

Sustainable and Environmental Friendly Practices

A Clear and Sustainable Commitment to Nature



PWP Earth's Pack™ Environmental Solutions

What is Earth's Pack ? - PWP's green product offerings and company wide green efforts. They include:

- **Post Consumer Resin** -
 - Manufacturing products using post-consumer PETE.
 - Products made from post-consumer recycled waste have six times the environmental benefit of virgin resin.
 - PETE #1 most recycled plastic.
 - Reduces resin destined for the waste stream.
- **Tamper-Resistant™** - Innovative packaging in shades of green. Unique for its exceptionally secure closure. It keeps food safe from tampering, and eliminates the need for shrink bands or shrink wrap, thereby reducing waste in our landfills.
- **Eco-Team™** – Employees from all areas within the organization have formed to further our efforts in being environmentally conscious. PWP is dedicated to making our Eco-Team and its fundamental goals a part of our business.
- **AgroResin®** - 100% biodegradable and 100% compostable. Material made of renewable agricultural biomass fiber composite.

Look to PWP for other sustainable product offerings in the future

Source: Going Green, Restaurant Business Feb. 2007

- Confidential -

How we Define Sustainable Packaging:

- *Sustainable packaging meets the needs of the present without compromising the ability of future generations to meet their own needs.*

PWP's Focus is Clear:

- *To make the best packaging on the market with an unequalled commitment to the environment. Products are made from recyclable materials, with the majority of packaging being PETE, the most recycled plastic available.*

PWP Environmental Initiatives



- **Eco-Team™** – Employees from all areas within the organization have formed to further our efforts in being environmentally conscious.

Mission:

- Educate our customers and ourselves on Sustainable Packaging
 - Collaborate with our customers on environmentally friendly packages
 - Originate ideas to reduce waste within our organization
 - Team with local communities to improve recycling initiatives
 - Energetically pursue sustainable packaging alternatives
 - Analyze our results against specific goals and objectives
 - Master the 3Rs of Environmental Sustainability:
 - Reduce
 - Reuse
 - Recycle
-
- **Member of the American Chemistry Council (ACC)** - Represents companies that make products that make modern life possible, while working to protect the environment, public health, and the security of our nation.

PWP Environmental Initiatives (7 R's of Packaging)

- **Remove Packaging**
 - PWP maximizes the amount of containers per carton and cartons per pallet in order to minimize the amount of packaging and fuel used to ship our products.
- **Reduce Packaging**
 - PWP works in collaboration with our customers to design and provide “right-size” packages for their food applications to reduce the product-to package ratio.
- **Reuse Packaging**
 - Through design, PWP is able to provide consumers packaging that can be re-used around the home.
- **Renew (able) Packaging**
 - PWP's AgroResin® products are made of renewable agricultural fiber.
- **Recycle (able) Packaging**
 - Manufacturing products using post-consumer PETE.
 - Products made from post-consumer recycled waste have six times the environmental benefit.
 - PETE #1 most recycled plastic.
 - Reduces resin destined for the waste stream.
 - Using corrugated boxes with 65% recycled content.
- **Revenue**
 - By designing packages with the least amount of plastic needed, our customers and our company are able to reduce costs and increase revenue.
- **Read (Education)**
 - PWP's Eco-Team™ educates our customers and ourselves on Sustainable Packaging.
 - Educational Environmental Advertising Campaign.
 - Attending seminars given by the Sustainable Packaging Coalition.

PWP Operations -

- The manufacture, use and disposal of PETE packaging materials involve fewer resources and creates less waste compared to alternative packaging materials.
- We use AC motors on our extruders to reduce electricity.
 - A typical motor can consume 10 to 20 times its cost per year in energy, making the payback period for installing a drive often less than two years.
 - Decreases energy consumption by as much as 50%.
- We use compact florescent lights (CFLs) which use at least two-thirds less energy than standard incandescent bulbs and last up to 10 times longer.

PWP Environmental Initiatives

PWP Texas Plant

- Started Operation August 2006
- Reduced shipping distance to customers -
 - 1120 Loads in 2006
 - 1000 miles per load saved
 - 1,120,000 miles
 - 5 miles per gallon
 - 224,000 gallons of diesel fuel saved (fuel, emissions, etc.)
 - At \$2.80 per gallon saved \$627,200 in Diesel fuel



PWP: A Clear and Sustainable Commitment to Nature



A Clear and Sustainable Commitment to Nature

PETE, the world's most recycled plastic, helps the environment—and you.

