


# Cartridge Wad

Contract ECO/10/277370/SI2.599581



 water soluble wad

## Layman's Report



Deliverable n°:	D1.5
Deliverable name:	Layman´s Report
Month of completion:	M24
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## 1. Summary

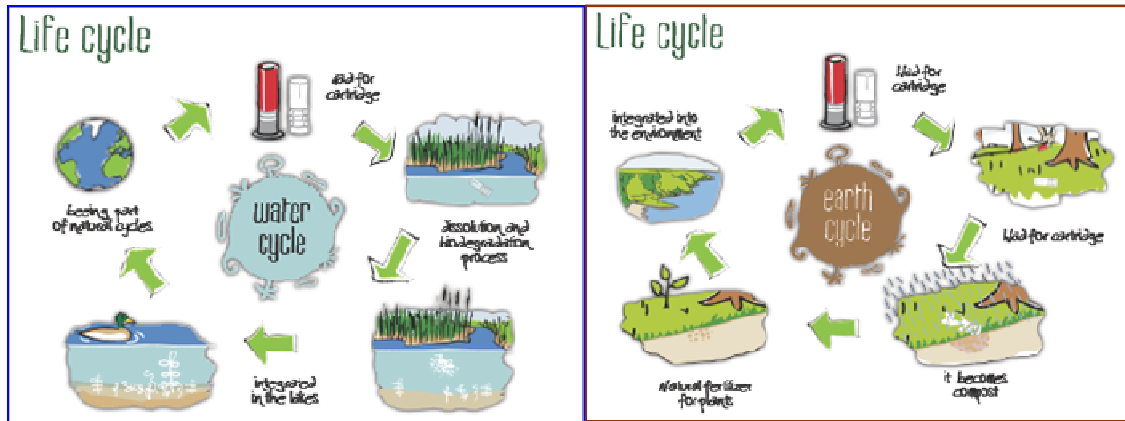
Hunting has been an activity developed by humans since our earliest days, and has evolved with the development of technologies until today's situation with components of sport, components of feeding, components of adventure, but always aiming to protect fauna and natural environments to preserve the ecological conditions and habitats of our world.

With the technology evolution of shotguns and cartridges, the impact of the hunters in the natural environments has become more and more critical. Some important steps have been taken to reduce perverse impact of the ammunition (substitution of lead by soft steel and similar metals), and to ensure cartridges sheaths are collected after its use and not dispersed by the fields.

However, there is an element, the wad normally made of different types of plastics (polyethylene and also opto-degradable plastics), which generates not only ecological contamination but also acts like poison to animals that eat it and eventually die because, when shooting, the wad accompanies the pellets for some 40 to 60 meters and lays down in the ground or the water.



The development of this hidrosoluble wad avoids the above mentioned problems and at the same time provides a nutrition base to the flora. The moisture of the ambience is able to cause the dissolution of the Wad in a very short period of time (even better in water presence) and its materials are non toxic, biodegradable and ecofriend.



Different technologies and companies had to work in tight cooperation to obtain the final Wad solution, incorporating the mentioned characteristics but at the same time ensuring that the shoot has a perfect ballistic performance. Plásticos Hidrosolubles has provided the lead in the project, most of the technical developments and the marketing effort to generate awareness and acceptance in the European market having already started the commercialization phase with encouraging results.

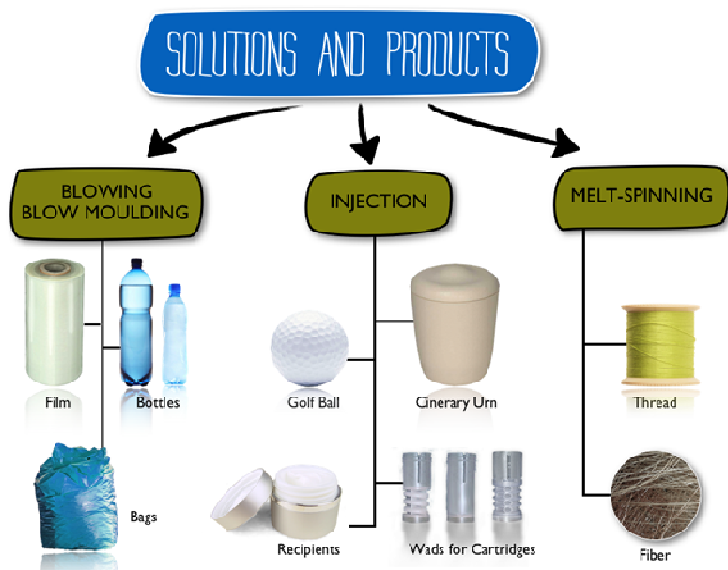
Certifications for all the references have been gotten provided by Carmusa and “Oficial Center of Ballistic Test in Eibar”. Available references are in Caliber 12 for lead pellets P28 grams and P32 grams for steel pellets A28 grams A24 grams and A32 grams. Also for cartridges that actually use filter wads we have available hidrosoluble plastic disc in cal12 and cal 20.



