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Introductory Chapter: Underwater Ordeals

Sérgio Lousada and Rafael Camacho

1. Underwater works

Underwater work is work done underwater, generally by divers during diving operations, but includes work done underwater by remotely operated vehicles and manned submersibles.

The versatility and multifarious skills of underwater works means that it is possible to operate over a wide range of activities, working in hyperbaric conditions or in confined spaces. The divers' experience in the field and their detailed knowledge of diving procedures enables them to operate in highly specific segments [1]:

- inspection of civil-engineering structures;
- undersea foundations and welds;
- ship hull inspections and raising of wrecks;
- work in hostile and nuclear environments;
- dam inspections using an ROV (Remotely Operated Vehicle);
- installing or commissioning outfalls, undersea conduits, and cables.

2. Trades and crafts

Virtually, all the civil-engineering trades and crafts can be transposed to underwater work, as in the case of high-pressure cleaning, cementing, welding, cutting, among others [1]. Therefore, all professional diving occupations have a few skills commonly used:

- underwater navigation;
- underwater searches;
- rigging and lifting;
- inspection, measuring, and recording;
- and the use of basic hand tools.

Some skills are specific to specialist occupations such as: erecting formwork and shuttering (civils), oxy-arc cutting (salvage, ships husbandry, offshore), hydraulic bolt-tensioning (offshore oil and gas), bomb disposal (military, public safety), search and rescue (public safety, police), and site surveys and mapping (scientific, archeology).

3. Ordeals

Most construction projects involving professional divers are engineered by road, canal, and port engineers, but only a few know in depth the risks inherent in the underwater work performed by professional divers [2].

As in any profession, engineers need a permanent updating in their area of expertise through continuous training [2].

One of these subareas is underwater engineering. However, for several years, engineering projects have suffered from a lack of rigor in their approach to underwater work, both at budget level, constructive procedures and in terms of safety and health [2].

It is believed that this is so, mainly due to the ignorance of the exceptional conditions that the hyperbaric environment imposes throughout the activity and the legal framework that regulates it. This means that the tasks are tendered with significant shortcomings that hinder their subsequent execution in adequate conditions of safety and economic viability [2].

The main objective of this book is precisely conveying the on-going constructive procedures, methods and methodologies, the equipment, the limitations, and the specificities that the hyperbaric environment has, where the diver develops his work, that so much condition an underwater work.

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