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WHY DO FASTENER SUPPLIERS USUALLY FOCUS THEIR ATTENTION ON A SINGLE MARKET SEGMENT?

Have you ever considered why most fastener suppliers, whether a distributor or manufacturer, tend to predominantly supply customers in a single market segment? In other words, consider for a moment, aerospace and automotive customers, it is extremely rare for a fastener supplier to support both industries. Although rare, it is not unheard of for a company to supply different market segments. In fact, I can cite several examples of manufacturers that have operations focused on different market segments, including several companies which have construction and automotive focused operations and one that has both aerospace and automotive focus. However, without exception, these operations are supported separately from different sites or as completely separate and independent operating divisions.

Given this tendency, one might become inquisitive as to why this is the case? At first blush, when comparing fasteners from one market segment against another, the untrained eye may not see a lot of differences. So let's dig a little deeper and see if we can ferret out some of the differences that separate parts and suppliers to help explain why there is little or no overlap between companies simultaneously supporting different market segments.

Order (Lot) Size

Perhaps the biggest differentiator of fastener market segments is order size. This idea applies whether we are referring to a manufacturer or a distributor. Manufacturing lot sizes and customer order quantities, perhaps more than any other factor differentiates the activities, structure, and way that a supplier conducts business.

Consider for a moment the range of order sizes associated with aerospace customers. Order quantities can go as low as 1 piece and on the other end, in very rare instances, into the hundreds of thousands or even a million or more pieces. Typical order size, however, probably ranges from several hundred to about ten thousand. A significant number of aerospace fasteners are standards, which can be potentially purchased by many unrelated and separate sources. Therefore, even though purchase quantity may be quite small from an individual customer, manufacturers are able to benefit from consolidation so that manufacturing lot sizes can be larger. However, even with this fact, manufacturing lot sizes are generally small, with 20,000 to 25,000 constituting a large order.

On the other hand, consider order quantities related to automotive. In automotive, normally every part number is unique to a specific customer or small group of related customers and purchased in annual quantities. Annual quantities range on the low side from about 25,000 pieces all the way on the high side to multiple millions. In fact, most automotive fastener manufacturers have several part numbers that likely exceed ten or twenty million pieces a year and maybe one or two that exceed that by another two or three times.

Depending on the annual usage, parts are produced in reduced lot sizes and supplied in "pulls" until the lot is depleted and needs to be replenished. In other words, imagine that the annual order quantity is 1,200,000 pieces. It may be manufactured in four equal lots of 300,000 and shipped in 100,000 piece pulls once a month. In this example, the order quantity would be considered 100,000 pieces but the manufacturing lot size is 300,000.

So in comparison, the point where aerospace quantities begin to peak is where automotive quantities are just starting. This quantity differential has a significant impact in a number of areas:

¤ ***Part Cost*** **-** The cost of aerospace parts is significantly higher than automotive parts. Although, this differential cannot be entirely explained by the manufacturing quantity differences, as requisite raw materials and process variations play a strong role, it is a significant factor. With fewer parts to spread the cost of tooling, labor, and burden over, a nearly identical aerospace part will be more expensive than its automotive counterpart, often by several multiplication factors.

¤ ***Equipment*** **-** The high volume aspect of automotive, construction, and some industrial fasteners lends themselves to the purchase of higher speed and more efficient processing equipment. Aerospace manufacturers, on the other hand, will be less interested in speed and perhaps more interested in ease and speed of set-up, accuracy, or range of manufacturing.

¤ ***Plant and Process Layout*** **-** Again, a high volume manufacturing scenario will have different needs than a lower volume manufacturing scenario. This is likely to play itself out in the way the plant is arranged, the type of personnel needed to either set-up or operate the equipment, and the way that tools are purchased and consumed. In a higher volume scenario a manufacturer may choose to incorporate as many processes into one step as possible, while it may be more practical or cost efficient in a lower volume scenario to break the process into multiple steps.

Workmanship

Workmanship is a term used to describe the appearance and quality of a part. It is generally attributed to the level of craftsmanship applied to a part and the absence of obvious flaws and discontinuities. The end use of the part is a strong function of the workmanship requirements of a part. Aerospace and some automotive parts (like internal engine parts) demand much higher levels of workmanship than more ordinary, less critical parts. To provide an idea of some common workmanship issues, let's compare aerospace to general purpose fasteners.

¤ ***General Appearance*** **-** an aerospace fastener will show little or no surface damage from rough handling before or after plating, no burrs, and no obvious geometric deformities. On the other hand, it is acceptable for a general purpose fastener we would pick up at the hardware store to look a little rough around the edges. Such a part might exhibit some surface imperfections in the plating or coating, small burrs or nicks, and slight geometric deformities.

¤ ***Geometric Form*** **-** a general purpose fastener is not going to be perfect in form. We would allow such fasteners to have rough, cupped, or irregular ends where the part was cut off from the raw material during the forming process. We might expect to see small rounding or underfill wherever there is a corner and head features may not be perfectly round. Many general purpose hex head fasteners will have a formed hex head rather than a trimmed one. This is easier and faster to make, but usually results in corners that are not as sharp and don't engage a tool as well. Aerospace parts, on the other hand, often have the ends shaved flat and square, heads shaved round, and hex heads are almost always trimmed to give nice sharp corners.

