

Submarine Rescue Drilling Machine

General

This device was developed in the aftermath of the KURSK disaster to enable emergency air to be applied through the hull of a stricken submarine. The basis of the unit was built around a specification derived for the Royal Swedish Navy and was trialled in the Baltic on a test plate during 2005. The drill will bore a hole 22 mm diameter up to 2.5 inches thick through submarine hull (material type classified)

Description

The drill is a special device which has the following features:

- 1) Replaceable “chipping” cutting bits
- 2) A self tapping section to lock into the hull
- 3) A sealing section to stop leaks
- 4) An air port with built in relief valve to allow air to enter to hull under pressure only typically 70 – 80 bar (variable) to prevent sea water ingress when not connected
- 5) A pressure balanced male stab which can be connected to a remote air supply
- 6) A low pressure skirt “coffer dam” surround to attach the drill to the hull typically 1000 kg of suction force to act as a reaction to run the drill
- 7) A hydraulic motor to the drill
- 8) A vertical drive piston to push the drill through when being driven
- 9) Three pronged level adjusters to ensure a 90⁰ drill angle
- 10) Automatic release from the drill bit and pressure balanced stab when the drill bit is through the hull, the self tapping “4 turns” lock is in place and the three separated hole seals are secure

Operation

The drill device is positioned by ROV or manned sub with a manipulator. Once in place a jabsco pump operates to suck water from the Cofferdam skirt. This generates a suction of about 1000 kg. The drill motor is then started and the drive piston is activated.

Once the drill is through the piston quickly pushes the drill through the hole to seal it in the hole and the self tapping section cuts into the hole until the drill stalls (about four turns).

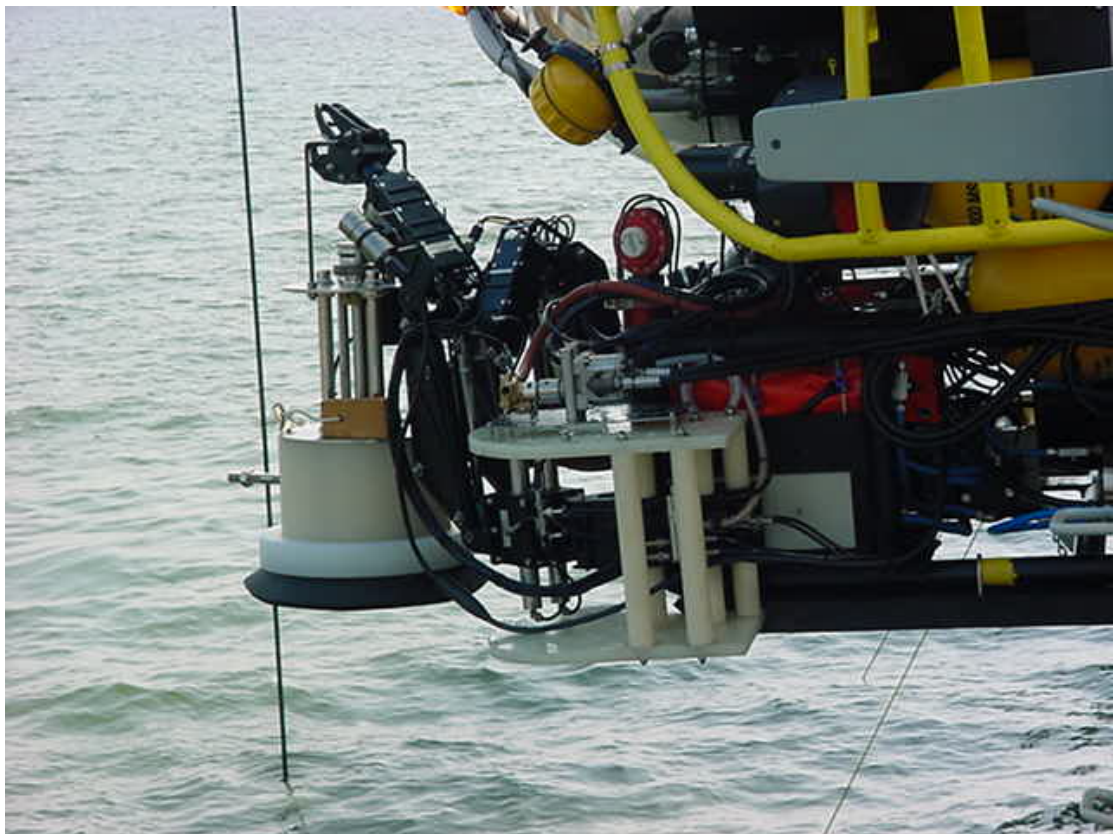
A simple ball bearing drive coupling automatically disconnects the drill and stab from the rest of the mechanism leaving the stab ready to be accessed by a remote air line.

