the USA to supply a nylon injection molding market more than 2.5 times larger than what all of North America is using today.

So there is an unbelievable amount of carpet available so that no one can control it (like OPEC)!!!

The major companies producing carpet are also being forced to take it back when new carpet is installed so a collection infrastructure already exists.

US is “Carpet Mine” of the World

- We think of this 5 billion pounds of used carpet that is being land-filled every year as “a natural resource”.
- So the USA is really the “carpet mine for the world.”
- Using this “natural resource” to make lower cost car parts is a very practical solution for dealing with this unwanted carpet.
- Wellman has sold over 170 million pounds of mineral/glass nylon molding resin using post consumer carpet as a raw material in the last 12 years without one quality-based incident.
- With this “carpet-to-car parts” approach, everybody wins!



In conclusion

- (1) Wellman has been recycling post industrial nylon for 50 years and post consumer resin from used carpet for about 12 years. We are the only ones recycling post consumer carpet into injection molding resins that we know of today.
- (2) We have proven that one does not have to start with virgin resin and then switch to post consumer resins. We have been starting new applications with 100% post consumer nylon from carpets since the properties of mineral / glass nylon based on virgin and based on carpet are the same.
- (3) Because of the cost pressures in emerging markets and the importance of lower cost plastics for growth of their auto markets, we believe resins decoupled from the cost of oil have an outstanding future in emerging markets!





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Questions?

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Thank you for attending TEMPI 2008