

Fastening:

Yesterday with Today and Tomorrow

by Peter Standing

Thumbing through the pages of the May/June 2017 edition of Fastener World, this Author identified just over a 2 : 1 ratio of advertisements for 'Engineering' fasteners/products relative to those used for joining 'Wood.' It was the diversity of product types which caused a highly regarded memory to emerge from the special place we all keep for such recollections.

Readers may remember General Motors in the late 1980's, early 90's and 'Corporate Warrior' and Head of Purchasing, Jose Ignacio Lopez. It is not an over exaggeration to say that he, almost single handedly, truncated the US based automotive supply base.

The thought which crossed the Author's mind when looking at the range of products in the Fastener World magazine was of an event held in 1994 at the University of Birmingham in the UK. The Workshop included a presentation by Wolfram Friesenecher who was then the Manager Fasteners Development and Coordination, at the GM Opel Technical Development Centre in Germany. The presentation was entitled, 'Deproliferation' which basically means 'rationalisation'.

Mr. Friesenecher informed the meeting that he had been heading the GM Deproliferation Unit for 12 months and their role was to reduce the number of different types of fasteners which GM used. Selecting welded studs as being the first target of the programme, they identified over 800 different products on their CAD system many of which were obsolete. The cost of keeping each part on the CAD system was 12,000 DEM per year. [Note – in 1994, 1 DEM was worth 0.57 USD]. By rationalising what they had with what

they actually required, the Unit were able to reduce the number of different welded studs from over 800 to 17. Moreover, Friesenecher stated that in future, 'design control' for any other welded stud, would rest with the Deproliferation Unit' and not with design engineers. The total savings over a year would be DEM 40 million.

In a second area of interest, Mr. Friesenecher said his team had reviewed fasteners used on engines. There were 22 different fasteners employed in 6 different environments which required 6 different coatings/treatments.

In what this Author considers to be one of the best 'focused' industrial research projects, the GM team sponsored a programme of work to identify a single surface treatment which could satisfy the environmental demands for all the engine fasteners. This Friesenecher stated was achieved, again making significant savings through rationalisation and product simplification.

Friesenecher's final point was to say that his team had surveyed the European auto industry and had concluded that, if all the OEM's and Tier One's were to standardise the whole of their fastener product range in the way GM were doing, this increase in volume could be met by the output of six large fastener manufacturing units.

It was this thought which came to mind when comparing the range of 'Engineering' with 'Wood' fasteners shown in the Fastener World magazine and the consideration if, what Mr. Friesenecher had expounded, actually did take place?

Input/Output

A manufacturing unit is simply a large shed or collection of linked sheds. Into this arrives the raw material, unworked, semi finished, whatever and out comes a saleable product. The action which takes place inside the shed adds value and the more efficient it is, the greater the profit which can be expected.

Like air or liquid through a pipe, drag at the wall and too high a velocity of flow will create turbulence which in turn reduces efficiency of movement. In the same way, a 'lights out', fully automated factory operating 24/7 will only run efficiently within its design capacity. Push the output of any machine or person beyond its/their optimum performance level and the 'turbulence' this will undoubtedly create will increase inefficiency. Clearly the key desire is always to achieve and maintain 'optimum performance!'

Two ends of the Performance/Utilisation efficiency spectrum can be seen in the automotive world. At one end will be an unsophisticated simple vehicle which an owner can use, abuse and repair. The other extreme might be a Formula 1 grand prix vehicle costing many hundreds of millions of US dollars to build and race. Figure 1 shows why with only 22 vehicles set against many millions of low cost vehicles, F1 is only used as a promotional device and could never be considered a sound commercial venture.