## 2. Project Objectives

### a. Background

Plásticos Hidrosolubles (PH) is a small company with deep skills and know how in the development of eco friendly solutions based in PVA plastics. During the last 5 years, PH has developed a large number of solutions that have been applied in different sectors: Pyrotechnics, Fertilizers, Furniture protection, etc.



One differential capability of PH is its patented solution and proprietary formulas to produce PVA pellets able to be injected to produce pieces with specific forms, fits and functions (3F). The resulting pieces are comparable to similar ones of polyethylene and other existing plastics, but adding the biodegradability characteristics of PVA's.

When we analyzed the problematic around traditional plastic wads (and other solutions based in felt, cardboard, etc) and their impact in the environment, we realized of the huge opportunity to replace them by our PVA, provided we were able to generate similar ballistic performance and affordable costs.

We needed to work in different fronts, with different technologies and different partners as the end sellable product would be the cartridge, not the Wad, thus requiring a broader effort and a careful alignment of interests and objectives of all the participants.

We spent several months identifying the right partners, contacting them and engaging them into the project to obtain a new generation of cartridges appreciated by the markets.

#### b. Objective

As above mentioned, the objective of the project is to develop a market appealing new generation of cartridges with the maximum eco friendly characteristics in which the PVA Wad becomes a key element of the solution because of its degradability, quick reintegration into the environment (fields or wetlands), non toxicity and contribution to flora development as compost.

The mechanical characteristics of the Wad are key in order to ensure the correct ballistic performance, the correct integration with the rest of components of the cartridge and the durability of the cartridge before its final use.

At the same time, the fluidity and stability specifications are key to ensure the injection process, the several manipulation steps and the automated final assembly process.

Another important element to take into account is the range of lengths and calibers used in the many shotguns existing in the market. It requires specific Wads for each type of cartridge and also coordination with the final manufacturer to adjust powder types and quantities in each application. This is not an easy effort and requires significant time, expertise, coordination, tests and certifications in order to generate a reliable range of products accepted by the customers.

