PAINT IT GREY

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In the beginning

Just as CCL was formed, The Environment Protection Act (1990) passed into law. Among its provisions were limitations on the amount of solvent that paints and printing inks could contain, i.e. Volatile Organic Content (VOC). The screw would be tightened in two stages, listing maximum VOC to be achieved by 1996, followed by lower target levels in 1998. The MoD itself then took up the reins by decreeing that its total solvent usage must be reduced by 30% by the year 2000 (Table.1).

TABLE.1 – *EPA(1990) v MoD(N) VOC Limits*

PAINT TYPE	PG 6/23 (1997)	MoD(N) 2004
Holding Primer	780	600
Blast/Shop Primer	780	600
All other Primers	500	200
Antifoulings	500	400
Bilges	450	300
Ballast Tanks	450	400
All Tank Coatings	650 (Fuel)	390
External Finishes	560	420
Internal Finishes	560	200
Tie Coats	560	550

As if this wasn't enough to cause a complete change in RN paint usage, new Health and Safety regulations dictated that lead, coal tar, bitumen, soluble chromates and isocyanates (e.g. polyurethane paints) could no longer be used in the RN if alternatives were available (Table.2).

TABLE.2 – *Health and Safety*

- No Coal Tar Epoxies.
- No Soluble Chromates (e.g. Etch Primers).
- No Isocyanates (e.g. Polyurethane Finishes).
- Internal Paints suitable for ships and submarines.
- Low Noise/Dust during steel preparation.
- Restrictions on the use of Power Tools.

Prior to 1991, the Defence Research Agency (DRA→DERA→QinetiQ) issued Defence Standards for paint, with formulation and performance requirements closely specified. Manufacturers were approved to make the various paints and could then respond to MoD ITT for supply contracts. The successful bidder piled the specified number of cans onto a lorry and forgot it – i.e. no after sales service; fault investigation; or advice on specifications was required. Nor did the

manufacturer have to lay down stocks, as the Royal Dockyards stocked in quantities calculated on the previous year's usage. The system led to 'feast or famine', alternating between over-supply (and waste, when stored paint exceeded its shelf life) and shortages because RN stocks were exhausted, and manufacturers' lead times were excessive. Lead-time and cost were increased by the MoD requiring small quantities; special containers and non-standard batch tests.

Meanwhile, commercial shipping companies benefited from before/after sales service, such as preparation of specifications; attendance of a technical inspector throughout any docking; and sale or return of the paint. Woe betide a paint company whose representative failed to meet a customer's vessel on arrival in any major port worldwide. The older reader will probably remember the pipe,

"The Gieves representative is now in attendance in the Wardroom Flat",

Our service had to be very similar. Stocks were computer controlled, with orders placed by 1500 being delivered in the UK the next working day. All this was included in the price of the paint, as was a general warranty that was always enforced. On rare occasions, e.g. when special products were to be applied in cargo tanks, a separate guarantee would be required and this guarantee would be insured through specialist brokers. This procedure, added about 5+% to total costs, with premiums dependant upon the claims history of the product involved. The insurance company was also likely to require independent paint inspection, which was charged separately. However, the MoD is paying a lot more for 'de-risking' at present – and with mixed results.

Faced with a requirement to change 95% of the paint inventory, and a need to reduce costs by using civilian products where possible, some IPTs simply altered their paint specifications to read 'Paint to Commercial Standards'. This all went horribly wrong when they got 'Greek Shipowner' instead of P&O, and some of the newer ships are still suffering from application of cheap coatings at low film thickness during build (FIGS 1&2).