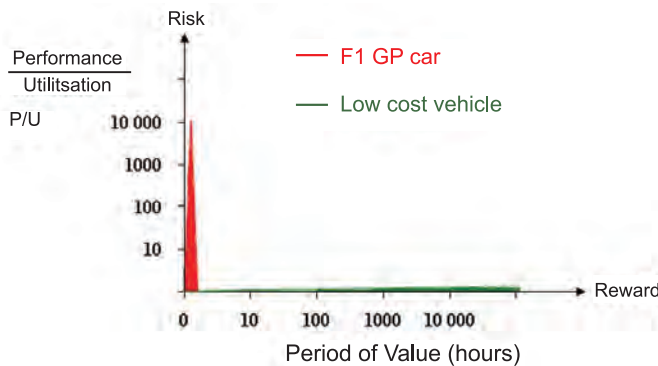


Figure 1. A spectrum of automotive value shown as a log scale.

Standard fasteners which as the name suggests relate to fasteners employed in general engineering, trade and domestic applications were originally manufactured in the developed countries where they were needed. The shift of high volume manufacture of ‘standard fasteners’ from Europe and North America to Japan, Taiwan, China and latterly India simply reflects the transition from low cost to higher value output in those countries. Standard fasteners are by nature standard products where the volume demand will always be high. What remains are the non standard products which naturally command a higher price in the market. Many of the non standard products are proprietary items developed and often patented by the companies which invented/marketed them. Until the patent expires, such items should be safe from commercial infringement.

But what about the big buyers of fasteners, the folks who have the design control, primarily the automotive industry which currently uses around 5 billion fasteners each year. What would happen if, as Mr. Friesenecher managed to do with Opel’s welded studs, OEMs/Tier 1’s reduced their product range by a factor of say just five? It is not possible to say that the current demand for five billion automotive fasteners will reduce to one billion. This is because the Opel work was based on fastener types. At present, given the vast diversity of automotive fasteners from springs, clips, plastic captive elements etc., it is not known how big the range of fastener types the OEM’s/Tier 1’s actually use is. It would not be an impossible task to find this out but it would take time and considerable effort even if all the OEMs and Tier 1’s cooperated.

Of course, it is not unlikely that other OEMs/Tier 1’s have done what Mr. Friesenecher did at GM and have Deproliferated/rationalised their own use of fasteners across all models. It is also not known how far Friesenecher took his work at GM or if he applied the Deproliferation programme across the whole range of fasteners. However, it is interesting to see Mr. Friesenecher as the contact person for General Motors 2005 Global Fastener Catalogue which can be found at www.docin.com/p-338573109.html

For some time now, vehicle architecture and platform sharing has become increasingly attractive to OEMs in their search for reduced costs. With the current uncertainty in terms of which power units will trend in the future, it seems highly likely ‘fastener’ use will be continuously rationalised to ensure a standard base exists for whatever other changes may follow.

Where to from Here?

Modular construction and design partnerships have in recent years made vehicle assembly lines shorter and significantly more efficient. Replacing on-site assembly with a bolt on modules is equivalent to taking the bends out of a pipe to improve the flow. The cost benefits this supply chain cooperation provides is now being expected from all sub Tier 1’s and it begins with design to eliminate inventory. Reduce one widget from a one million vehicle per year build and you instantly remove the costs of: material, manufacturing, distribution, inventory and save the mass of one widget on each car.

For years, the folks who make boxes for IT and electronic goods, have been brilliant in using sheet metal tabs to secure their products together. In the same way, the designers of cardboard boxes to contain and ship sometimes very odd shaped articles around the globe e.g. lawn mowers etc., achieve the most remarkably strong and secure containers by simply folding and tabbing a relatively weak and flexible material. Given the very likely prospect of driverless/crashless vehicles becoming the only available standard product people will be able to buy, the cars in 20?? could be made from polymer coated, folded and tab assembled cardboard! Vehicle safety could become something we had to deal with when we polluted the Planet?

The Construction Industry is likely to remain a very necessary and thriving sector as the global population continues to increase and people migrate to ever larger centres of population as seen in Figure 2. These will all require major infrastructural projects to maintain a ‘quality of life’ and will also require the linkages between them.