### 3. Method

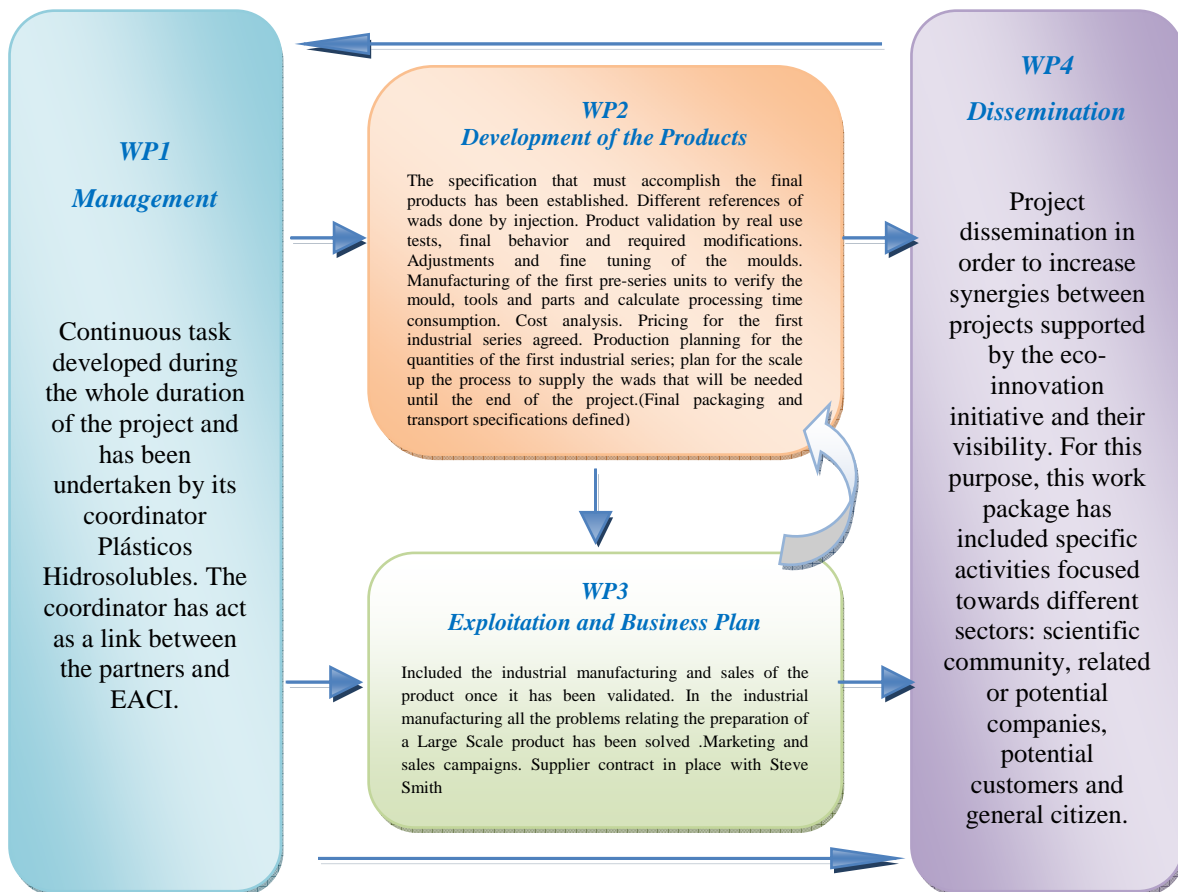
#### a. Analysis and development

During the initial steps of the project, the following partners were identified and engaged to contribute with specific tasks and deliverables all of them tightly connected to ensure the join final objective of a successful new generation of cartridges.

Phases of the Project:

The project was for 24 months and the activities developed were included into four work packages:

- WP1. Management
- WP2. Development of the Products
- WP3. Exploitation and business plan
- WP4. Dissemination.



Plásticos Hidrosolubles: owner of the idea and leader of the project, PH has defined the project itself, assigned tasks, responsibilities, lead times and resources to the rest of the partners, and coordination among themselves.

Looking at its own activities, PH has developed a wide number of formulations in order to find the most suitable ones for the Wad production and life cycle conditions, provided critical input to manufacture injection tooling able to produce parts based in this PVA, adapted its internal manufacturing processes to ensure the right specifications and stability of the products, etc.

Additionally, the marketing activities to understand market requirements and its translation into Wad specifications and complete cartridges characteristics were also part of the initial tasks accomplished by PH and in some cases in collaboration with Armusa and AFWM

The total global market of cartridges in developed countries is in the range of 2.000 to 3.000 million units per year. The portion of this volume still using lead and “non advanced components” that contribute to a better ecological condition is the majority of the demand, probably 70 to 80%.

The easiest entry point of this new generation of cartridges will be the most conscious and sophisticated users, both hunters, hunting academies, shooting centers, etc that could add up to 15 to 20% of the total market in the next 5 to 10 years. Therefore, the accessible market could be in the range of 300 to 600 million units per year in this period of time.

The cost of this new Wad is significantly higher than traditional ones in polyethylene or felt but still is less than 20% of the total manufacturing cost of top class cartridges. This cost is an initial barrier to the quick expansion in all kind of cartridges, but have to admit as well that lead is a poisonous product that still is used in more than 60% of the cartridges that are currently used. As the ecological conscience spreads more and more among the players in this sector, we expect a faster acceptance of the PVA Wad in the market in the coming years.

We have already contacted lobbies interested in developing specific regulation to protect hunting environments who have demonstrated a genuine interest in supporting the use of our PVA Wad. Should these initiatives positively progress and succeed, the accessible market could significantly increase. Just as an example, the national consumption of cartridges in Spain is around 200 million per year. Since the implementation of the mandatory collection of the sheaths in Spain, 99% of them are properly collected by the hunters. A similar legislation imposing the use of PVA Wads could have a dramatic impact in the consolidations of our solution and the market consolidation.

b. Field tests

After generating the first samples, conducting the ballistic tests in Armusa's premises and then in AFWM laboratories, the first field tests were launched with "clay pigeon professional shooters", one of them being the Spanish champion Jesús Serrano who classified 5<sup>th</sup> in the Olympics 2012 using samples of our Wads/cartridges.

Several rounds with this type of professionals in different centers in Spain helped to fine tuning the right combination of wad characteristics, powder quantities, exploding strengths, etc. Some of these events were recorded by media specialized in hunting and shotguns.

The first charter clients have also conducted their preliminary field test generating important feedback to prioritize sizes and calibers in the initial market launches.

One important thing observed during these tests was that our new Wad performs ballistically much better than most of the existing ones because the higher specific weight of the PVA produces a straight trajectory for longer distances. This means that the pellets contained in the Wad, after leaving the shotgun barrel, penetrates the air in a much more compacted manner and without dispersions. This is a characteristic highly valued by expert hunters.