PWP's mission is clear: to make the best packaging on the market with an unequalled commitment to the environment.

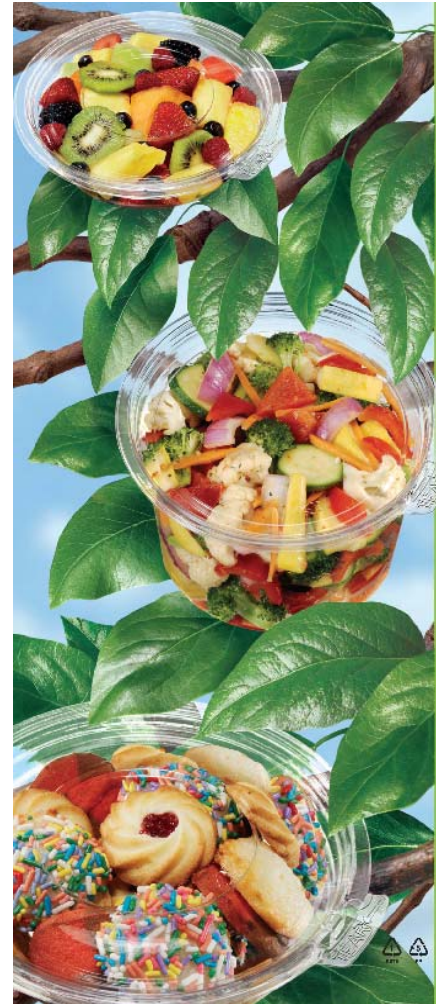
Both objectives are accomplished by using post-consumer PETE, a material made from the billions of water bottles discarded into recycling bins each year. And our active Eco-Team™, a group of cross-disciplinary employees, continually works to develop ways to reduce waste and enhance community recycling.

It all comes together to make sure our mission is clear. And sustainable.

For more information and a free sample, call 877-700-0330.
www.pwpindustries.com

PWP **eco**
 PACKAGING WITH PERFECTION™ AN HPC COMPANY | PWP EcoTeam™ Making beyond today.

© 2007 PWP Industries 



Innovative Packaging Solutions in Shades of Green

Whether it leads to the perfect container or a healthier environment, it bears fruit.

You have packaging concerns; we have solutions. We listen to what you need and use experience and creativity to solve specific problems.

One example of PWP's creativity is our Tamper-Resistant™ packaging, unique for its exceptionally secure closure. It keeps food safe from tampering, and eliminates the need for shrink bands or shrink wrap, thereby reducing waste in our landfills.

It's a clear solution. In shades of green.

Make us your partner in innovation.
 Call 877-700-0330.
www.pwpindustries.com

PWP
 PACKAGING WITH PERFECTION™
 AN HPC COMPANY

eco **SFI**
 FSC® C010882
 www.pwpindustries.com

© 2007 PWP Industries 

Packaging Material Comparison

<u>Attribute</u>	<u>PETE</u> 	<u>PP</u> 	<u>AgroResin®</u>	<u>* OPS</u> 	<u>* PLA</u> 
<u>High Temperature</u>	Fair	Good	Good	Fair	Poor
<u>Low Temperature</u>	Excellent Frozen, Excellent Refrigerated	Good Frozen, Good Refrigerated	Good Frozen, Good Refrigerated	Poor Frozen, Fair Refrigerated	Poor Frozen, Fair Refrigerated
<u>Clarity</u>	Excellent	Fair	N/A	Excellent	Excellent
<u>Moisture Barrier</u>	Good	Excellent	Excellent	Poor	Poor
<u>Oxygen Barrier</u>	Excellent	Fair	Fair	Very Poor	Poor
<u>Greases/Oils</u>	Fair	Excellent	Good to Excellent	Fair	Poor
<u>Density (g/cc)</u>	1.33	.90	.45 - .75	.96	1.24
<u>Recyclable</u>	Excellent	Good	Compostable, Biodegradable	Fair	Compostable
<u>Microwaveability</u>	Poor	Excellent	Excellent	Poor	Very Poor
<u>Oven Proof</u>	Very Poor	Poor	Poor	Very Poor	Very Poor
<u>Heat Distortion Temp °F</u>	158	200-240	275	170	105

