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CAN 3 GRAMS OF ADHESIVE PULL 208 TONS OF FREIGHT TRAIN?

Structural bonding is fast gaining popularity over conventional joining methods for several reasons. The ability to join dissimilar materials such as plastics and metals is one significant benefit as it allows different combinations to be chosen for their performance quality without having to consider the joining method. A bonded joint is also sealed so it prevents leakage and corrosion and as there is no visible sign of the join, it looks good too.

Then there's the question of strength and durability and it's here that adhesive manufacturers are often met with a degree of resistance. Even though structural adhesives are used in some of the toughest applications – automotive and aerospace manufacture to name but two - some people remain unaware of the true scope of structural bonding. Others doubt its suitability over traditional joining methods.

The challenge

So, when Henkel started to explore the best way to convey the merits of its latest LOCTITE® structural bonding development, it set its sights on creating a demonstration that would really make industry take notice. Henkel engineers decided to show the strength and durability of new and patented LOCTITE® hybrid adhesive technology by designing a bonded coupler that would pull freight train wagons weighing 208 tons.

The new adhesive chosen to showcase this technology was LOCTITE® HY 4070. It is one of new breed of adhesives that combine the critical attributes of several adhesive technologies to achieve bond strength, durability and cure speed. These qualities are also complemented by improved health and safety credentials.

Good impact resistance makes LOCTITE® HY 4070 a great choice for joining the elements of products that are subject to drop testing or shock loading. It also provides good elasticity, an important consideration when joining parts subject to relative movement; the train application being a great example! Fixture and cure speeds of this product are similar to those of an instant adhesive and this is achievable even when there is a relatively large gap between mating parts.

Selecting the best adhesive for the job, however, was only part of the story. As with all applications, the design of the rig that connected the engine to the lead wagon had a huge bearing on the outcome.



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“208 tons is a lot of weight on a small bonded assembly,” explained Austin Campbell, one of the engineers who designed the rig. “We therefore incorporated springs in the mounts to accommodate movement and to add strength we specified, toughened pins to hold the rig under the knuckle couplers.”

Having cleaned and sanded the steel plates, all it took was just 3g of LOCTITE® HY 4070 and one hour of cure time to create the bonded assembly. On paper the join was man for the job but how would it fare in practise?

Austin Campbell summarised: “The train started to move, pulling 208 tons of wagons along the track, up hills and over bridges. Ultimately the steel plates bent but the adhesive join held firm. It was a tremendous effort by all the LOCTITE® teams involved. Making a success of such a powerful demo was a great feeling.”

About Henkel

Henkel operates globally with a well-balanced and diversified portfolio. The company holds leading positions with its three business units in both industrial and consumer businesses thanks to strong brands, innovations and technologies. Henkel Adhesive Technologies is the global leader in the adhesives market – across all industry segments worldwide. In its Laundry & Home Care and Beauty Care businesses, Henkel holds leading positions in many markets and categories around the world. Founded in 1876, Henkel looks back on more than 140 years of success. In 2016, Henkel reported sales of 18.7 billion euros and adjusted operating profit of 3.2 billion euros. Combined sales of the respective top brands of the three business units – Loctite, Schwarzkopf and Persil – amounted to more than 6 billion euros. Henkel employs more than 50,000 people globally – a passionate and highly diverse team, united by a strong company culture, a common purpose to create sustainable value, and shared values. As a recognized leader in sustainability, Henkel holds top positions in many international indices and rankings. Henkel's preferred shares are listed in the German stock index DAX. For more information, please visit www.henkel.com