**Tele-noticias**

### Presentación del Nuevo cartucho de Armusa, fabricado con Taco Ecológico "Green Shot"

la mañana, donde acudieron una treintena de personas entre tiradores de elite y medios de comunicación especializados entre los que podemos citar al olimpico Jesús Serrano o a los Reinales Trofeo y Campos de Tiro entre otros.

Se dispararon numerosos tiros al plato en las modalidades de tiro olímpico, mixed y ciego.

Tras cada serie de disparos en cada modalidad de tiro, se realizaron pequeñas "ruedas de opinión" donde cada uno expresaba su opinión sobre las cualidades y características que apreciaban en esta nueva munición que está llamada a ser un "referente" para la protección del medio ambiente, razón por la cual, los máximos responsables de la empresa ARVUSA tomaron buena nota de los comentarios técnicos que se les hizo, para tratar de ajustar en lo posible esta nueva munición a las necesidades de los tiradores.

Las pruebas duraron hasta bien entrada la mañana y se finalizó el acto con una copa de vino español.

Se nos fueron entregadas varias cajas del nuevo cartucho, por lo que próximamente publicaremos en nuestras revistas CAMPOS DE TIRO, un amplio "Banco de Pruebas" de esta nueva munición ecológica y sagin sus fabricantes, respetuosa con el medio ambiente.

**Tele-noticias**

El pasado 20 de abril, la conocida fábrica de cartuchos ARMUSA, hizo la presentación oficial a los medios de comunicación especializados, así como a destacados tiradores, del nuevo cartucho "Green Shot", cargado con teco ecológico, biodegradable e hidrosoluble, cargado especialmente para tiro al plato, con perdición de plomo y con 24 y 28 gramos de peso de perdigones.

La presentación tuvo lugar en las instalaciones del Club de Tiro de Cantoblanco el citado sábado 20 de abril por

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campos de tiro - Mayo 2013

c. Awareness raising and training

We have developed in a short period of time an important impact in the market as it can be confirmed by media publications, contacts and presentations made during Nuremberg's exhibition "IWA 2013", distribution of an educational video (see link : <http://vimeo.com/61309670>). Samples have been distributed in countries like UK, Lithuania Italy, France, Canada, and Spain.

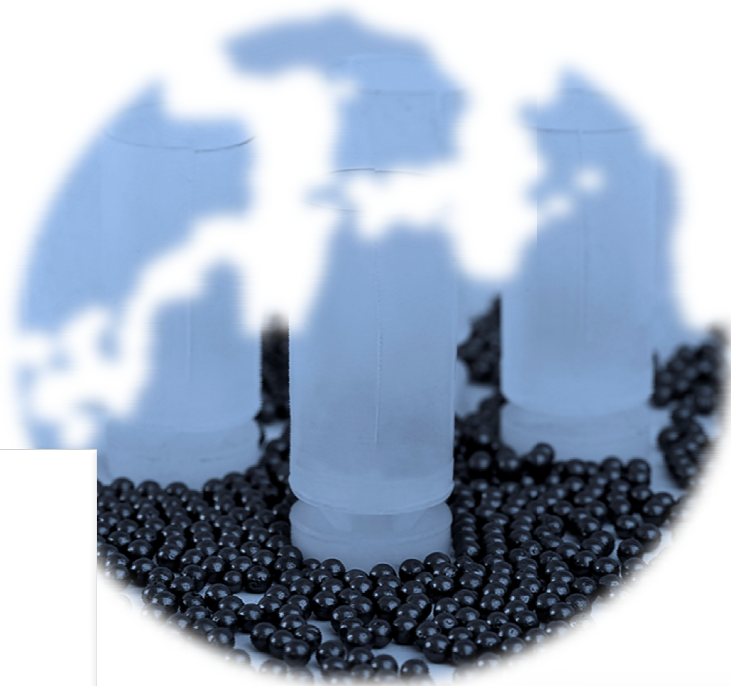
Nevertheless the best awareness signal is the initial demand already experienced with orders coming from UK and Spain and prospects from much other geography.

4. Results

As of today, we can confirm that the new fully ecological Wad developed in this project is a reality, with characteristics that are understood in the market, which allows the manufacture of a completely eco-friendly range of cartridges in a definitive step beyond substitution of other components already implemented.

The extra cost of this material should be offset by the elimination of harmful impacts in the environment and we expect evolution in the regulation that will enforce its utilization in the future.

The manufacturing processes developed by PH and its partners are already mature enough as result of the efforts and investments incurred during the project. Further improvements have been identified and some of them will contribute to costs reductions that will make even more attractive the hydrosoluble Wads and the new range of Ecological Cartridges as "Green Shot" advances in its market consolidation.





*shooting without trace*

