

**-Backgrounder-**

**The Intelligent Speed Bump (BIV)<sup>\*</sup> by Badenova**

The company Badenova S.L. from Málaga (Spain) has developed a pioneering road safety product, an intelligent speed bump named BIV. When vehicles travelling at the appropriate speed pass over the top, the intelligent speed bump provides no resistance and, as a consequence, does not cause any damage. For cars moving at excessive speed, however, the speed bump hardens and therefore provides the same resistance as any standard speed bump.

This behaviour is due to a non-Newtonian fluid which constitutes the filling material of the intelligent speed bump. These kinds of fluids behave differently than water. This means that their flow properties cannot be described by a single constant value of viscosity. There are different types of non-Newtonian fluids. The intelligent speed bump contains a so-called *shear-thickening fluid* (also known as *dilatants*).

Dilatants are suspensions whose viscosity increases with the rate of shear, i.e., the strain rate raises with the rate of shear. The dilation effect occurs when closely packed particles are combined with enough liquid to fill the gaps between them. At low velocities, the liquid acts as a lubricant, so the non-Newtonian liquid flows easily. At higher velocities, the liquid is unable to fill the gaps created between particles, and friction greatly increases, causing an increase in viscosity.

As a consequence, the non-Newtonian material allows the speed bump to change from a soft to a solid state according to the vehicle's speed. The fluid is biodegradable, non-toxic, non-contaminant and very unlikely to leak out thanks to a high-quality enclosing material. It is a plastic material, which has been developed by the Spanish institution Andaltec, one of the industry's leaders in plastic technology. Also, this material has proven to be especially resistant against unfavourable weather conditions, vandalism and wear-out.

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\* BIV is the Spanish short form for “**B**aden **I**nteligente de **V**elocidad” (Intelligent Speed Bump)

The intelligent speed bump by Badenova S.L. is a worldwide registered and patented product.

The installation of the BIV is particularly quick and easy using a metal plate and screws in order to fix the intelligent speed bump to the ground. Consequently, construction works are not necessary. Moreover, its design can be calibrated for any speed limit or road type.

#### ADVANTAGES OF THE INTELLIGENT SPEED BUMP

Since the intelligent speed bump does not constitute an obstacle for those vehicles travelling at the permitted speed, Badenova's innovation has many advantages over the conventional speed bumps:

- It reduces the possibility of car collision accidents due to rapid braking as a driver approaches the speed bump
- It prevents back and/or neck injuries caused by sudden jumps
- It decreases the damage to the vehicle as both spring suspension and mechanical parts that do not suffer any impact.
- Reduced CO2 emissions due to the avoidance of sudden braking and subsequent acceleration.
- Less noise as the sound of braking before a speed bump is reduced

#### THE COMPANY

Badenova S.L. is a partnership of University professors, technicians and entrepreneurs from different fields such as the food industry, alternative energy or the construction industry. The equity invested capital of the company is 2.2 million Euros.

Badenova's innovative system has received several awards, including the prize for "Best Technological Innovation 2010" by the Spanish National Road Safety Foundation ("Fesvial"). In addition to that, the company has been selected to be one of the 17 nominees for the



**Badenova S.L.**

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“Innovation Award” at Intertraffic 2010 in Amsterdam. Together with two more companies, Badenova is now hoping to receive the prestigious award in the category “road safety”.

José Antonio Aguilera, Badenova’s CEO and inventor of the BIV, is a 29-year old businessman from Villanueva de Tapia (Málaga). In 2008 he received the Young Entrepreneur Award granted by the University of Málaga. Apart from the intelligent speed bump, Aguilera has also invented other products such as an amphibian motorcycle and a solar swimming pool.