Intelligent steel for safer cars

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As ductile as a rubber band: Extremely fine and uniformly distributed granules provide new types of steel their "super-plasticity". Above: the original component; middle: symmetrical extension by a factor of 850, below: elongation after fracture at 1025 percent. Image: Max Planck Institute for Iron Research GmbH

Each year, more than 200,000 car accidents occur in Germany. Car manufacturers devote much time, effort, and cost to developing new ways of protecting drivers and passengers.

Along with the design of the car body, the steel grades used are of prime importance. In the event of a crash, the steel components must combine two different characteristics: they should be ductile to absorb most of the collision energy and at the same time have sufficient shape stability to protect the passenger cabin.

At the Max Planck Institute for Iron Research GmbH (MPIE) in Düsseldorf, Germany, a joint venture of the Max Planck Society and the

German Steel Institute (VDEh), scientists have developed a new type of steel for such future requirements.

In case of a crash, this so called TWIP-steel (twinning induced plasticity) deforms but a forming capability (ductility reserve) remains. Each part of the steel elongates, then strengthens and passes on the remaining deformation energy to the surrounding parts, which then also starts to deform. Hence, by dispersing energy over the whole surface, the collision momentum is absorbed more efficient and the passengers stay safe.

In a few years, this TWIP steel will be integrated into bumpers and side doors which are the most vulnerable parts of a crashed car. The development of the TWIP-steel clearly demonstrates that steel is still able to tackle the future with tradition.

Source: Max Planck Institute