Packaging Material Comparison

Plastic Food Packaging Raw Materials

	Amorphous PET (APET)	Crystalline PET (CPET)	Polypropylene (PP)	AgroResin®	Oriented Polystyrene (OPS)	Expanded Polystyrene Foam	High Impact Polystyrene
Appearance	Clear	Opaque	Moderately Transparent	Natural Brown and Colors Available	Clear	Opaque	Opaque
Heat Resistance	Poor	Excellent	Good	Good	Poor	Good	Poor
Cold Resistance	Excellent	Good	Good	Good	Good	Good	Good
Rigidity	Moderate	Good	Good	Good to Excellent	Excellent	Good	Good
Advantages	<ul style="list-style-type: none"> • Good chemical resistance • Excellent taste and odor properties • Best resin in cold temperatures; crack resistant 	<ul style="list-style-type: none"> • Stable at high temperatures • Good impact strength • Good oxygen and water barrier • Ovenable 	<ul style="list-style-type: none"> • Good resistance to fatigue • High heat resistance 	<ul style="list-style-type: none"> • Biodegradable • Sustainable • Compostable • Can design and combine attributes to meet specific needs 	<ul style="list-style-type: none"> • Easy to process • Easy to print on • Inexpensive 	<ul style="list-style-type: none"> • High heat and cold retention • Strong • Lightweight • Inexpensive 	<ul style="list-style-type: none"> • Inexpensive • Easy to process • Easy to print on

Source: LEK Consulting

PETE Benefits

- PETE, the world's most recycled plastic
 - “Closing the Loop”
 - Using post-consumer (recycled PETE) and pre-consumer recycled resin
 - Products made from post-consumer recycled waste have six times the environmental benefit
- Reusable for many applications around the home
- *Listed by Wal-Mart/Sam's as a preferred plastic material
- Superior clarity
- Increased durability
- Great temperature performance
- Great barrier characteristics (increases shelf life)
- Reduces resin destined for the waste stream
- Material Health: Minimizes greenhouse gases, energy, water, toxins and emissions

PLA Attributes

- Poor recyclability
 - PLA cannot be recycled along w/ other recyclable plastics
 - PLA is compostable, however industrial compost sites do not exist
- No available resin supply
- Cracks when frozen
- Does not handle heat well. Deforms when exposed to temperatures in excess of 105°F
- Requires refrigerated shipping
- Requires a temperature sensitive storage facility
- Product packaging must be maintained in a refrigerated environment
- PLA is more permeable to liquids and thus food weeping may occur

