



A Better, Natural, Cost Effective Material Solution for the Medical Market

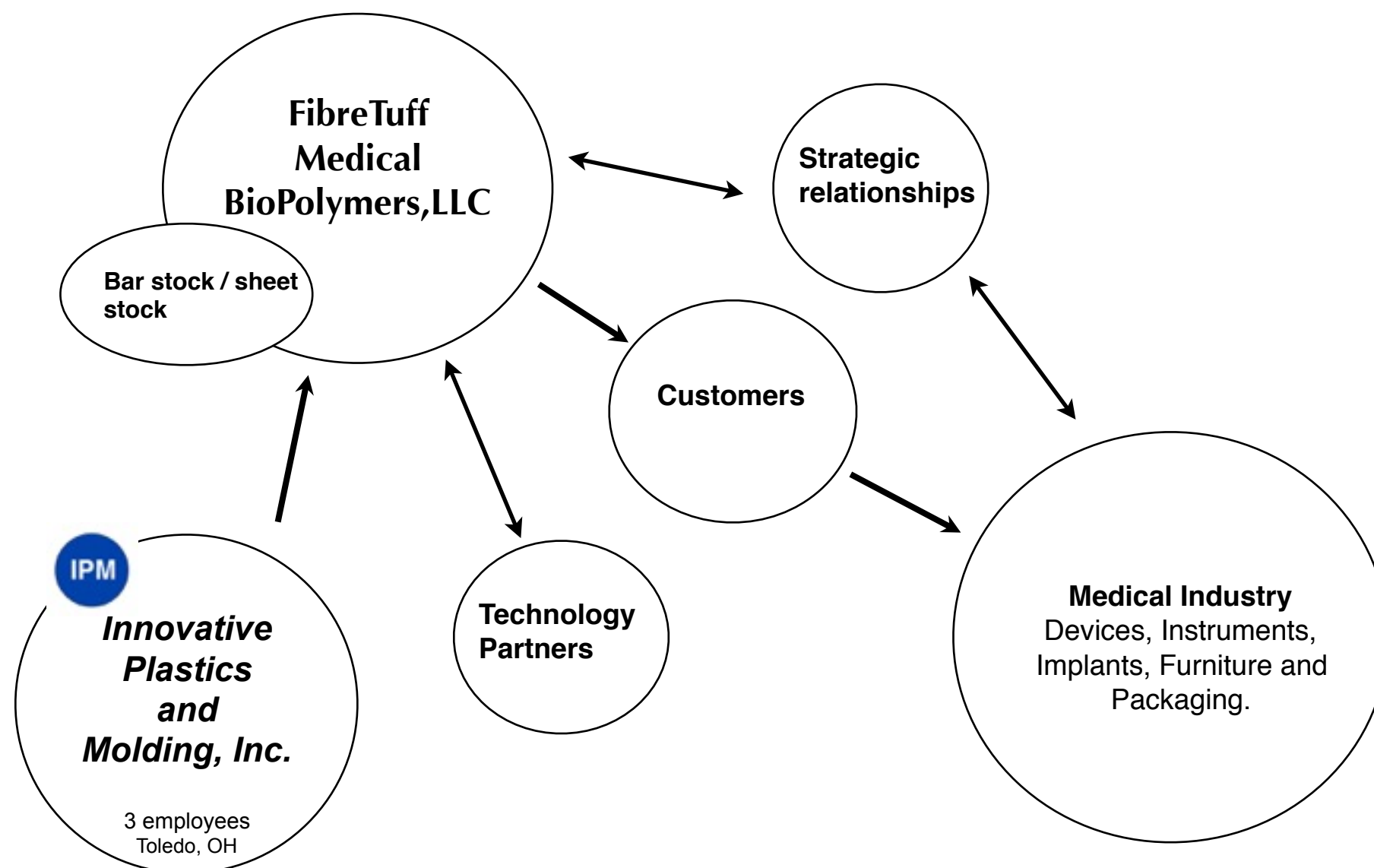
FibreTuff Medical Biopolymers, LLC

Presentation by Robert Joyce Founder and President



FibreTuff Medical Biopolymers, LLC is a partnership that is focused on selling FibreTuff specialty and master batch compounds. Primary customers for FibreTuff will include companies who sell into the medical device, instrument, implants, packaging companies and specialty compounders. The company will sell the FibreTuff 5.0, a >50 cellulose thermoplastic alloy compound with FDA compliant ingredients to specialty compounders. Also, producing FibreTuff 2.0 for the 3 D printing market. Later, to expand into other FibreTuff specialty compounds for producing and selling molded bar, rod and sheet stock.

Innovative Plastics and Molding, Inc. is owned by Robert Joyce. The company is located in Northwest, Ohio and has been in business for more than a decade. The company is a biopolymer technology company, that owns intellectual property, trademark “FibreTuff”.





