

WASC 1953

History of:  
Materials Dept.  
at Waltham Abbey  
R. D. Sims



### History of Materials 1 Department at Waltham Abbey

During the 1950s a department entitled DMXRD, the directorate of materials for explosives research and development existed within the MoD in London. This department was staffed with technical staff but was to a large extent advisory. It was realised that to fulfil their role properly laboratories were needed to carry out experimental work and hence laboratories near to London were sought. Spare laboratories were available at Waltham Abbey so some of the group moved as a lodger group to take over an empty building, L134, at Waltham Abbey in about 1958. The Superintendent at this time was Mr Warburton-Hall who spent two or three days with the section at Waltham Abbey and the rest in London. Warburton-Hall was quite special in that he had invented a fire detection system for jet engines based on the fact that certain glasses became conductive at high temperatures and had been rewarded by the MoD with a cash payment (very unusual).

The original members of the group as far as I can remember were Basil McNulty (in charge at WA when Warburton-Hall was in London), Dr Garvie (tropical testing), George Harding (plastics), Eddie Hazell (testing), Wilf Dukes and Bob Bryant (adhesives), John Wright (paints), Arthur Stokoe (rubbers), Eric Poupard, and Bill Pullen (plastic driving bands). Some of the early tasks they were involved in were rubber Dracones for the storage of fuels, nylon driving bands for shells, developed at Halex the toothbrush people then at Hertford, paints, adhesives and the weathering of in particular polyethylene at the tropical outstation site then in Nigeria.

In 1960 a building next to L134, L137 was gutted and completely refurbished with the addition of an air conditioned tensile test room and about this time DMXRD became a section of Waltham Abbey. At this time there was only the one materials group SM1. This was a time of rapid expansion with the recruitment of a number of graduates including Drs John Roberts, John Golden, Terry Hobin, David Sims, and Tony Davis plus a number of supporting staff between the years 1960 and 1962.

These staff allowed work to commence on many physical properties of basic polymeric materials.

It was realised however that it was difficult to give advice on rubber and plastic components unless the department was able to mould these on a trial basis itself so within 2 years L143 had been acquired and was fitted out with a rubber mill, a press and a Peco injection moulding machine so as to allow the processing of rubbers and plastics to known standards. An old magazine L135 became a workshop and L132 housed an electrode boiler and a curing autoclav. Building L130 which had been the materials store was knocked down as it was very contaminated and the store moved into L143 for solids and L194 for liquids.

After Warburton Hall retired in 1964/5, the section was led for a fairly short time by Dr Ray Williams, a spectroscopist. He, however, moved on to the Metropolitan Police Forensic Science Laboratory. The post of Superintendent was then filled by Dr Brian Hollingsworth. He had a year or two previously joined the materials section to work on the synthesis of polyesters that might be useful as rocket motor binders. In 1965 Dr Sims was also working on the synthesis of polymers potentially useful as binders. In his case he was working on polytetrahydrofurans.

Under Dr Hollingsworth the polymer applications side was expanded. The bridge building L166 was constructed as offices and work began on asbestos, glass and carbon fibre filled thermoplastics. An annexe was built along the length of L143 to accommodate an extruder and allow investigations into the production of ethyl

cellulose inhibition for EDB rocket motors together with research on preparation and extrusion of lower smoke materials.

The adhesives section was split off and came under the wing of Dr Tony Kinloch as part of SP2 section

Basic studies were not neglected and work continued on high speed impact behaviour of plastics (Golden and Hazell), degradation of polymeric materials by radiation and tropical exposure (Davis), relationships between structure and properties of polyurethanes (Wright), moulding and moisture uptake of nylon driving bands (Pullen and Stokoe), storage of fully cured rubber at low temperatures (Stokoe) and basic physics of plastics (Roberts), the weathering of plastics and the effects of moulding on these (Sims and Davis) and the synthesis of novel polymer systems (Richards)

About 1970 an NMR machine had been purchased and Dr Tony Cunliffe recruited to investigate the NMR properties of polymers. In the mid 1970s Dr John C Wright joined the group to look at the degradation of HTPB propellant binders containing heavy metal oxides used in some fast burning compositions.

These years represented the zenith of the Materials 1 Group.

Within months the group was broken up with Dr Hollingsworth assuming head of Propellants 2 section following the retirement of Dr Freeman. By now the technology side of the Materials group now led by Dr Sims had outgrown L143 and was relocated and re-equipped in building G418 on South Site to become part of the chemical engineering (Process Research) group and Dr Richards novel polymer systems group also became attached to process research.

The polymer technology group quickly became a prototype and small scale manufacturing unit making specialised parts that could not be easily obtained from industry. Manufacture of ethyl cellulose tubing for EDB rockets produced by RO Bishopton became one of the early prime products and 14,000 lengths of 2" tubing were made in 2 weeks for the Falklands war. Many other important products followed including:- rubber seals for gun mounts, vents for chieftain tank guns, head end liners and boots for rocket motors, Chevaline seals. Plastics parts included various conducting ware for RO factories, the desiccator pack/burster disc for LAW, protective nose cap for Stingray and the radome for Harrier jump jets plus the documentation of all the associated specifications for the above.

A considerable amount of research was still carried out including work on newer insulants and methods of application to rocket motors and on the formulation of rubbers compatible with hydrazine or with IRFNA.

In 1985 PERME was split up with various parts being assigned to RO or left with the MoD and becoming part of RARDE. This situation continued quite satisfactorily until it was decided to close Waltham Abbey. During 1990 the part belonging to RO was scattered around the UK to various RO sites. Most materials work moved to RO Summerfield. By 1991 the remaining parts at WA were relocated to RARDE at Sevenoaks.

All other MoD materials groups notably at Woolwich, Holton Heath, Sevenoaks and Farnborough have been closed or much reduced in scope since that time.

DS 2008 This is as I remember therefore some events may be out of order.