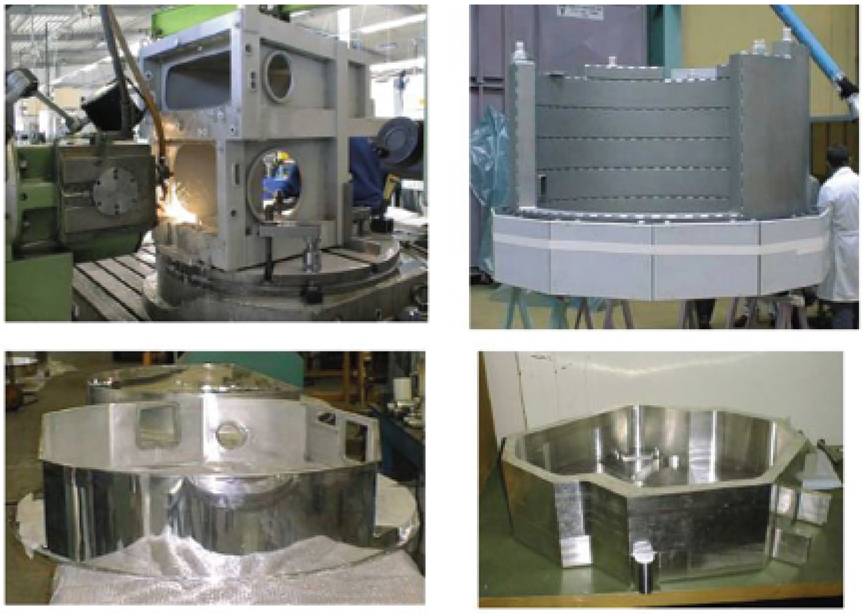

Figure 8: Clockwise from top left - the TMA support structure, instrument support structure, radiation shield and pre-slit optics housing during manufacturing.

facility used to qualify many of the ISAAC, SOFI and now CRIRES functions before integration. Figures 6 – 8 show various other optical and mechanical parts as described in the captions. In principle, everything could now go ahead full steam – were it not for those other instruments just mentioned plus a few other activities which are currently overloading our integration laboratory. To be fair however, some of items shown were also delivered late and we are still awaiting delivery from Sagem of the TMA mirrors which have just been accepted at their premises in France.

Electronics and Software

The electronics and software for controlling both the CRIRES spectrometer and the AO system are proceeding well. Motors are being driven and their control parameters fine tuned. The Observing Software and Real Time Displays are being finalized. The IRACE detector acquisition electronics and software are being used for the detector tests. On the Science Operations side, the instrument observing modes have also been defined, the corresponding observing templates are being coded and first thoughts are being given to the pipeline.

CRIRES on sky?

Unless anything goes seriously wrong with CRIRES or one of those other projects competing for the same manpower we expect to see 1st light on the VLT in the first quarter of 2005. Watch this space.

Addendum to

"The History and Development of the ESO Active Optics System"

(*The ESO Messenger* No.113)

R.N. Wilson

Following my article, I received a most interesting e-mail from my ex-colleague of ESO and good friend, Daniel Enard. He was concerned about the precise chronology of the development of the ESO Shack-Hartmann image analyser – see the second section of my article. Enard pointed out that *he* and I first visited Roland Shack together in February 1976, *before* the 3.6 m telescope was set up some months later. Already before then I knew of the Shack proposal as I had been receiving the "Optical Sciences Center Newsletter", in which it was first published in 1971 (see Ref. W99 in my article). This was why we visited Shack to learn more about it. Shack complained bitterly of lack of interest in the American community and was encouraged by our deep and practical interest.

In further discussions with Francis Franza, we have now concluded that he and I visited Shack again in 1977 (not in 1979 as I wrote in my article) and it was then that Shack gave me the lenslet raster. This was the difficult element: otherwise the construction of the S-H image analyser was quite straightforward. It was with this original raster, made on a lathe by Shack, that ANTARES I was built in 1978 (see W99, Fig. 2.24) for testing *off-line* ESO telescopes on La Silla. The S-H plates were measured on the PDS measuring machine at ESO Garching. We believe that this was the first Shack-Hartmann image analyser actually built and used for testing telescopes. In view of its importance today in so many active and adaptive optics applications, we see this now as an important step forward in the necessary technology.

Franza and I investigated a number of possibilities of producing S-H rasters mechanically with a German firm, but the firm went bankrupt before any results came out. The breakthrough in this procurement problem came when I gave a talk in Graz about Active Optics in 1981 and Franza saw a poster presentation of a *laser etching* technique presented by the RCA Laboratories in Zurich, later renamed the Paul Scherrer Institute (see W99). Two successful negative masters were afterwards made to an ESO contract and replicas were made for the final raster screens by Jobin-Yvon in Paris. This was the source of all successful screens used for the further experiments in ESO and for the NTT. The masters for the VLT were also made by the Paul Scherrer Institute, which also supplied the replicas.

Shack's original mechanical method of raster manufacture is now probably only of historical interest, but it nevertheless showed his genius. He produced rows of cylindrical lenses by stepping on the lathe and fine grinding and polishing with a concave cylindrical rod. Then he turned the raster through 90° and produced cross-cylindrical lenses. He had proved theoretically that the difference between these cross-cylindrical lenses and true axially symmetrical lenses was well below the diffraction limit for such extremely weak lenses with 1 mm square aperture and 80 mm focal length.

My thanks are due to Daniel Enard and Francis Franza for further clarifying this historical development, which was of fundamental importance for both the NTT and the VLT.