FibreTuff Medical Biopolymers, LLC

The company provides ***FibreTuff***® master batch or specialized compounds / powder and molded bar, rod or sheet stock.

- The company will supply master batch compound to compounders and some specialized compounds for 3 D printing.
- Focus on replacing styrene ABS, PLA, PP and PEEK for class I, II and III devices.
- The company will supply directly to OEM's, contract suppliers with bar, rod or sheet stock.

Class I devices
Tongue depressors
Bandages
Gloves
Bedpans
Simple surgical devices



Medical Tray

Class II devices
Wheelchairs
X-ray machines
MRI machines
Surgical needles
Catheters
Diagnostic equipment



Orthotics

Class III devices
Heart valves
Stents
Implanted pacemakers
Silicone implants
Hip and bone implant

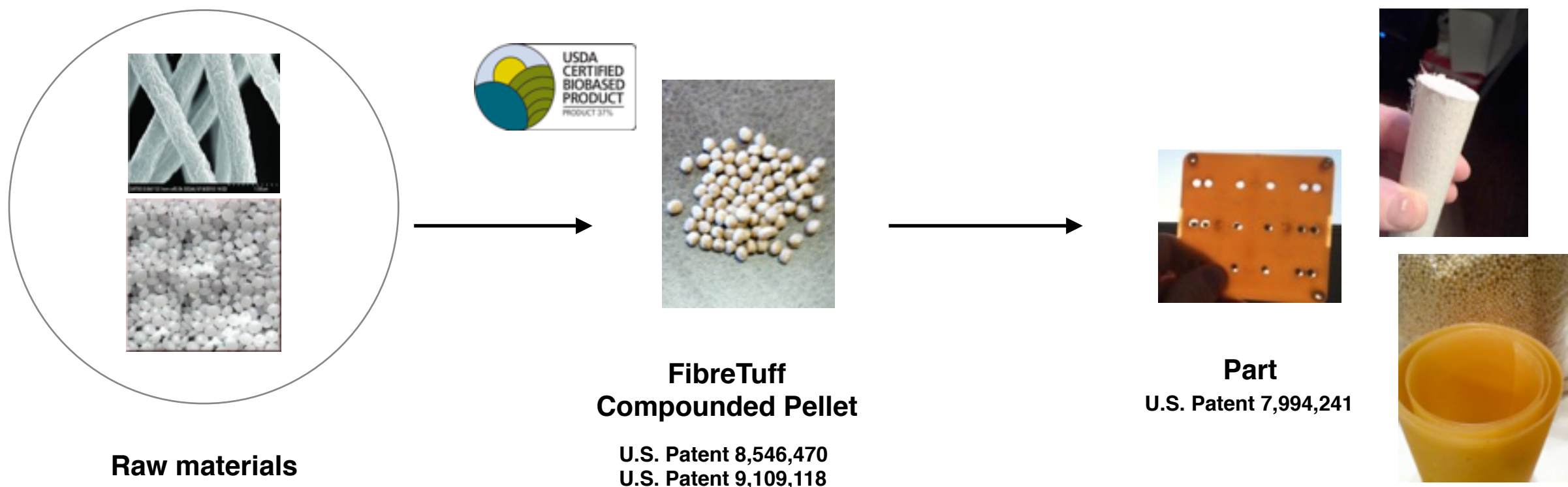


Screw Implants



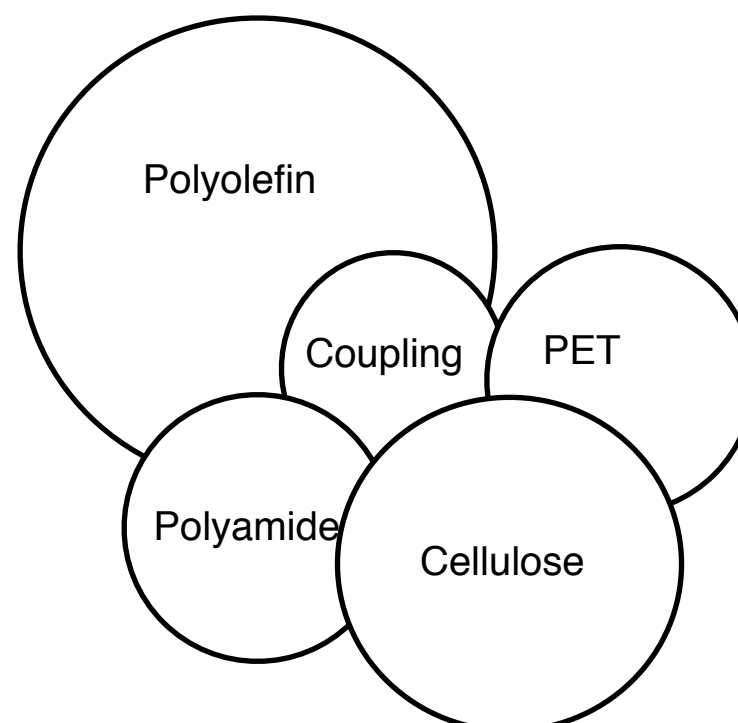
FibreTuff® Technology

- **FibreTuff®** biopolymer technology that utilizes ingredients with previous exposure to the body - cellulose, polypropylene and polyamide.
 - Alloy compositions can be compounded in line or independently to enhance performance for specific markets and applications - injection molded components, 3 D printing, sheet, oriented fiber.
 - A thermoplastic alloy biopolymer composition that can utilize all FDA approved ingredients including “Cellulose”
- **FibreTuff®** technology can use hydrophilic and hydrophobic ingredients for biocompatibility.





FibreTuff®



Intellectual Property and Trademark

U.S. Patent 7,994,241. WOOD COMPOSITE ALLOY COMPOSITION HAVING A COMPATIBALIZER THAT IMPROVES THE ABILITY TO PROCESS AND COMPRESS CELLULOSIC FIBER. Claims reflect a molded part consisting of a compressed low moisture pellet having less than 1% moisture comprising of four ingredients..

U.S. Patent 8,546,470. CELLULOSIC INCLUSION THERMOPLASTIC COMPOSITION AND MOLDING THEREOF. Claims reflect a composition of matter patent that is a thermoplastic biopolymer.

