## INTRODUCTION

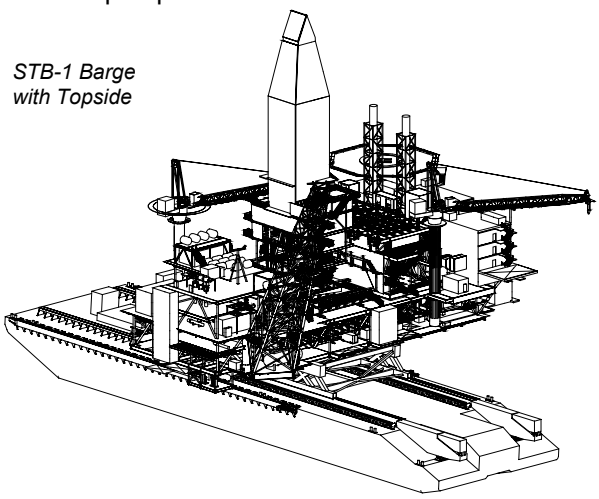
As a part of T&I operations performed by *Saipem* for *AIOC/BP ACG Project* in Caspian Sea, **STB-1** Transport & Launching Barge will be used for installation of four Topsides by *Floatover* procedure. For this purpose barge was additionally strengthened, refurbished and equipped with **Dynamic Ballast System**.

## FLOATOVER OPERATION

STB-1, loaded with 15.500-17.500 te Topside will enter the preinstalled Jacket slot and ballast, gradually transferring load from Deck Loadout Frame onto Deck Mating Receptacles. Upon completion of the operation it will be towed out of the slot.

Weather conditions for this operation are limitation factor, making high requirements on ballast system response. Installation of *Dynamic Ballast System* with **free–flooding butterfly valves** provides several technical and commercial advantages over the conventional system based on additional deck-mounted pumps.

*STB-1 Barge with Topside*



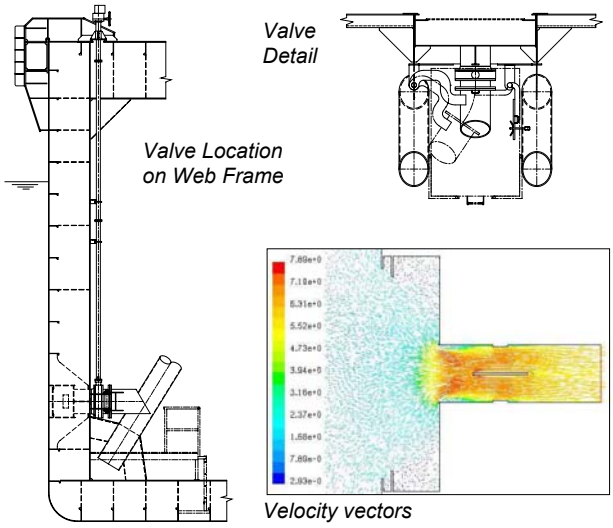
## STB-1 BARGE

STB-1 barge was built in 1983 by *Blohm und Voss*, Hamburg – Germany. It is designed for transportation and unloading of jacket structures for fixed platforms up to 18.000 te of weight. It is also suitable for floatover installation concept of platforms/topsides up to 16.000 te. The vessel is owned by *KMNF*.

Total ballast tank capacity is 61.758 te. It is equipped with conventional ballasting system consisting of four pumps with total capacity of 4.000 $m^3$/h. *Dynamic Ballast System* **24" butterfly valves** are installed in four wing tanks (No.4&5 PS/SB, 4 x 4.523 $m^3$ each), one in each tank. They are remotely operated from control room or manually from deck.

## SYSTEM DESCRIPTION

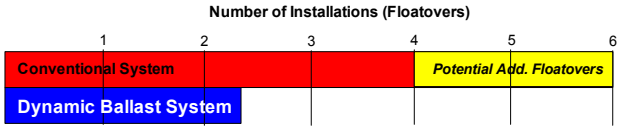
Selected sea intake diameter 600 mm, and system design flow rate of 1.3 $m^3$/s for each tank result in providing capability to ballast **9000 te** of water in time interval of **30 minutes** during final steps of floatover operation. The valves are positioned at level (-) 5.5 m below waterline during the mating operation (i.e. 3.0 m from the barge keel).




*Velocity vectors*

## ENSUING BENEFITS

Economical comparison against conventional system using deck-mounted pumps of 8.000 $m^3$/h total capacity, rented for each operation, (which was considered as an initial option) lead to subsequent superseding by *Dynamic Ballast System* installation. Total cost bars displayed bellow, show the economical **pay-off** after third installation (Floatover).




*Cost Comparison*

## FUTURE EVOLUTION

Use of dynamic ballast system concept already applied on *Saipem* flag ship *S7000* and now on STB–1 barge, provides a large opportunity for development, improvement and future application on various offshore projects.

The next application of this system for floatover operations can be expected on the *Sakhalin* project, where the new transportation barges may be equipped with the modified *Dynamic Ballast System* using **bottom valves**.