AgroResin®

Sustainable Packaging

AgroResin® Sustainable Packaging

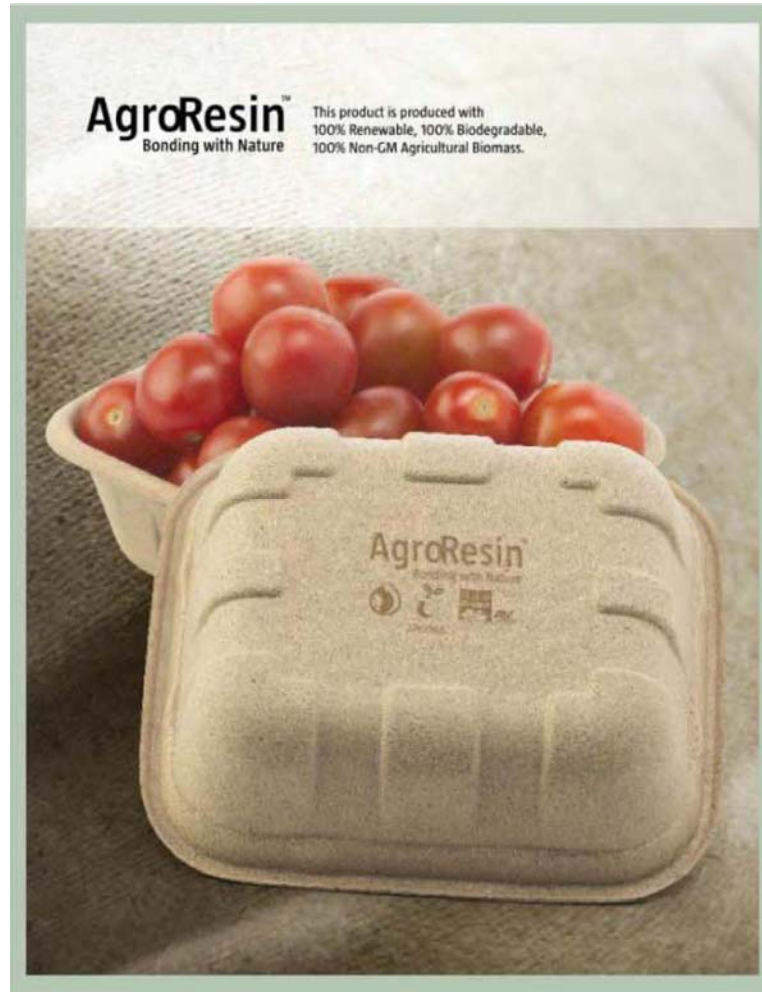
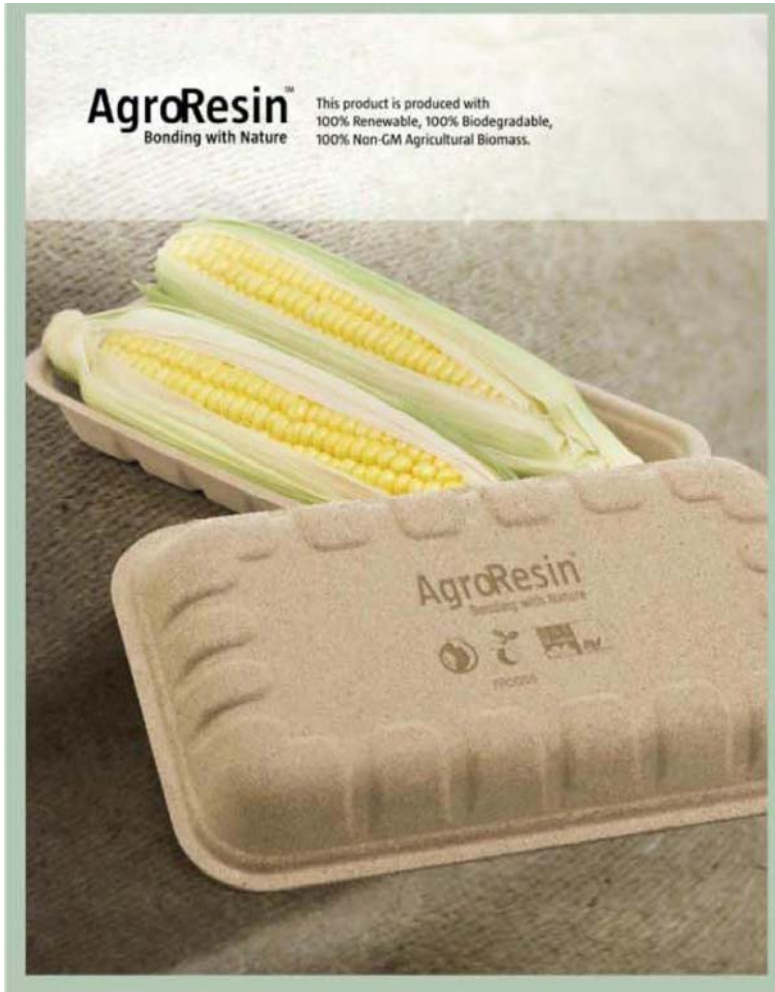
- 100% biodegradable, 100% compostable.
- Provides a cradle-to-cradle packaging solution. Derived from a renewable agricultural biomass fiber composite that used to be considered a waste product and incinerated or land filled. Now it is made into packaging that, after displaying and protecting products, returns to earth when composted.
- Reduces the ecological footprint of the packaging by closing the loop and returning to earth.
- Minimizes the environmental impacts associated with the disposal of the former waste product.
- FDA approved for DIRECT food contact.
- Natural “earthy” brown look and feel compliments your fresh food products.
- Perfect for a wide variety of applications.
- Microwaveable.



