



# One fix for the whole mix

Having a single fastening technology to deal with every material from metals to composites sounds like joined up thinking! Tim Fryer spoke to one company who believes it has such a solution

At its most obvious level, lightweighting can be achieved by simply using smaller, lighter component parts. To go a step further and make most use of some of the advanced materials on offer it can mean embracing some new technologies. There is no use, for example, in finding weight reductions from composites if you then lose its structural integrity by drilling holes in it for assembly – the fastening technology needs to be sympathetic to the materials.

PennEngineering's customers, particularly

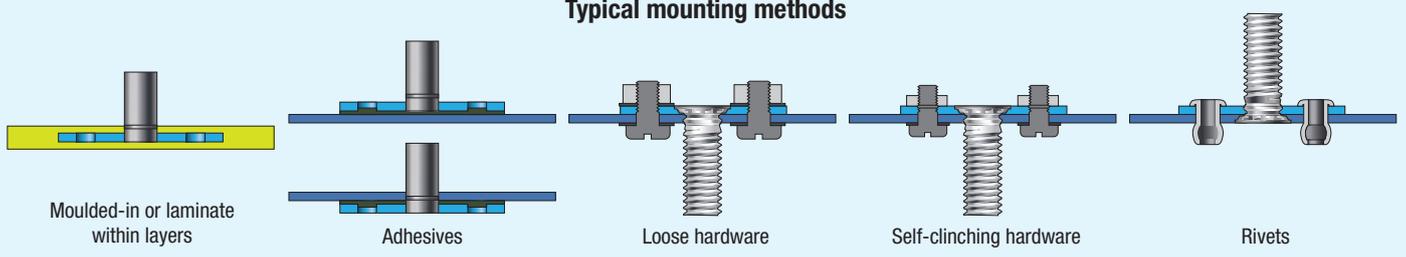
those from the automotive sector, were exploring solutions that were both strong and light, but that also satisfied the demand to be applicable across a range of materials. The company responded by deploying its self-clinching technology in a new format resulting in the VariMount product line.

Liam Foy, director of sales and marketing EMEA at Penn, commented: "The technology that's out there today, like welding, is quite unwieldy and quite costly. Self-clinch technology means that the mating component part of the VariMount is a captive part of the plate. In

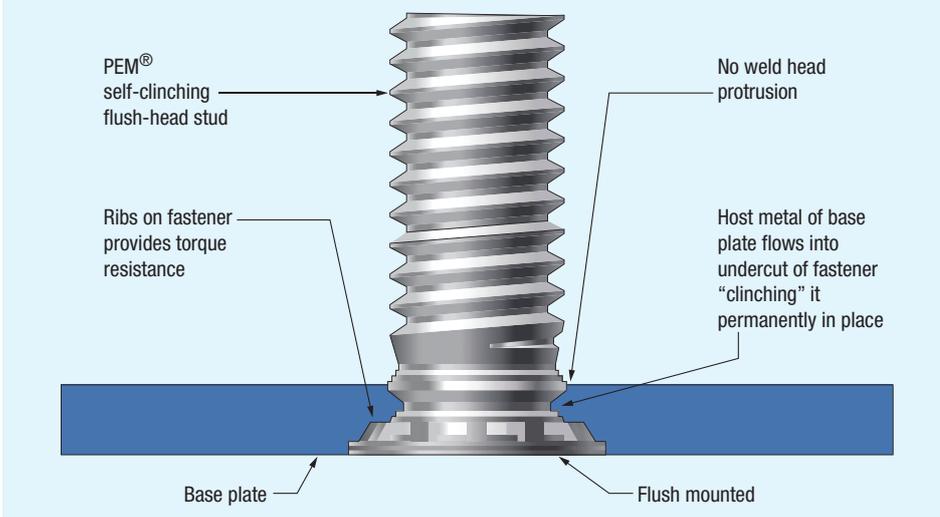
addition, there are eight various sized holes in the base plate that are designed to accept standard sized other fasteners, like rivets. The idea here is that the customers wanted a different way to mount a fastener. They spoke to us about mounting in terms of adhesives, and then they spoke to us about the different types of mating material that they wanted to mount. Those included things like plastics, laminates, substrates that you couldn't actually pierce."

