

Remote Concrete Mattress Deployment Frame

Concrete mattresses provide a recognized engineering solution for several of the challenges faced in subsea pipeline construction, umbilical deployment and seabed and soil protection/stabilization. They are cost effective and may be readily deployed using standard handling systems. Typically, concrete mattresses may be used to provide protection from dropped objects, added weight and stabilization, scour prevention, crossover support and separation for pipelines and umbilicals, supports or foundations for other subsea activities, riverbank erosion control. The group shall design and implement a remotely operated concrete mattress deployment frame for use in shallow water from a deck crane.

System Level of Requirements:

1. While a standard unit can lift a standard 20 [ft] x 8 [ft] x 1 [ft] concrete mattresses offshore, the group shall design and build a scaled prototype (1:4 scale suggested) for deployment and cost purposes. The maximum operating depth shall be 60 [ft]. The automated deployment frame shall have positioning and orientation thrusters built-in to mattress frame. These shall be manually controlled by an operator on the barge. The automated deployment frame shall include a failsafe capacity/design in event of signal or hydraulic pressure loss. The automated deployment frame shall carry 1 mattress and release mattress within an area delimited by optical markers, a pipe or a cable (Figure 1). The automated deployment frame shall permit remote viewing of the mattress frame orientation relative to the seabed using at least 2 cameras.
2. Requirement 1 + the automated deployment frame shall carry 2 mattresses and release 1 concrete mattress at a time so that they lay side-by-side over the pipe or cable.
3. Requirement 2 + a short-range sector scan sonar shall be mounted for low visibility operations (the sector scan sonar would be supplied by the Center for Acoustics Vibrations). The acoustic data shall be displayed in real-time and shall be recorded simultaneously with optical data.

Operating Requirements:

- Crane operation from the R/V McAllister.
- No diver or ROV intervention.



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Figure 2. Remote Concrete Mattress Deployment Frame.