AgroResin® Sustainable Packaging

- Presents well due to natural earthy color, fibrous texture.
- Protects fresh produce due to its stiff and durable structure.
- Extended shelf-life due to porosity allowing produce to breath.
- Gas permeable yet water resistant.
- Avoids bruising of produce due to fibrous surface.
- Automation capable due to its excellent de-nesting feature.
- Cost competitive compared to molded virgin pulp.
- Promotes sales via private label as it is compatible with flow-wrap and shrink-wrap.
- Lid embossing is available for promotional logo opportunities.
- Promotes corporate social responsibility as it is made of renewable raw material.

AgroResin® - Bonding With Nature



AgroResin® Product Line

Products		Product Description	Dimension L x W x H
BT1		Square Fresh Produce Tray	5.31" x 5.31" x .98"
BT3		Rectangular Fresh Produce Tray	8.85" x 5.31" x .98"
BT8		Square Fresh Produce Tray	6.22" x 6.22" x .98"

Prototypes



AgroResin® Fresh Produce Packs



- Bananas
- Broccoli
- Corn
- Cucumbers
- Zucchini
- Apples
- Pear
- Avocado
- Tomatoes
- Plums
- Mushrooms

AgroResin® Business: A Challenging and Exciting Journey

- First in the world to commercialize molded palm fiber composites packaging containing 100% non-chemical processed palm fiber with a proprietary starch binding agent.
- Initial product launch was in 2002 in Carrefour Singapore.
- Organic fresh produce pack was launched in 2004 at selected stores in Sainsbury UK.
- Full-scale commercialization of AgroResin business in Malaysia was challenged by lack of supply and high cost of conversion of palm fiber.
- Strategic decision made to shift AgroResin business to China given available agricultural residue there.

Who is Who in the Scene

Company	Country Origin	Business	Materials	Products
Pactiv	USA	manufacturer	molded recycled pulp	<u>omnipack</u> : fresh produce, cushion pack, egg trays
Huhtamaki	Finland	manufacturer	molded recycled & virgin pulp	<u>Chinet</u> : disposable foodware & lunch trays; serviceware recycled pulp: cup carriers; produce trays
Roots Biopack	HK/China	manufacturer	molded pulp from sugarcane	<u>roots</u> : fresh produce
Natura Packaging	Dutch	distributor	molded pulp from sugarcane	<u>natura</u> : fresh produce
Biocorp	USA	distributor	molded from virgin sugarcane & biopolymer	disposable food service wares
NFP	Canada	distributor	molded pulp from EFB of oil palm	<i>NFP</i> : food serviceware, carryout boxes, cutlery, trays
Earthcycle	USA	marketing rep	molded pulp from EFB of oil palm	<i>earthcycle</i> : fresh produce, nuts, take-away food
NNZ	Dutch	distributor	all sorts	agricultural produce packaging of all sorts
Cereplast	USA	packaging manufacturer	PLA blend	<u>Nat-Ur</u> : thermoforming
Biosphere	USA	packaging manufacturer	baked starch/fiber packs	produce packs
Eatware	HK/China	packaging manufacturer	starch/fiber composites	food service ware
COOPBOX	Italy	packaging manufacturer	thermoplastic starch	<u>coopbox/naturebox</u> : thermoforming
Metabolix	USA	resin manufacturer	PHA	<u>mirel/telles</u> : thermoforming, injection, extrusion
NatureWorks	USA	resin manufacturer	PLA	<u>Natureworks PLA</u> : films, thermoforming, extrusion
Novamont	Italy	resin manufacturer	thermoplastic starch	<u>Materi-Bi</u> : carrier bags, thermoforming, extrusion
Plantic Technology	Australia	resin manufacturer	thermoplastic starch	<u>Plantic</u> : thermoforming
Symphony Plastics	UK	additive & packaging manufacturer	pro-degradant additives & oxo-degradable plastics	<u>Symphony</u> : thermoforming
EPI	Canada	additive manufacturer	pro-degradant additives	<u>EPI</u> : thermoforming

Biodegradable vs. Compostable

Biodegradable (Biodegradation) :

Is the process by which organic substances break down naturally into carbon dioxide, water and organic matter as a result of exposure to micro-organisms. A biodegradable material must be exposed to moisture, heat and micro-organisms to biodegrade. The time it takes to “degrade” or return to its natural (safe) state depends on how much exposure it has to these three factors, as well as size and type of the material.

