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**Objective:** Americans, on average, lose over 300,000 golf balls on ranges and courses annually. It takes each of those golf balls nearly 1,000 years to biodegrade, leaving behind zinc poisoning on the flora and fauna around it as they do. Our objective is to use soy, in an innovative way, to develop a new type of golf ball core that allows for safe and quick degradation of the ball and maintain its practical usability.

**Cost of Production:**

Ingredient	Cost	Cost per Ball
Soybean Hulls	\$-	\$-
Cornstarch (per oz)	\$0.06	\$0.006
Soymilk (per mL)	\$0.003	\$0.007
Vinegar (per mL)	\$0.002	\$0.0004
Glycerin (per mL)	\$0.02	\$0.004
<b>Total Cost per Ball</b>		<b>\$0.02</b>



**Overview:**

Golf as a sport expects to extend its legacy of more than 300 years to millions around the world, and a creative use of soybeans can help make this happen. Our team has developed the *Shear Envi Golf Core* using soy products to address some environmental concerns. Reinventing the golf ball core allows for the elimination of a critically wasteful aspect in an otherwise environmentally-conscious game. For example, courses are sometimes built on retired landfills, clubs are manufactured from recycled metals, and grass clippings from course landscapes can even be used as fertilizer, but the solid plastic cores for modern golf balls are developed and disposed of in relatively irresponsible ways. Our product replaces the plastic core with soybean byproducts and is made from relatively under-utilized components of the soybean. Consequently, we have developed an environmentally responsible product which happens to be economically viable.

Shear Envi Golf Cores are low-compression ball cores intended for use on a driving range. Centered in a standard ball shell, layers of soybean hull pulp and soy-derived plastic terminate at a liquid core made from soymilk, cornstarch, and soy oil. This liquid core is consistent with ongoing research at existing ball manufacturing firms, but poses a distinct twist. Although it exists as a fluid in normal conditions, this unique liquid takes on the properties of a solid at high speeds. It is a shear-thickening liquid—one that behaves as a solid when suddenly accelerated, as when a golf club strikes a ball on the tee. This presents two major improvements over current technology: it allows for the majority of the ball to be injected as a liquid during mass production, and the end product can function like a traditional golf ball because it has a primarily solid core in flight.

**Competitors:**



The Wilson Eco Core Ball is comprised of a core that is made of recycled rubber tires.

The Eco Golf company has created a ball made entirely of wood intended for use on cruise ships.



Albus Golf's ball has a core made of densely packed fish food.

**Global/Societal Impact:**

- Low production costs
- Rapidly degradable
- All-natural core materials

*Meaning....*

- Increased access to the sport
- Limited manufacturing re-work
- Environmental benefit

**Ingredients:**

- Soybean hulls
- Cornstarch
- Soymilk
- Vinegar
- Glycerin

**Constraints:**

- Ball size and weight
- Aerodynamic properties – Dimples and core type
- Shear-thickening properties and components