P3N TECHNOLOGY Inc.

NEW MICRO HEMP FIBER

UNLEASHING THE POTENTIAL OF INDUSTRIAL HEMP IN THE PLASTICS MARKET

OVERVIEW:

Over the last four years P3N Technology has been working with Addisperse Technology to develop new micro hemp fibers for use in plastics. The focus of our development work has been the treatment and modify of industrial hemp fibers, maximizing their reenforcing properties in plastics. The results of our work has been the creation of a new high value additive specifically targeted for use in Bioplastics, **MICRO HEMP FIBER.** The addition of our new micro hemp fiber to biopolymer composites can accelerate the replacement of petroleum based plastics in todays market place.

BACKGROUND:

To understand the potential of Industrial Hemp (fiber and hurd) in the plastic market, it is important to understand the dramatic changes that are occurring in the plastics markets today. The majority of all plastic products in the market place today are based on oil and natural gas. As a result of increasing social, environmental and regulatory pressures, suppliers of plastic products, film (packaging and agricultural), automotive parts, containers, bottles, toys, filament for 3D printing, fixtures, parts for construction, medical products, disposable and structural parts are under tremendous pressure to supply products and parts that are more sustainable, environmentally safer, eliminate growing health concerns related to micro plastic particles found in our eco system and food supply and reduce dependence on oil based plastics. This is not an easy task. Producers and supplier of oil and natural gas based plastics, such as polyethylene, polypropylene, ABS, and polystyrene, have spent many years refining their products to meet the physical properties, process requirements, design and cost needs for companies that make products that are in the market place today. Equipment suppliers and converters have modified equipment and processes to manufacture quality products at the lowest possible cost. It is also important to understand that all products made from plastic contain additives. Additives are used and needed to reduce manufacturing costs, protect finished products during their life cycle, add desired color and appearance and modify the physical properties of the products to meet all of the requirements of the market place.

The challenges confronting the plastics Industry are many, complex and have and will continue to require significant technical and capital investments. Some of the most immediate approaches used to confront the issues at hand are the increased use of recycled plastics, the use of natural fillers in petroleum based plastics, the development of bio based plastic compounds to replace petroleum based plastics and the development of biodegradable compounds (that do not develop micro plastics particles) for single use applications. The most intensive technical and product development areas are related to the development of bio based compounds to replace petroleum based plastics and the development of biodegradable compounds for single use applications. Not to diminish the importance of recycling, bio based compounds and biodegradable single use compounds are the best short and long term solutions to many of the challenges the plastics industry is facing today.

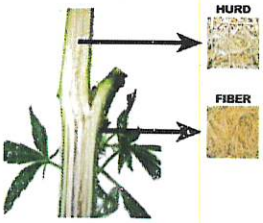
Many biopolymers and biodegradable polymers do not have the physical properties to compete with petroleum based plastics in todays market. Biopolymer and additive producers world wide are working intensively to meet this challenge. The US is not a leader in this area, in fact most of the innovation, technology, additives, compounds and products have been developed by companies in Europe and Asia. Natural fibers, specifically Industrial hemp fiber, have the potential of accelerating the replacement of petroleum based plastics in the US and the world plastic market. Mother Nature has supplied a raw material feed stock (Industrial Hemp), that if treated and modified, can dramatically

improve the physical properties of biopolymers and biodegradable polymers (specifically flexural strength, tensile strength and heat distortion temperature), and accelerate the replacement of petroleum based plastics in todays market.

Through the joint development efforts of P3N Technology and Addisperse Technology.

NEW MICRO HEMP and MICRO HURD FIBER HAVE BEEN DEVELOPED

Our new micro hemp fibers are based on untreated Industrial Hemp fiber and hurd chips.