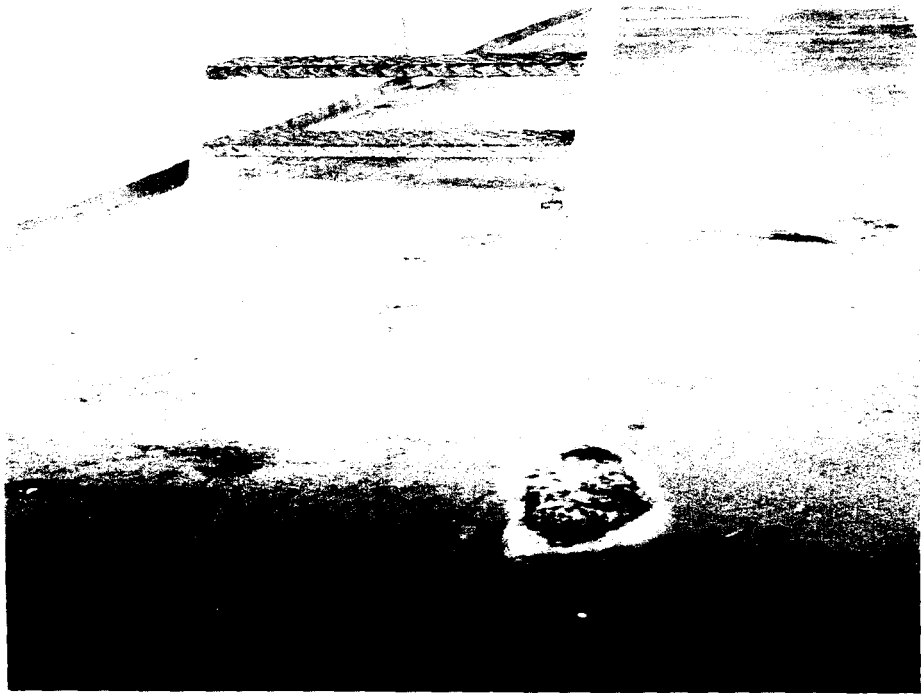

FIG.1 – HMS NEW SHIP AFTER GUARANTEE RECTIFICATION

FIG.2 – HMS NEW SHIP AFTER GUARANTEE RECTIFICATION

Getting it right

A great deal of thought and experience was invested in producing a completely new system for specifying, procuring and using paint for the RN. As a start, it was recognized that we are a relatively small customer and that manufacturers were unlikely to invest in R&D to produce special products. However, the pattern of operations, maintenance and habitability differs markedly between commercial and military shipping; thus not all commercial coating systems are suitable for RN use.

The first step was to produce a list of 'Design Life Requirements' covering all the major areas of a warship (Table 3).

TABLE.3 – *Mod Design Life Targets (2000-2004)*

Holding Primer	6 Months
Hull Primer	10 Years
Antifouling	5 Years
External Finish	3 Years
Internal Primer	25 Years
Tank Coatings	15 Years
Bilges (zinc sprayed)	25 Years
Internal Finish	5 Years

These requirements took into account maintenance intervals and reduction of Through Life Costs. Manufacturers were then given guidance on 'Performance Characteristics' – e.g. VOC, H&S, min/max drying and overcoating times etc. – to ensure that application of each coating system was practicable. To encourage suppliers to participate, and to bring the RN into commercial practice, the 'Whole

Ship Specification' (WSS) scheme enabled them to register suitable commercial systems for every ship area (Table 4).

TABLE 4 – *CVF Design Life Targets*

Holding Primer	6 Months
Hull Primer	15 Years
Antifouling	6 (12?) Years
External Finish	6 Years
Internal Primer	25 Years
Tank Coatings	15 Years
Voids	25 Years
Bilges (zinc sprayed)	25 Years
Internal Finish	5 Years

The 7 major marine paint suppliers participating could then compete to supply a complete ship at refit. The successful bidder was also allocated to that ship for stores supply for the next 5 years, with the option of a further 5 depending on service and performance. As coating systems and thickness were registered with STGMT, and warranted to have the required design life, there could be no compromise with quality or quantity during bidding. Success depended on the best price and (to a lesser extent) service during the refit. This procedure correlated closely with commercial practice, and was initially reported to have reduced refit paint costs by 30% when instituted by the surface ship IPTs.

Prior to publication of the WSS, examples of the new 'VOC-compliant' generic paint systems – such as waterbased acrylics for internal and external use – were evaluated on the museum ships HMS *Plymouth* (FIG.3) and *Belfast*.

FIG.3 – HMS PLYMOUTH – TESTING NEW GENERIC TYPES COLOUR AND GLOSS MEASUREMENTS

This was more to check cosmetic appearance and ease of application than performance. The trials contractor soon stopped preening himself on being chosen, when told that,

"If he could apply it successfully, then anyone could."

As an exception to the new system, 'ship stoppers' – i.e. Flight and Weather decks, Cleansing Stations and FW tank coatings are subject to more stringent evaluation, including lab tests by QinetiQ. Where possible, innovative new coatings are trialled on front line warships, but IPTs and the operating authorities seem loath to allocate platforms. This doesn't stop them complaining, however, when other navies appear to possess more advanced coatings.

Logistics specialists will have spotted that the WSS system introduced a problem for NPPO. It would have existed in any case, as many of the paints listed in the 8010/0442 CRSP are now illegal. Since any one of 7 manufacturers might supply stores paints, their maintenance products all had to be codified. However, paints that were not for actual RN use (e.g. tank and hull coatings applied by contractors) need not be codified. Quantities could be estimated by the professionals and ordered direct for next day delivery. Potentially a great cost saver, but very slow in implementation.

Documentation

It was realized that such large procedural changes needed to be well advertised and explained. An early step was to write a second volume to *The Manual of Ship Husbandry* (BR2203), called *Paint and the Painting Process*. This attempts to explain the theory of paint for non-experts, and has been in circulation for 2 years. The next task was to combine all the old paint NES (since become DefStan). However, such publications take years to amend (let alone print) and it was decided to split the information, placing process guidance and requirements in a BR and product information in *Warpaint*, which would be published every 6 months. The BR would be 'BR3939 Issue 2'. This has been in draft form for some time, and is now due for issue.