¤ ***Thread Class*** **-** the thread class defines how tightly the external thread mates with the internal thread. The industry default fit is a Class 2 (inch threads). Aerospace and some internal engine components demand a Class 3, tightly fitting thread, which is significantly more difficult to manufacture and control.

¤ ***Thread Laps -*** thread laps are open discontinuities in the thread usually the result of misalignment of dies during set-up. In certain applications, especially parts subjected to fatigue loading cycles, thread laps are considered dangerous and generally unacceptable. Thread laps in certain locations may be allowed on many general purpose fasteners but are strictly forbidden on many aerospace fasteners.

¤ ***Cracks and Bursts-*** these are generally open cracks as a result of localized material overload. In many cases, cracks will not be acceptable to any customer, however, they are particularly dangerous on parts subject to fatigue loading.

¤ ***Seam Free Wire*** – seam free wire is raw material that has had the outer layer removed. By removing the outer layer, any imperfections in the surface of the raw material are also removed. These imperfections usually manifest themselves as cracks or open discontinuities on finished parts. Once again, although this material comes at a significant cost premium, it is commonly used in aerospace where fatigue considerations reign supreme.

¤ ***Specific Process Steps*** – in addition to the issues described above it is not uncommon for aerospace fasteners to have threads and fillet radius rolled after heat treatment. Although these operations significantly reduce the life of the tooling used and increase part cost, they improve fatigue life and add value to those fasteners where they are employed.

Quality Systems And Certifications

Another significant distinguisher between market segments are the quality systems. For the last twenty or so years ISO9001 has been universally recognized as the benchmark quality system. Both the automotive and aerospace industries, however, have additional and segment specific requirements that are important to them. As a result, automotive suppliers are required to have a system registered to IATF 16949. This standard adds an additional 275 requirements on top of the 135 already included in ISO 9001. For aerospace there is AS9100 for manufacturers and AS9120 for distributors. Like the automotive standard these add many additional requirements above and beyond the ones included in ISO9001.

In the automotive market segment, generally the only requirement is to obtain and maintain IATF 16949 status. Industrial and construction market segments encourage ISO 9001, although with most customers this is probably not a necessity.

Although it probably does not come as any surprise, Aerospace has probably the most stringent requirements. In addition to requiring AS9100 or AS9120, some aerospace customers provide their own approvals or certifications. Often a supplier is unable to supply parts to one of these customers if they don't have the requisite company specific certification. Additionally, aerospace often requires source approval, meaning that only certain companies can supply finished parts or only approved vendors can provide selected services. Often these vendors have to get company specific approvals or obtain NADCAP certifications for the "special processes" they provide.

Supply Channels

In North America the supply channels vary between the different market segments. For the OEM and Tier automotive community, supply is almost exclusively from direct relationships with manufacturers. In the industrial segment supply is a mix between direct manufacturer relationships and distributors (many of the distributors adding value with vendor managed inventory services). The construction segment is serviced by distributors and retail outlets. Aerospace is a mix of direct manufacturing and distributor relationships.

Like some of the previous points, the supply channel illustrates how these market segments are separated. For example, the Aerospace segment uses distribution, but these distributors are exclusively focused on aerospace customers.

Standards

Fasteners can be categorized into one of three categories; customer specific parts, Consensus Standard parts, and Non-consensus Standard parts. Customer specific parts are unique to a specific customer. The customer likely has a unique print and part number for every part that falls into this category. When someone talks about standard fasteners it excludes this category of parts.

Consensus Standard parts are those that are subject to standards from a Consensus Standards Organization (CSO). A CSO has specific rules and procedures about how a standard is drafted, which involves a group of industry experts reaching a relative consensus position on the contents of the standard. A couple of examples of Consensus Standard Organizations include ASME, ASTM, SAE, NASC, and ISO. Non-consensus Standards are those generated by an organization that is not conducted using a consensus procedure. Essentially any company specific standard such as ones published by GM, Boeing, and John Deere are examples of Non-consensus Standards.

The different fastener segments utilize standards differently. In automotive, almost all fasteners are customer specific parts and utilize company Non-consensus Standards to provide context to specific points such as material, product strength, and platings. Take GM as an example, they will release a GM part number and print for even a simple fastener that other market segments would use a Consensus Standard for. On that GM print there will be references to GM standards for material, plating, and part strength, but there is not one broad product standard.

About one half of aerospace parts are customer specific and are guided by either prints or Non-consensus company standards, while the other half are Consensus Standards, mostly from the National Aerospace Standards Committee (NAS and NASM standards). These are mostly product standards that are universally used throughout the entire industry. This makes it easier for a customer purchasing a small quantity of parts through an aerospace fastener distributor because the distributor may have fifty other customers purchasing the same standard part.

The industrial segment uses a mix of Non-consensus, customer specific standards and Consensus Standards. This segment uses mostly ASTM, ASME, SAE, and ISO standards.

There are perhaps a variety of other answers to the question about why fastener suppliers are focused on individual market segments, specifically related to marketing, sales, customer service, and branding, but these points above serve to provide some good insight into why fastener suppliers generally support only a single market segment. History shows that it is very difficult for a supplier to break into one of these other segments if they are well established in a current one. I believe the primary reason for this is not that the technical hurdles are impossible to overcome, although aerospace fasteners require some technical attributes that must be carefully learned, but rather that customer requirements and business expectations between market segments are different enough that it is very difficult to provide the necessary segment focus with shared resources, so that it simply doesn't happen and the market is structured the way it is today.