U.S. Patent 9,109,118. CELLULOSIC INCLUSION THERMOPLASTIC COMPOSITION AND MOLDING THEREOF. Claims reflect a composition of matter patent that is a thermoplastic biopolymer.
Continuation of an application.

FibreTuff® is a registered trademark with the USPTO.

Each U.S. Patent listed above is jointly owned by Innovative Plastics and Molding and Hexpol. Either company has the right to defend the intellectual property. FibreTuff Medical Biopolymers, LLC is an exclusive licensee of these U.S. Patents with Trademark from Innovative Plastics and Molding, Inc.



***FibreTuff*® Biopolymer**

- ***FibreTuff*®** ingredients
 - Ingredients can be 100% FDA compliant with 99% exposure to the human body.
 - Hydrophilic and hydrophobic molecules are also known as polar molecules and nonpolar molecules, respectively. Some hydrophilic substances do not dissolve. This type of mixture is called a colloid.
 - In designing a DES (Drug eluding stents), it is critical to balance the hydrophilic and hydrophobic components of the polymer system to obtain optimal biocompatibility, while maintaining controlled drug elution.
 - Cellulose fiber is hydrophilic, isn't resorb able (can be broken down and assimilated back into body)

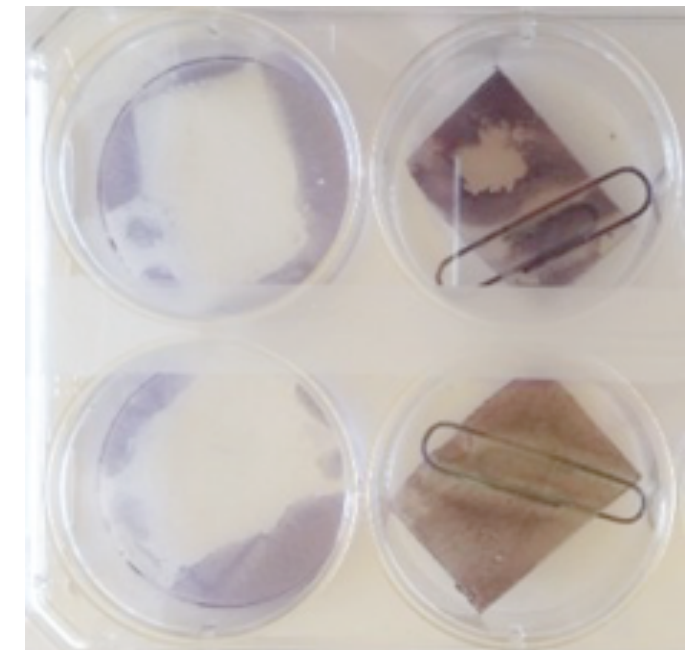


***FibreTuff*®** Biopolymer floating in water for several weeks.



FibreTuff® Benefits for Medical applications

- **Testing performed on *FibreTuff®* not once but twice**
 - The material was immersed in the culture medium for 16 hours
 - Human embryonic kidney cells were seeded
 - After 24 hours, the material was transferred to an another well
 - MTT assays were performed to measure cell viability
- **Initial results demonstrate non-toxicity, cell growth in its presence /proliferation essential quality for implants.**
 - Further cell growth data needs to be acquired to evaluate.
 - Cell growth rate
 - Cell attachment to the material like paper clip.
 - SEM Microscopy