Compostable (Compostability) :

The ability for a product to break-down when introduced into a composting or waste site (e.g. land-fill). The lack of oxygen for buried products can delay or limit the breakdown of many products. This term refers to the ability of the product to return to its natural state in a compost heap.






1. The American Society for Testing and Materials (ASTM) defines materials as compostable if they can degrade in a compost site.
2. They must break down into carbon dioxide, water and organic matter at a similar rate to other naturally occurring materials (e.g. cellulose in plants).
3. Disintegration is important - the resulting particles must be very small.
4. They must also leave no toxic residue. The compost must not contain heavy metals or other toxins, and be useful as organic fertilizer.

Q: What is the difference between biodegradability and compostability?

Biodegradable material is not necessarily compostable, as the residue may be toxic and is, therefore, not considered compostable.

Compostable materials leave no toxic residue and therefore, the resulting humus is a safe and healthy contribution to soil.

Global Biodegradable & Compostable Certification Scheme

Association	European Bioplastic	Biodegradable Plastics Institute/ US Composting Council	Vincotte	Finnish Solid Waste Association	Japan Bioplastics Association
Name	Compostability	Compostable	OK Compost	The Finnish Apple	GreenPla
International recognition					
Standards	EN 13432 ASTM D6400 ISO 17088	ASTM D6868 ASTM D6400	EN 13432	EN 13432	Biodegradability according to Japan and international standard
Countries	Germany Switzerland, Netherlands, UK Poland	USA Canada	Belgium France	Finland	Japan

Biodegradable & Compostable in Compliance with:

- **Biodegradable Products Institute (BPI):**
 - The BPI's certification demonstrates that AgroResin® products meet the American Society for Testing and Materials (ASTM) D6868 standards and will biodegrade completely and safely.
- **German Institute for Standardization (DIN)**
- **OK COMPOST:** The OK Compost mark guarantees that the material of a product can be composted in an industrial plant or in a private household's compost.



Certified by the FDA for Use in the Food Service Industry:

- 21 CFR 176.170 (Components of paper and paperboard in contact with aqueous and fatty foods)
- 21 CFR 176.180 (Components of paper and paperboard in contact with dry foods)
- Tests conducted for clearance of heavy metal, microbiological, pesticides and herbicides, dioxin

AgroResin® - Technical Specifications

AgroResin® is a registered trademark of Grenidea Technologies	
Materials	: lignocellulose composites
Color	: natural fiber, earthy; colored products can be made upon request
Appearance	: fibrous texture
Air permeability	: porous
Thickness	: 0.6 – 1.2 mm
Density	: 0.45 – 0.75 g/cm ³
Temp tolerance	: - 13 °F - 275 °F
Water absorption	: Cobb ₁₂₀ < 25g/m ²
Sealing	: shrink wrap / flow wrap / lid / lamination seal
Printing	: embossing prints; printing
Shelf life	: 12 months
Food contact	: FDA 21 CFR 176.170/176.180
	: Directive 80/590/EEC & 89/109/EEC, BfR (German recommendation XXXVI)
	: Reg No 25080 U 07
Biodegradability & compostability	: Biodegradable Products Institute (BPI) ASTM D6868
	: European Standard DIN EN13432:2000-12, Reg No 7P0066
	: OK Compost Reg No O 06-112-B
The product is authorized to carry international recognized sustainable logos shown below	

