Mobile Control Center: a new approach to deploy ROV-oriented education and training

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Abstract - **The paper discusses the requirements to design a mobile control center (MCC), which is a remotely operated vehicle (ROV) educational control center that is compact and that can be used in different high sea ROV operations. The intended applications are for research and educational purposes.**

The need for better-prepared technical professionals is present in the Brazilian offshore oil and gas scenario. In deep-sea operations, where space is scarce and need to be wisely occupied, ROV operators need to have a proper formation and have a widespread awareness of the processes they participate.

Using a control center that brings the reality of the operator day-by-day experiences to ROV students will help in the improvement of the skill set of the future ROV operators.

A literature survey on the state-of-the-art on the subject was carried out to assess the existing technology and it has shown that there is an opportunity for developing such as concept. Current initiatives reported in the literature include a containerized delivery system with an automated control centers and other features essential to ROV operations. However, our analysis has indicated that this type of solution does not entirely address the requirements for research and educational activities.

The mobile control center design should include a generic control center that could be integrated in an agile fashion onto different ROV units from different manufacturers. Besides, it needs to be present in the facilities planed to fit the course, next to the Santos basin, where major in oil engineering is lessoned. By addressing these requirements in this control center and forming techniques and engineers in the same facilities and in with the same attention and teaching method makes them closer and readier to work together in the future.

Keywords - ROV operators; inspection; O&G; ROV; offshore; control center.

I. INTRODUCTION

This paper relates a survey and its analysis and discussion about the development of an educational tool for ROV operators.

Most of Brazil O&G operations are carried in deep waters and therefore the use of ROVs (Remote Operated Vehicles) is needed for a large set of activities such as maintenance, inspection, equipment installation and monitoring, among others [2]. O&G ROVs need operators and those operators will drive expensive machines in an unsettling environment. It is important that they are well prepared and ready for operational situations with a good technical background, and not limited to practice in ROVs maneuvering.

The operators courses held in Brazil are shorter and somewhat less comprehensive compared to what the Committee of Remotely Operated Vehicles of the Marine Technology Society [1] recommend in the

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international ROV curriculum. Possibly because of that, foreigner operators often carry out Brazilian offshore O&G ROV operations.

Many ROV courses in Brazil are focused on practical aspects of the operation and are designed on a workload between 40 and 80 hours, versus the international ROV curriculum that recommends a 2-year program. Therefore, many courses in Brazil are not yet aligned with the best international practices.

The facilities here in Brazil are not so well adapted for some of the level 3 disciplines in international ROV curriculum as in the countries where the most successful ROV programs are held. To address this issue we discussed a proposal to develop a ROV training center for practical exercises and simulation tests. Such training center should be built on a portable base, so it can be used in the vessels of the research fleet of the university as well in the marine bases of the university nearby the town of Santos. A container-based solution is therefore being proposed, where we could fit a control center and a winch in a way it could interact with multiple kinds of ROVs.

II. METHODS

The used methodology can be divided into the following topics:

- Bibliographic review about the current state of tech education in Brazil.
- Consult with experts about the current state of ROVs training in Brazil.
- Understand how the ROV course is structured in already acclaimed educational centers.
- Establish what the MCC should contain in order to be relevant for the ROV operator formation.
- Adequate the MCC for the facilities where it will be held and the lessons it should be done using it.

III. FINDINGS AND ANALYSIS

As Brazil advances its O&G deep-sea operations, more specialized technical education is needed in specialized areas, such as ROV operations [5].

The situations that cause discomfort in Brazilian ROV service contractors are the ones that make the ROV operator act in an isolated way within the working environment. It is essential the operator is completely aware of the role of the ROV technician in the entire process, which is not the case with less experienced operators that took basic ROV courses with shorter workloads.

A Professional ROV Qualification Committee has been established in Brazil in 2014 to discuss the current situation and to identify the course of action to address these issues both in the long- and in the short-term. This committee includes representatives from the educational sector, including technical schools and universities, to ensure the educational challenges are well understood and that there are plans in place for a longer-term robust solution aligned with the recommended guidelines, in particular, with the topics in level 1 and 2 international curriculum for ROV technicians.

The international ROV curriculum divides the ROV topics of study in three levels:

- Level 1: General course work that could be offered at most schools
- Level 2: More specialized course work that requires higher levels of equipment & training.
- Level 3: Highly specialized ROV coursework, requiring significant equipment support [1]

As the technical schools, even without the ROV focus, are able in the short-term to deliver level 1 and 2 topics properly, the focus of the current ROV training in Brazil should be on the level 3 topics.

Once Brazil established proper ROV-oriented basic tech education, what is needed to make a course more complete and trustworthy? Developing a way to deliver level 3 disciplines with tools to put in the market

operators ready to make the difference in the ROV operations, in Brazilian coast looks the right answer.

We do not have the facilities yet for a comprehensive pilot and simulator training, so we started to search what already exists in terms of mobile training centers. Recent ROV literature [3] mentions examples such as the Seabotix CDS (Containerized Delivery System), transportation vans that contain the vehicle, LARS (launch and recovery systems), TMS (tether management system), winch, workspace, and control room. An example of the CDS is shown in Figure 1.

Figure 1: The Seabotix CDS. Source: (2013) The ROV Manual: A User Guide for Remotely Operated Vehicles.

This setup is an attractive concept, but we needed an option that could be used with different kinds of ROVs, because we could not restrict the practical classes to only one kind of vehicle in order to deliver a complete formation. Besides the standard container is 20 feet, larger than what we planned for it to be mobile. So, we need make it in a smaller container of 10 feet in order for it to fit transport and the current fleet of University of São Paulo. An approach to it is making able to run simulations; making the simulations and practical classes possible in the same tool seems to be the best alternative if it is feasible. The point is to make the educational control center close as it can to the command centers currently used in Brazilian O&G operations, in that way an operator would feel comfortable to work on them straight out of the program.

The variety of situations that this control center is applied and the constant need for transportation, made us call it Mobile Control Center (MCC), a name with a short abbreviation and easily memorized, that summarize his functions.

If the MCC is well applied to level 3 disciplines the previously mentioned discomforts of the industry with the ROV operators will be terminated. A better work scenario gives the possibility for us to start improving the actual operations, instead of worrying about the operators not being able to deliver the expected.

IV. DISCUSSION

The key-issues associated to setting up the proposed MCC project include:

- The University of São Paulo is known to be a R&D center for new technology and science; therefore we have access to other researchers to contribute in the design and construction of the MCC to ensure alignment with the state of the art.
- Research in ROV training area is somewhat recent in the University of São Paulo.
- There may be logistics issues as the development center of the MCC is likely to be distant from the application sites.
- University of São Paulo has cooperation agreements with strategic partners such as the Marine Institute of the Memorial University, a renowned center for ROV technician training.
- Partnerships between USP and technical schools are being developed in parallel to the MCC project.
- The MCC will be built for educational purposes mainly, but there may be potential for its future application in research and on-site activities as well.

The MCC still a concept. After this initial assessment, the main outcome has been the significant and positive response that has been received from the local industry. The need for better-trained ROV technicians is acknowledged by the sector in general and the MCC project proposal has been validated by local O&G professionals as an important way forward to address that challenge.

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