## UVOD

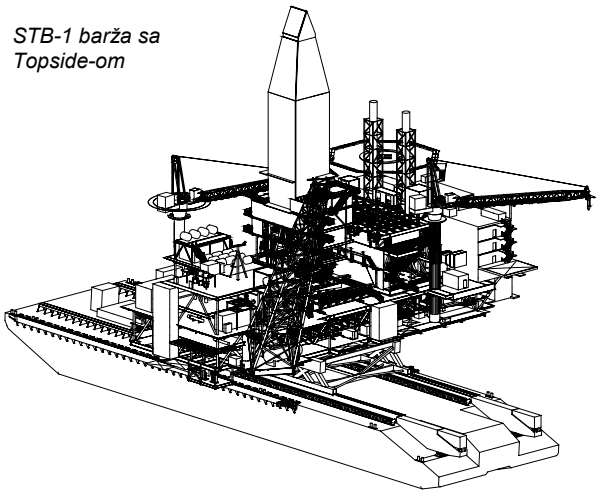
Kao dio T&I operacija koje izvodi *Saipem* za *AIOC/BP ACG Projekt* u Kaspijskom moru, **STB-1** barža za transport i porinuća biti će korištena za instalaciju četiri Topside-a principom *Floatover-a*. Za ovu namjenu barža je dodatno ojačana, renovirana i opremljena **Sustavom dinamičkog balastiranja**.

## FLOATOVER OPERACIJA

STB-1, nakrcana 15.500-17.500 tonskim Topside-om ući će u slot prethodno postavljenog Jacket-a i balastirati, postepeno prenoseći opterećenje sa Deck Loadout Frame-a na Deck Mating Receptacles. Po završetku ove operacije biti će odtegljena izvan slot-a.

Vremenski uvjeti ograničavajući su čimbenik za ovu operaciju, postavljajući visoke zahtjeve na odziv sustava za balastiranje. Ugradnja *Sustava dinamičkog balastiranja* s leptirastim ventilima za naplavljivanje pruža niz tehničkih i komercijalnih prednosti nad konvencionalnim sustavom zasnovanim na dodatnim palubnim pumpama.

*STB-1 barža sa Topside-om*



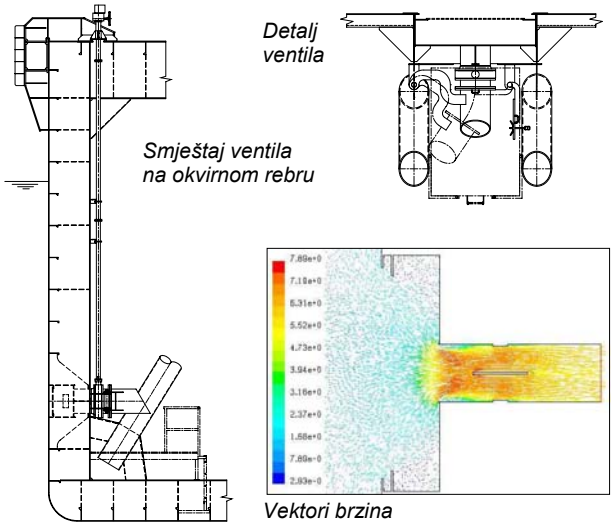
## STB-1 BARŽA

STB-1 barža izgrađena je 1983 u *Blohm und Voss-u*, Hamburg – Njemačka. Projektirana je za prijevoz i iskrcaj jacket struktura za fiksne platforme teške do 18.000 tona. Također je pogodna za postavljanje platformi/topside-a do 16.000 tona konceptom floatover-a. Brod je u vlasništvu *KMNF-a*.

Ukupni kapacitet balastnih tankova je 61.758 tona. Opremljena je konvencionalnim sustavom balastiranja koji se sastoji od četiri pumpe ukupnog kapaciteta 4.000 $m^3$/h. **24" leptirasti ventili** *Sustava dinamičkog balastiranja* postavljeni su u četiri wing-tanka (br.4&5 PS/SB, 4 x 4.523 $m^3$ svaki), jedan u svakom tanku. Upravljani su daljinski iz kontrolne prostorije ili manualno sa palube.

## OPIS SUSTAVA

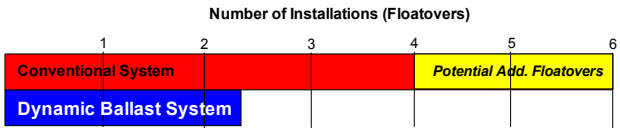
Odabrani promjer usisa mora od 600 mm i projektirani protok sustava od 1.3 $m^3$/s za svaki tank rezultiraju sposobnošću balastiranja **9000 tona** vode u vremenskom intervalu od **30 minuta** tijekom završnih stadija operacije floatover-a. Ventili su smješteni na razini (-) 5.5 m ispod vodne linije tijekom operacije spajanja (tj. 3.0 m od kobilice broda).




*Vektori brzina*

## NEPOSREDNA DOBIT

Ekonomska usporedba u odnosu na konvencionalni sustav koji koristi palubne pumpe ukupnog kapaciteta 8.000 $m^3$/h, iznajmljene za svaku operaciju, (što je razmatrano kao početna mogućnost) dovela je u konačnici do odustajanja u korist ugradnje *Sustava dinamičkog balastiranja*. Dolje navedeni indikatori ukupnih troškova, pokazuju ekonomsku **isplativost** nakon treće instalacije (floatover-a).




*Usporedba troškova*

## BUDUĆI RAZVOJ

Uporabe koncepta sustava dinamičkog balastiranja, već primjenjenog na Saipem-ovom zastavnom brodu *S7000* i sada na barži STB-1, pružaju veliku priliku za razvoj, poboljšanje i buduću primjenu na raznim offshore projektima.

Slijedeća primjena ovog sustava za operacije floatover-a može se očekivati na projektu *Sakhalin*, gdje bi nove transportne barže mogle biti opremljene modificiranim *Sustavom dinamičkog balastiranja* koji koristi **ventile na dnu**.