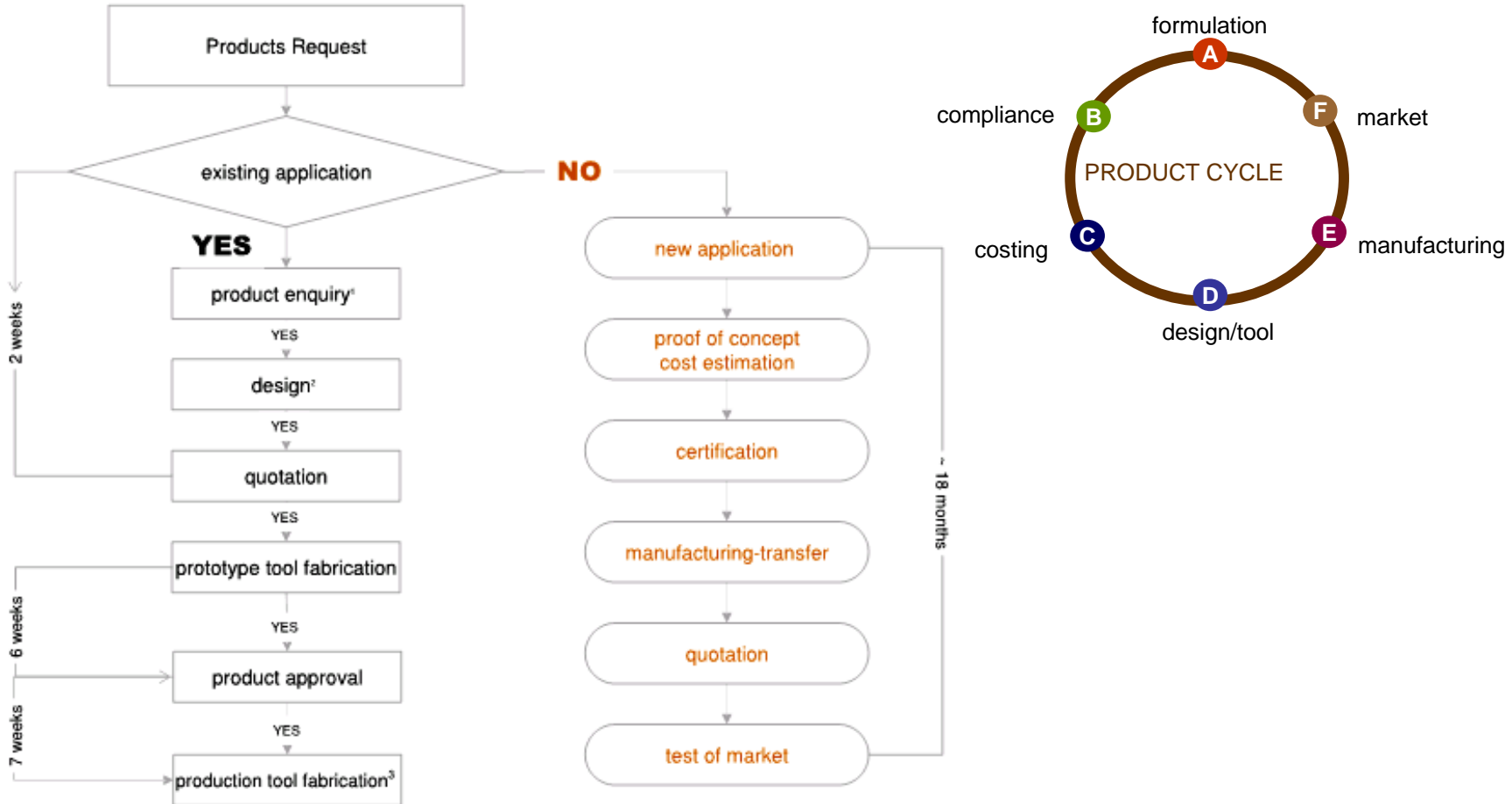
Inspection Item	Quality Criteria
Appearance	uniform fiber texture and natural fiber color no dark patches
Tear & Delamination	no tear & no delamination
Crack & Hole	no cracks & no through hole
Rim	clean cut
Water resistance	no seeping & no leakage in exposure to water for 24 hrs at 41°F and 75% RH*
	* Application of AgroResin® fresh produce trays is shelf-proved in selected stores of US and Australia under conditions of 41 - 46°F and 75% RH for a period up to 3 days



- Confidential -



Product Turnaround Time



- Notes:
1. upon submission of fully furnished product enquiry form
 2. feedback to design proposal within 2 working days
 3. leadtime for production tool fabrication is benchmarked to monthly capacity of 1 million

PWP Environmental Initiatives

- In conclusion, PWP is and has always been committed to being environmentally responsible.
- PWP is making our Eco-Team™ and its fundamental goals an integral part of our daily business.
- PWP can be your partner as the marketplace moves towards more environmentally friendly packaging solutions.
- Together, we will contribute to a better tomorrow.