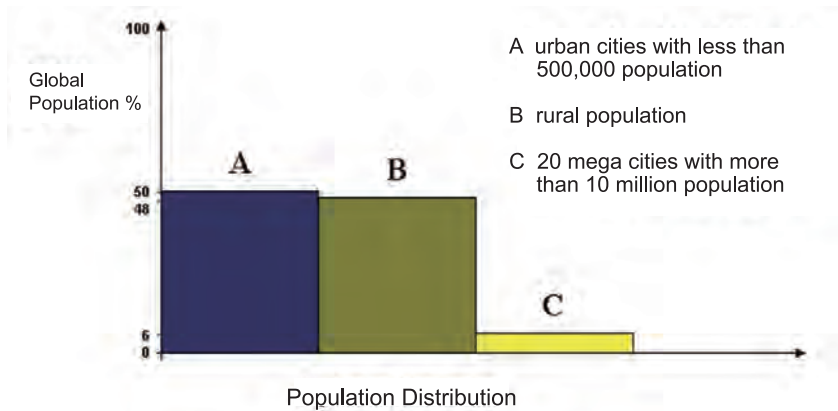


Figure 2. Current distribution of global population
(source UN)

The ‘flat pack’ furniture industry was made possible by the development of special purpose fasteners. The same philosophy is also being applied in house building, warehouse and office construction. In each case, new opportunities are opening for fastener design and manufacture to give greater freedom to those pushing the boundaries of tomorrow. This type of fastener development is not the province of large scale mass producers but those with the technology and skills to identify both the future needs and how they may be fulfilled.

The problem for the general purpose fastener manufacturer is that as industrial rationalisation increases pace, their business opportunities reduce down to being suppliers to the obsolete and special request market. Of course, whilst it lasts, this can be very lucrative but, without a dedicated on-going market, such businesses can never be more than jobbing shops.

An Afterthought

In the 1990’s the global aluminium producers declared an intention to make major in-roads into the automotive steel makers’ market. In response, 35 steel companies from 18 countries engaged Porsche Engineering Services Inc to work on an Ultralight Steel Auto Body (ULSAB) Project (www.worldautosteel.org/projects/ulsab). The work has been continued and published independently by a number of collaborating companies resulting in the rapid development and take-up of Advanced High Strength (AHS) steel for body construction. This AHS material together with the attendant manufacturing methods developed to use it have been hugely successful in producing lightweighting of passenger vehicles. Moreover, since the auto industry is the largest single user sector of steel strip rolled products, the shift to AHS will produce an inevitable decrease in the use of low carbon steel and hence introduce an increase in its price.

It is the dominance of these powerhouse industries and the impact they have on the supply chain which can have serious consequences for the small customers who use the same chain. If AHS become the ‘standard’ materials of choice, then for the reasons given above, it will be incumbent upon those who use them to be able to do

whatever is required cost effectively. The yield strength of the common AHS’s are now at least four times those of low carbon steel and in the case of boron steels, twice even that. Those working in the automotive sector using these materials have done much to develop the tooling and techniques needed to cut and shape AHS’s. Naturally, this information is proprietary and kept closely guarded as part of a company’s core technology.

Compare and contrast this knowledge base to that of the small scale, independent manufacturing facility which has little in the way of resources to develop an in-house capability of working with AHS even if they had a customer. The separation between major global players and the rest is distinct today and in the future will become an uncrossable divide. The questions is, what will remain for the rest?

Only fifty years ago in most Western countries, there existed very few ‘international’ companies, many more ‘nationally’ recognised companies and a myriad of ‘regional’ and ‘local’ manufacturers. Today, the landscape in manufacture is very different. Even though numbers of people employed and number of companies employing them have reduced by two or even three orders of magnitude, in certain sectors, e.g. automotive, the output and hence efficiency has increased.

The inexorable trend toward fewer, larger units of production will continue probably quicker than it has done to date. This will create greater opportunities for output and also for new business. But it will also require very careful consideration as to where future investment should be made. Get this wrong and there may be little chance of come-back!

In a totally regulated future where all goods are disposable, there will be few opportunities to manufacture outside existing supply chains? But the products will be low cost, efficiently produced and designed to satisfy the widest distribution of consumer demand.

So, does your Company have a strategist with a well polished crystal ball and what plans do you have for the future? In only 20 years, manufacture in China has turned the world on its head; major rationalisation is sure to follow. ■