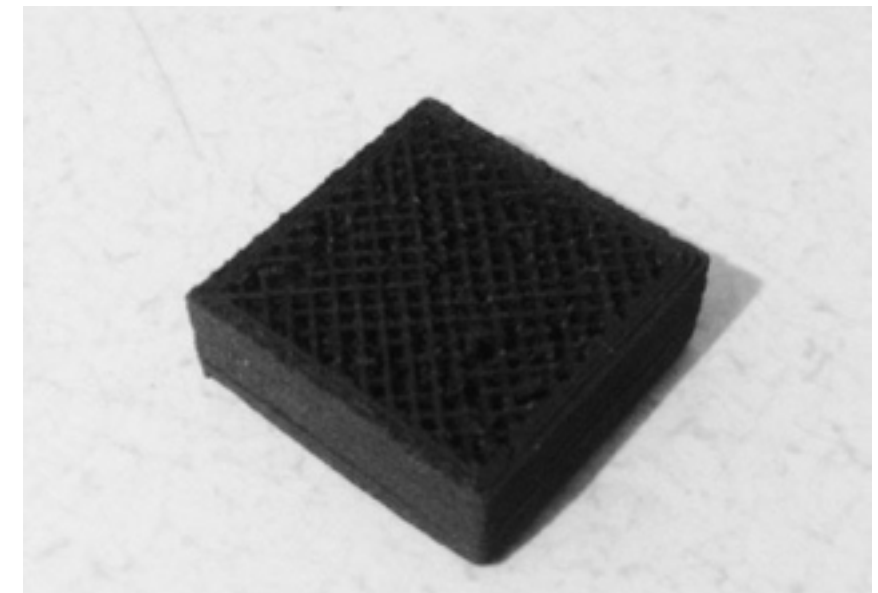
FibreTuff biopolymer



3 D Printing *FibreTuff*® Biopolymer

- 3 D Printing medical devices and or orthotics made of ABS, PLA have performance shortcomings and safety concerns.
 - Current biopolymers like PLA are processing intensive for purity and costly.
 - The PLA is degradable, absorbable and desired structural properties for medical devices.
- ***FibreTuff*®** comparison versus a PLA, ABS
 - Lighter
 - No heat plate required.
 - Faster processing time.
 - No drying required before processing.
 - Not as brittle with very good elasticity versus competition.
 - No warpage compared to other PP
 - No abrasion of printer tip.
 - No offensive odors.

***FibreTuff*®** Biopolymer





3 D Printing *FibreTuff*® Biopolymer

- Rapidly design novel devices, such as 3D printed antennas, electromagnetic coils, or stack ICs in ways that were previously impossible.
- No longer are you limited to planar PCBs - now you can design the electronics to fit your part, rather than designing the part around the electronics.
- Applications:
 - Spinal cord stimulation (SCS), in the simplest form, consists of stimulating electrodes, implanted in the [epidural space](#), an electrical pulse generator, implanted in the lower [abdominal](#) area or [gluteal region](#), conducting wires connecting the electrodes to the generator, and the generator remote control.



FibreTuff® Biopolymer filament



FibreTuff® Biopolymer transparency in molded form



Phase I

Summer 2014 to Summer 2015

- FibreTuff biopolymer compounded and plaques molded for testing and evaluation April 2014
- FibreTuff biopolymer tested by University of Toledo for cell growth and non toxicity. Two tests were performed at \$15K that showed positive results. August 2014
- Incorporated of FibreTuff Medical Biopolymers, LLC. (FMB) November, 2014
- University of Toledo Bioengineering signs project agreement with FMB for design and testing of FibreTuff biopolymer for surgical instruments, spinal implants, cages, articulating surfaces November 2014.
- Exclusive license contract agreement with Innovative Plastics and Molding, Inc for composition of matter U.S. Patent 8,546,470 and molded part U.S. Patent 7,994,241.
- Participated at the Starlight Capital group investment fund in November 2014.
- FibreTuff trademark registered with USPTO. January 2015
- University of Toledo Student design class completes project with FibreTuff and oriented fiber. April 2015
- Continuation of U.S.patent application 14/037453 claims for composition is allowed by USPTO. May 2015.
- 3 D printed part using FibreTuff Biopolymer. May 2015
- U.S. Patent 9,109,118 composition of matter patent awarded to Innovative Plastics and Molding, Inc and licensed to FibreTuff Medical Biopolymers, LLC



Using biological materials may not only be better for the environment, but better for the human body.

Thank You

FibreTuff® biopolymers is now a proven biopolymer material science technology with an excellent value proposition for the medical market.

More information

[FibreTuff Medical Biopolymers - Google Sites](#)