HURD CHIPS TO MICRO HURD FIBER. (1mm)

HEMP FIBER TO MICRO HEMP FIBER. (3 to 5 mm)

DEVELOPMENT OF MICRO HEMP FIBER:

Industrial hemp plants have a complex structure. The bast fibers and hurd chips are composed of micro fibers held together by lignin, pectin and hemicellulose. Releasing the micro fibers found in the bast fiber bundles and the Hurd chips is the key to optimizing the performance in biopolymers. The binders (specifically lignin) are on the surface of the fiber bundles and between the micro fibers.Lignin is a low molecular weight waxy material. It has a low melting point, it is dark in color and develops odor when heated. We have found that it is important to extract the lignin from the surface of the fiber and critical to remove the lignin between the micro fibers, fibrillating the fiber bundles. Once the lignin is removed and the fiber fibrillated we treat the fiber optimizing the interfacial adhesion between the plastic and the fiber. A patent application has been submitted for the manufacturing of micro hemp fibers.

ADDISPERSE IS CURRENTLY MANUFACTURING and DEVELOPING COMPOSITES, CONTAINING MICRO HEMP FIBER, FOR:

APPLICATIONS IN BIOPLASTIC - PLA COMPOSITES

(To replace petroleum based plastics such as PP, ABS and PS)

* Automotive composites - door inter-liners and under the dash components
* Toys - game parts, figures, trucks, beach toys
* Containers - bottles (for vitamins and pharmaceuticals)
* 3D Filaments - general purpose and for structural applications (displays and furniture)
* Structural molded parts - bowls, tooth brush handles, camping accessories,
* Tokens and novelties (promotional items)
* High temperature applications - cups, trays, food packing (microwave applications)

APPLICATIONS IN BIODEGRADABLE SINGLE USE PRODUCTS - PHA AND PBS COMPOSITES

(To Improved physical properties, without effecting biodegradation)

* Cups - Stadium and general drinking cups.
* Utensils - multi and single use applications
* Trays - medical and general food use
* Plates - reusable and single use
* Agricultural - netting for soil erosion control
* Straws - marine degradable
* Tree spikes, tags, ties and protective sheet

APPLICATIONS IN PETROLEUM BASED PLASTICS - PP AND HDPE COMPOSITES

(To upgrade the physical properties of recycled compounds and light weighting)

* Automotive - replacement of glass fiber in PP
* Furniture - recycled HDPE lawn and garden chairs and tables
* Construction - road bedding HDPE molded parts
* Sheet - wall partitions and separators

EXAMPLE - APPLICATION AND PERFORMANCE:

INJECTION MOLDED CUP MADE WITH BIO-COMPOSITE PLA-A

100% Bio Content
Industrial Compostable
Colorable
Printable
High Surface Gloss

MAGNIFICATION 100 X

MAGNIFICATION 400 X

Injection molded cup containing
10% micro hemp fiber

BIO-COMPOSITE PLA-A TYPICAL PHYSICAL PROPERTIES

* IMPACT, NOTCHED IZOD, ASTM D256 (ft/lbs/inch)	5.2
* TENSILE STRENGTH AT PEAK, ASTM D638 (PSI)	10,718
* ELONGATION AT BREAK, ASTM D638, %.	18
* FLEXURAL MODULUS, ASTM D790 (PSI)	682,029
* FLEXURAL STRENGTH, ASTM D790 (PSI)	20,624

PHYSICAL PROPERTY CHART

(COMPARING PLA-A to PLA*, a COMMERCIAL 25% HEMP FILLED PLA and ABS**)

	PLA-A	PLA*	COMMERCIAL 25% HEMP FILLED PLA	GENERAL PURPOSE ABS**
. IMPACT - NOTCHED IZOD ASTM, D256, (ft/lbs/inch)	5.2	0.3	0.63	6.5
.TENSILE STRENGTH ASTM, D638 (PSI)	10,718	9,000	4,068	5,990
.ELONGATION at BREAK ASTM, D638 %	18	3.5	4.14	>30
.FLEXURAL MODULUS ASTM, D790 (PSI)	682,029	515,000	434,000	377,000
.FLEXURAL STRENGTH ASTM, D790 (PSI)	20,624	15,700	13,150	10,400

* NATUREWORKS PLA GRADE 3001 D

** LNEOS ABS LUSTRAN 633

COMPOUND COLOR

(COMPARING PLA-A to a COMMERCIAL 25% HEMP FILLED PLA)

PLA-A

COMMERCIAL 25% HEMP FILLED PLA