Problems

Implementation

The process so far has been for WSS to be implemented only as ships enter refit. This has resulted in more than half of the Fleet being 'unallocated' to a paint supplier and wondering whose paint to order. Cost savings, which would easily realize the 20% reductions beloved of DLO, are slipping away and the technical support available in the event of paint breakdown goes to the Contractor – not to the MoD.

For the system to have maximum effect, and reap the cost and performance benefits enjoyed by commercial shipping, the MOD must be the customer. NPPO should conduct a tender exercise (as it does now for stores), selecting perhaps 3 WSS suppliers. Their prices would apply for refit **and** stores paints, with an agreed indexing over 5 years. Presently, prices are cut to the bone to gain the refit supply to the Yard, but we have then seen both Yard and the Painting Contractor charge 'Handling Fees', which are added to the paint price. Manufacturers make up their profits on stores supply to the MoD, which thus loses out both ways.

Coordination

Probably because of a lack of understanding of the function of the new processes, and delay in issue of BR3939 Issue 2, there is widespread lack of co-ordination of paint policy implementation. For example, two consultants from the same company appear to have reached study conclusions that are totally at variance. One (for WSA) has concluded that all paint supply and application should be dealt with by a single contractor. The other (for NPPO) has concluded that all paint should be supplied by the MoD through a warehousing contractor. Neither has taken on board the work carried out by STGMT in the past years or seems willing to consider the combined STGMT/CCL/Paint suppliers' advice.

Maintenance in Fleet Time

Our Helpline is kept busy with calls from ships that are due for maintenance periods, and have been told to choose and order the paint themselves. In the case of specialist tank coatings, they probably lack the expertise to choose the appropriate product. They are also likely to over/under order, as the staff involved are not trained estimators. It would be far better to allow the painting contractor to estimate and procure the paint that, with a properly written NPPO contract, would be at MoD prices. With paint available next working day and substrate preparation to be done, there is time for a proper survey and estimation of surface area without delay to the projected work. Any surplus paint can then be applied to the next job, instead of being left as scrap on the berth when the ship sails.

Quality

The MoD needs, and has specified, extended performance from warship coating systems. However, modern paints demand intelligent handling and substrate preparation (Table 5).

TABLE.5 – *Achieving Design Life*

Coating system life depends upon:

- The working environment.
- Subtstrate preparartion – profile and cleanliness.
- Paint quality.
- Correct choice of generic paint type.
- Overall dry film thickness.
- Application – workmanship, equipment and microclimatic conditions.

For example, high performance epoxies are subject to such large curing stresses that, given an inadequate surface key (substrate profile) they will simply detach. In general, because of condensation problems, tanks can only be coated with the ship in dry dock – or with expert advice on hand. No coating should be applied on surfaces that have not been tested for soluble salts. Such rules are constantly ignored, and budgets wasted, because expert advice is not on hand. Commercial ship owners would not consider carrying out such work without the presence of the paint supplier's technical representative – supplied at no extra cost – and the MoD should play to the same rules. The makers' representative supervises installation of new electronic or mechanical equipment, and much of it is cheaper than recoating tanks in a T42 or the Flight Deck on CVS.

Stocking

Certain parts of the MoD seem uneasy in this electronic age, and do not trust 'Just in Time' (JIT) delivery. We were contracted in 1994 to propose ways of ensuring JIT delivery of RN paint and concluded that, as long as the paint; containers; labels; batch tests were identical with commercial stocks, suppliers' own electronic stock control would ensure JIT delivery for RN use. However, if any one facet changed, the stock control number changed and the paint had to be made and stocked separately. This is a result of 'Total Quality Management' (TQM) and is unavoidable. If this conclusion were observed, there would be no requirement for major MoD paint stocks and their associated manpower, real estate and bureaucracy.

Summary

a. MoD – STGMT has generated new processes for the specification, procurement and application of modern coatings for the Fleet. The processes closely mirror commercial practice and allow for the changes enforced by Environmental and H&S legislation.

b. The associated guidance documentation has been slow to appear, but will shortly be available so that the new processes can be fully understood and implemented.

c. Full implementation would produce the financial savings required by DLO, together with other savings associated with TLC reduction and the abolition of major MoD and shipyard paint stocks.

d. Implementation appears to be threatened by other studies being conducted for the MoD, apparently without a full knowledge of best commercial practice within the paint industry.

e. Implementation throughout the Fleet can be rapidly achieved using NPPO tender action; allowing IPTs to select suppliers of refit and stores paints.