From Jack Wilcock

First I'll give you a rundown on my background. My working life was altogether aircraft. First, a RAF Apprenticeship at Halton, then wartime fighter aircraft servicing in the south of England; starting at Warton as a junior draughtsman; working my way up through the ranks to spend my final twenty years as the Divisional Chief Standards Engineer, responsible in particular for compiling the international Panavia Standards Manual for Tornado and also working as a leading member in an ISO aerospace fasteners committee. In retirement I have published three local history books, am preparing a fourth and have written my autobiography (not for publication).

My involvement with TSR.2 was as a Group Leader in the Design Office at Warton responsible for the integration of systems into the structural build. In a design programme structural design happens while the systems are still being thought about, so there is a chance that expensive repair with delay might be required later on if system requirements are not anticipated. My job was to look into a crystal ball and predict the systems needed to ensure that structural designers were adequately forewarned. I also had to liaise closely with Weybridge about the marry-up of systems to their half. These tasks led quite naturally on to three other jobs: small bore piping, provision for instrumentation and a few weeks heading up Warton design liaison at Boscombe Down.

TSR.2 was Warton's first collaborative project and Weybridge were prime contractor, so there was a need to align design procedures, including adopting the Weybridge drawing system. Whereas previously each Warton systems group looked after their own pipe runs, the routing of everybody's small bore pipes became my concern. Instead of drawing pipes in detail, which required meticulous and time consuming draughtsmanship, and even then needed adjustment on build, the routes were sketched out in line form and extensive use made of the mockup, to which I made frequent visits.

On past projects the pipe fairleads had been fashioned from a hard composite material called Tufnol. A basic design consideration is that piping should not restrain the structure in any way, and because the structure bends and stretches in flight, the pipe clamps must not grip the pipes too tightly nor be too slack. The solution we chose to use on TSR.2 was to make the fairleads from a very hard rubber faced with a thin lining of PTFE, just then coming in to vogue. The problem was that PTFE is slippery, so how do you attach it to another substance? Fortunately, a supplier was found who had solved this problem. Nowadays an equivalent can be found on the PTFE-faced rubber pads used under heavy domestic items so that they can be slid around quite easily, but I guess our usage was an early application of this technique.

I remember other tricky problems. The TSR.2 had an all moving tailplane with some kind of trim tabs worked by hydraulics, so there was a need to install a swivelling connection alongside the bulky tailplane pivot. This was designed by a sub-contractor, but fitting it in to a very limited space required precise draughtsmanship.

That was one, another was that the rear fuselage piping had perforce to run along an inverted tunnel along the underside and consequently was subject to a fair amount of stretch. The same sub-contractor designed a pressure balanced joint to allow for this. The engine installation was quite fraught, with many connections crammed into an access bay underneath, and fortunately not my responsibility, although I had to link up with the various systems on the bulkheads fore and aft. A major exercise was to tidy the lot up on the fifteenth aeroplane, and we were working on this when cancellation struck.

Once the design was reasonably advance, along came the Flight Test people wanting to thread their extensive instrumentation leads through the structure. I'll now quote from my autobiography.

‘One problem I was faced with was to cater for a staggering amount of instrumentation required on the prototypes by Flight Test which meant finding throughways for masses of electrical cables and small bore pipes. The cables, being flexible, could be fed through a succession of holes in the framework, but rigid pipes presented difficulty. It so happened that, as the quandary came to light, I was scheduled to attend the Farnborough Air Show. On one of the trade stands I spotted a pipe connector which needed no special pipe end preparation, and on another I saw coils of pliable PTFE piping, then a fairly new concept. I gathered samples of each and took them back to Warton to make sure they would work well together, which they did. The business of routing pipes through difficult pathways had been considerably simplified. Contrary to the generally held opinion that trips to Farnborough were merely days out for the workers, I had used my visit to good effect.’

I was pleased to see that this solution was later adopted by colleagues at Filton working on the Concorde.

I hope my remembrances are of some use to you. I quite enjoyed contributing to the project, but I feel fortunate to have had a very satisfying career in the aircraft industry anyway.

Jack Wilcock