The special drill bits chip the swarf which is contained within the Cofferdam.

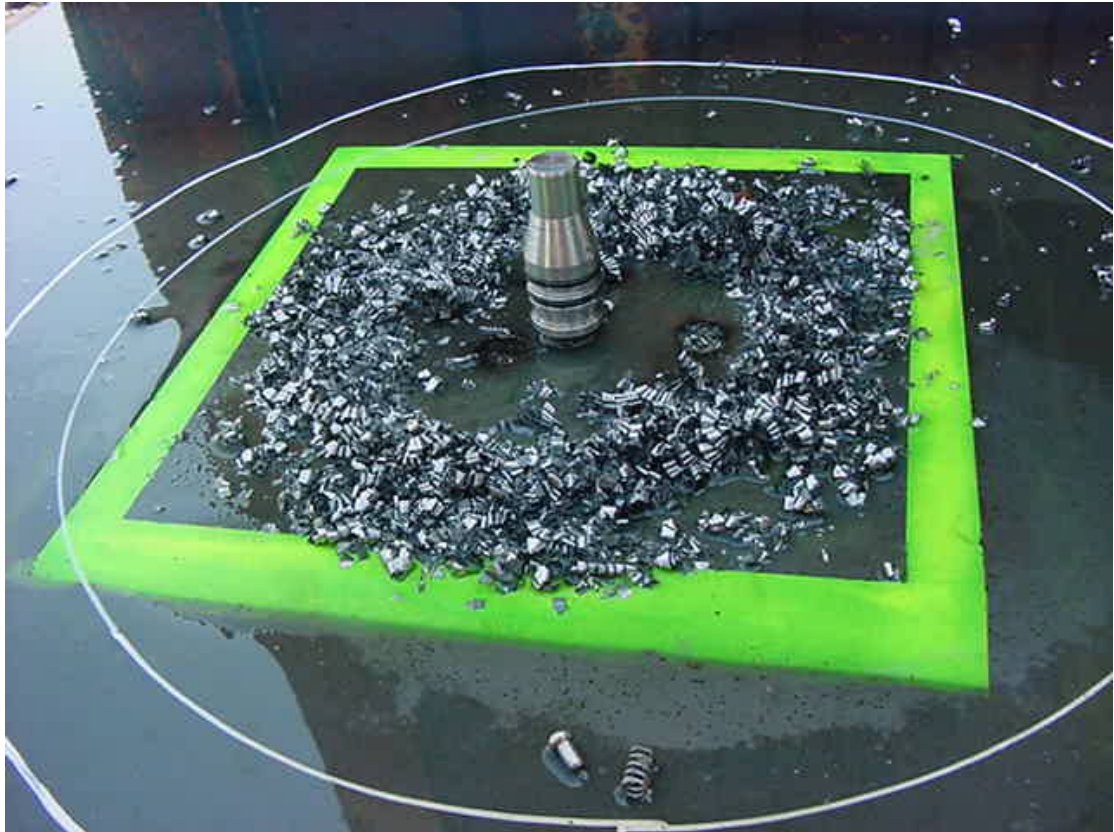
The whole assembly weighs around 30 kg and is operable from most typical work class ROVs.



Coffer dam skirt with drill bit and level adjusters



Ready for deployment from a mantis sub using Hydro-Lek HD5 manipulator



After release the hot stab is locked into the hull with the swarf clearly within the skirt area



The actual hole size 22 mm after removal of the drill bit