CHAPTER I

THE PROTECTION OF DIFFERENT PARTS OF SHIPS UNDER CONSTRUCTION

1.1. Introduction

The construction of a new ship begins with the welding together of plates and profiles into block sections. Before being welded, the various parts have undergone mechanical treatments such as rolling flat, cutting to size, bending, stretching and drilling. The sections are usually built under cover, in the so-called section hall. They are transported to the slipway, where they are welded together. Most slipways are not covered, although a growing number of yards in Western and Northern Europe build their ships completely under cover and consequently they are no longer dependent on the climate. Before the ship is launched for fitting-out, after welding the sections together, it is always necessary to apply a protective paint system to the bottom, the boottop area and preferably to the entire outer hull. If the ship is to lie in sea water during fitting-out, it is recommended that one or more coats of antifouling paint should be applied to the underwater plating before launching.

1.2. Protective methods

Current practice is to blast-clean the steel plates and profiles that are to be assembled into sections and to coat them with a prefabrication primer (shop-primer, shop-coat, see 5.1). The main advantage is that for a considerable time during the construction period the steel is protected from corrosion and contamination by atmospheric pollution; an additional advantage is that workshops remain clean. This method is called building in the shop coat.

The classical method is the so-called building-in-rust, in which surface preparation and painting are deferred until the sections have been welded together on the slipway. During construction, weathering will partially or completely remove the mill scale. This process, however, is often accompanied by more or less severe pitting, which can reduce the lifetime of paint systems considerably, even when the entire substrate is thoroughly blast-cleaned before painting. Also, it should be taken into consideration that large-scale blast-cleaning in the open air, is not always acceptable in view of the environmental pollution it causes. For the above mentioned reasons the building-in-rust method is unattractive. In Europe, this method has not been practiced for a long time.
A variation of the building-in-rust method is to blast-clean the steel plates before fabricating the sections, and to carry out further surface preparation and painting after welding the sections on the slipway. The time lapse between blast-cleaning and painting, however, allows fresh rust to form. Although this method, in comparison with that described above (removing of mill scale by weathering), has the advantage of reducing the risk of pitting, it is equally unattractive as regards protection unless the surface is blast-cleaned for a second time before painting. Moreover, in a heavily polluted (industrial/marine) atmosphere, the steel surface may become contaminated with soluble salts. These salts considerably reduce the lifetime of paint systems and are difficult to remove by blast-cleaning (see Part 3.2.4.5).

Building sections from unpainted blast-cleaned steel is of advantage to the shipbuilder because welding and flame-cutting operations can be carried out at the highest possible speed. On the other hand, the method is expensive as, for a good result, blast-cleaning must be carried out twice.

Still another variation is to blast-clean the plates and profiles, assemble them into sections, if necessary blast-clean them again, and apply the first coat of paint before they are welded together on the slipway.

By far the best method as regards protection is, undoubtedly, to build ships in completely sheltered and heated spaces. This method, although it requires high capital expenditure, has become more widely adopted by Western and Northern European yards, because of long periods during the year when weather conditions are unfavourable for outdoor work, including coating application. Beside the considerable advantage of working in sheltered, heated and well lighted workshops, which makes it possible to work without interruption, there are, however, some disadvantages. The steel surfaces often become dirty due to dust and welding fumes. Welding zones, which can be alkaline, will not be neutralized (washed) by rain as would happen in the open air.

It will be clear from the foregoing that additional cleaning operations are necessary. When building under cover large scale blast-cleaning, apart from tank internals, is impractical; only vacuum- or mini-(pencil) blast-cleaning can be permitted. Furthermore, painting under cover causes problems such as fire (explosion) risk, unpleasant odours and health hazards through solvent vapours and spray mist. Consequently, unless a very good ventilation system is installed, painting is mostly done during night when all other work is stopped.

As already stated, current practice is to blast-clean the parts to be assembled into sections and to provide them with a so-called prefabrication primer (shop-primer, shop-coat). Surface preparation and application of the prefabrication primer are usually performed by the yards themselves. It is possible, however, to begin construction with steel plates