The VariMount solution means the base plate can be mounted on or below a panel, or

## Typical mounting methods



**Example of a Varimount™ assembly using self-clinching technology**



between the layers of it.

“The beauty here is that you can attach any self-clinch fastener to that,” continued Foy. “So you can have a stand-off, you can have a blind nut, you can have a female thread, you can have a male thread - as the name suggests, it’s a variable mounting fastening system. It really offers the customer a unique solution to a lot of the issues that they face in terms of spreading the load and mounting on different materials.”

The core here is the self-clinching technology which revolves around the fastener being harder than the base plate material, which is made of steel or stainless steel. The PEM fasteners, of which there is a variety of types made of harder steels, will be pre-installed – therefore permanently clinched to the base plate without unsightly welds.

Foy commented: “In most cases it’s stronger than a weld. With self-clinch the fastener becomes a captive part of the sheet. It becomes locked in on this base plate.”

Standard fastener offerings are available in a range of metric and unified thread sizes and lengths include steel and stainless steel nuts, steel blind nuts, steel standoffs, and steel and stainless steel threaded studs. Beyond these standard offerings, other PEM fastener types and sizes can also be supplied pre-installed into base plates to suit particular application requirement.

The first industry that PennEngineering has concentrated on with the system is automotive, mainly because they were the ones starting to use composites. “Typically in automotive those

guys will look at their own material first,” stated Foy. “The fastener selection is way down the line. It’s very much an afterthought. But we found, especially inside the car, that they were looking for ways in which they can mount fasteners in composites. The key thing about composites is you can’t pierce it. The fastener has to be either in the layer or outside of the layer, and this system provides such a solution.”

Other likely early adopters will be the aerospace industry where the use of composites is growing and an appropriate fastening solution is required.

Foy said: “The use of metal is reducing as these industries want to reduce weight and so turn to plastics. They want a solution where they

can mount a fastening base plate and a fastener using adhesives to plastics.”

**Designer awareness**

When using with composites, designer awareness is critical. As composites can lose their integrity if they are machined the fastener needs to be part of the material’s manufacture and can no longer be an afterthought. This is typically outsourced by automotive manufacturers to composite specialists, which may be performing other functions like putting electrical connections through the composite.

Foy therefore believes VariMount will actually promote the use of composites: “One of the challenges in composites was you couldn’t mount a fastener to it. So this actually is in support of a material that’s out in the marketplace today that they didn’t have a solution for.”

Self-clinching fasteners are put together using a press and Penn has a range of equipment designed for use with its own products. But does this pose an obstacle for adoption? Not only does the design engineer need to be convinced it is the best solution but the production engineer also needs to be willing to commit to a new process.

“They are all using competing technologies already and whatever one they are using requires a secondary operation,” says Foy. “Now that there is this understanding that any fastening element is an integral part of their overall assembly, I think there’s an understanding that you need to take care of the installation as well as the fastener design itself.”

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**Self clinch goes micro**

Lightweighting, with its resultant components becoming harder and stronger, is a major trend, but there is also a continual drive to make things smaller. Particularly with electronic devices the need for smaller fastening devices that are stronger is growing. Here, a full micro range from PennEngineering is challenging the use of traditional fixing methods.

Liam Foy of PennEngineering commented: “If the mobile phone is getting smaller and smaller, and you are using screws that are going to get tinier and tinier - how do you assemble that as a high-volume manufacturer without damaging the screw, and make sure the screw aligns correctly with the mating nut? The applications require a mechanical fixing element. We actually find ourselves competing against some of the more traditional fastening methods like welding, and loose nuts and bolts. And it’s really about educating the marketplace. But we’ve got a fairly strong message to take to those guys, we can say that we can improve the speed of your assembly, we can take out the cost of welding, and ultimately, when you look at nuts and bolts, we can replace two fasteners with one.”

The microPEM fastener range have threads down to M1, pin diameters as small as 1mm and clinches into sheets as thin as 0.3mm.