High performance fibres

High performance yarns (Aramid, Dyneema, Nomex, etc.)

In recent years, new, tough fibres have been introduced to the market. These fibres, such as aramids, are distinctive in that they have a very high strength-to-weight ratio. Their applications of pressure vessels, flak jackets, etc., are now very familiar. This category includes materials such as Aramid, Dyneema, Spectra, Nomex and others. These fibres have different formulations from everyday fibres such as nylon and polyester, but they share simple external physical characteristic with common fibres, in that they are all relatively low-count continuous-filament materials.

However, they are tough; they are usually difficult to cut. Failure to cut the waste ends reliably and cleanly certainly can make splicing performance unreliable, and this issue is a perennial headache for splicer manufacturers and users. However, the business of cutting is purely an engineering problem, which has no direct relevance to the mechanisms of splicing.

In many respects, the new fibres behave just like nylon or polyester. They are continuous filament yarns, and generally have a negligible twist level and might therefore be considered to ideal candidates for splicing. All other things being equal, with cutting problems excepted, an aramid splice should be very similar to a nylon splice. A splice in nylon / polyester and a splice in an aramid of similar count, are remarkably similar, and they have a reasonably similar absolute strength.

However, another major issue exists for splicing advanced fibres. It is one of perception. The absolute breaking load of an aramid splice, and the absolute breaking load of a nylon splice, are not that much different. But when the breaking load is reported as a proportion of the parent yarn strength, an aramid splice looks very poor, and this fact displeases the users. Knowing that the fibre is being used in extreme environments, they are concerned that a “weak” splice will fail in service.

Whatever the actual merit of such an argument, it needs to be accepted that it inhibits willingness of aramid users to accept the application of splicers to their operations. The technical solution is simply to make the splice longer. When splicing an inherently strong yarn, maintaining an acceptable percentage of parent yarn strength will require a longer splice length, and therefore greater knife spacing. The change of splicing performance with change of yarn strength can therefore be addressed as a particular case of the phenomenon of “scaling”.

Airbond have addressed this issue in two ways – either of which can be chosen, according to the environment:

- the Models 113, 701 and 702, with no automatic cutters, are immune to the problems of deterioration of knife performance, and can make splices of any length.
- Our large, bench mounted splicers such as the Models 121 and 122, incorporate a radical new cutting system. Splice length is fixed, but ample.
- And new splicers are in development.