

# **THE BRUCE<sup>®</sup> PENNLA (Patented)** **(Pile Embedment Near Normal Load Anchor)**



1/10<sup>th</sup> scale model of 12m<sup>2</sup> Pennla and 120mT lubricating modular pile

**PRECISION INSTALLATION IN CONGESTED SEABEDS**

**NO HIGH-OPERATIONAL-COST ROV**

**LESS COST THAN SUCTION PILES**

**SELF-LUBRICATING FOR DEEP EMBEDMENT**

**EMBEDS FURTHER IN HURRICANE CONDITIONS**

**DOES NOT LOSE PENETRATION DEPTH ON KEYING**

**STABLE ON AHV DECK AND NO A-FRAME NEEDED**

**EASY RECOVERY BY ANCHOR LINE**

**MODULAR FOR LOW COST TRANSPORTATION**

# THE BRUCE<sup>®</sup> PENNLA (Patented) (Pile Embedment Near Normal Load Anchor)



## THE PENNLA SYSTEM

### The System

The Pennla system consists of the Bruce Pennla (Pile Embedment Near Normal Load Anchor) and a specially designed gravity pile for its embedment.

The gravity pile consists of a stack of plug-together modules whose cross-sectional area is kept to a minimum to minimise penetration resistance. Each module weighs less than 25 tonnes and is less than 6m long for ease of transport and assembly on an AHV deck. The bottom module has a lubricant reservoir which provides automatic lubrication of the anchor and pile. This reduces skin friction to promote penetration. A mechanism on the pile controls rotation (keying) of the Pennla prior to its release from the pile. The Pennla rotates about a pivot on the pile so that the weight of the pile prevents loss of penetration during keying.

### Embedment

To install the Pennla, the system is lowered from an AHV and penetrates the seabed under its own weight. The Pennla is then brought into the optimum attitude for release from the pile. To achieve this, it is rotated through approximately 45° about a pivot at the bottom of the pile by cyclically loading and relaxing the anchor line. On completion of keying of the Pennla, the pile is heaved up to disengage from the anchor and is recovered to the surface. The required proof load is then applied, with uplift as high as 45°, to complete the installation. Subsequent storm loading causes the Pennla to embed further along a substantially linear trajectory which gives progressively increasing capacity.

### Recovery

To recover the Pennla, load is applied to the anchor line in the opposite heading to installation. This causes the anchor shackle to slide in a slot to the rear of the anchor, enabling easy recovery at low load and high uplift angle.

**The Pennla embedment and recovery procedure can be seen in 'Video Demos' on Bruce Anchor's Website: [www.bruceanchor.co.uk](http://www.bruceanchor.co.uk).**

The Pennla system offers the precise positioning of a suction pile at less cost and without the need for an external power source. Unlike suction piles, suction-pile embedded plate anchors, and drop-in anchors, the Pennla does not need a high-operational-cost ROV.

In hurricane conditions the anchor embeds progressively deeper, giving higher holding capacity in the same way as the Bruce Pennla which has established a worldwide track record of high performance and low turnaround time.