No. 14

IHC HOLLAND OIL REPORT

IHC HOLLAND - OFFSHORE DIVISION - P O BOX 11 - SCHIEDAM

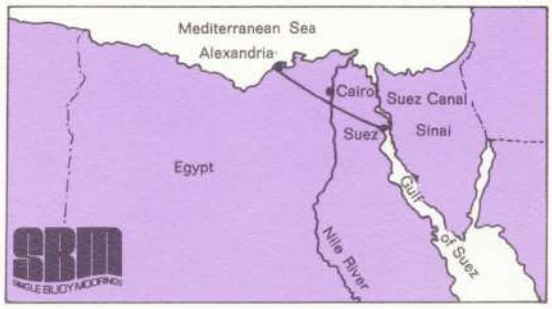
NEW DEVELOPMENTS

Eight SBM systems

On 31st July, 1971, Dr. Aziz Sidky, the Egyptian deputy premier for industry and oil, signed an $ 18,350,000 contract with IHC Holland and its subsidiary, SBM Inc., covering the design, construction and installation of eight SBM systems for loading and discharging tankers of up to 250,000 d.w.t.

To restore the flow of oil from Middle Eastern fields to the Mediterranean, the United Arab Republic will build two pipelines more than a metre in diameter and 320 kilometres long linking Suez and Alexandria. Three of the SBM systems will be installed off Suez and five off Alexandria.

The first of the pipelines is scheduled to be in operation in two years time, and the entire project must be completed six months later.
When completed, the pipeline will annually carry 80,000,000 tons of crude across Egypt.



Three self-elevating platforms for civil engineering

The Brazilian contracting consortium Empresa de Construção e Exploração da Ponta Presidente Costa e Silva (ECEX) has placed orders with the Offshore Division of IHC Holland for three self-elevating platforms. These will be used in the construction of a bridge 12 kilometres in length linking the cities of Rio de Janeiro and Niteroi and reducing travelling time between them by 1½ hours.

Jack-up rig for Penrod and packages for Shell

In an address during the launching of the drillship *Pélican* on 20th August, Mr. R. Smulders, managing director of IHC GUSTO, revealed details of two recent orders. The first, obtained by IHC Holland-Le Tourneau Marine Corporation, a recently established subsidiary of the Group which is based in Kilgore, Texas, calls for a 3-leg jack-up rig for the Penrod Drilling Company of Dallas. The rig will be built at a yard in Corpus Christi.
The second order, for Shell U.K., covers the design, construction and installation of production, generation/switchgear, hydration and emergency helicopter deck packages. The last-named will be supplied and installed by Gusto Staalbouw, a department of IHC Holland which specializes in offshore structures.

These orders together total abt. $ 8,500,000.

800-ton IHC Stancrane

There can be little doubt that the growing interest in the IHC Stancrane range of standardized cranes is due in part to the exceptionally large distance between hook and body when hoisting, which enables loads with large horizontal dimensions to be handled.
This factor certainly contributed to the recent order which the IHC Offshore Division received for an electrically-powered 800-ton capacity Stancrane for heavy offshore operations.

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New Developments

In this issue of Oil Report New Developments mean New Orders. The IHC Offshore Division will build 8 SBM systems for the United Arab Republic, at least three sep's are ordered by a Brazilian contracting consortium, Penrod ordered a jack-up rig with IHC Holland – LeTourneau, packages were ordered by Shell and another 800 ton IHC Stancrane will be added to the offshore theatre. And – stop press! – hot news is the Russian order: a $ 15.000.000 pipelaying barge and a pipe coating plant. To be published in Oil Report no. 15!

PAGE 2

Lay-out of the drillship "Pélican"

More details on the most sophisticated mobile drilling rig in the world, the drillship *Pélican*. She was launched at the IHC GUSTO yard on Friday, 20th August 1971.

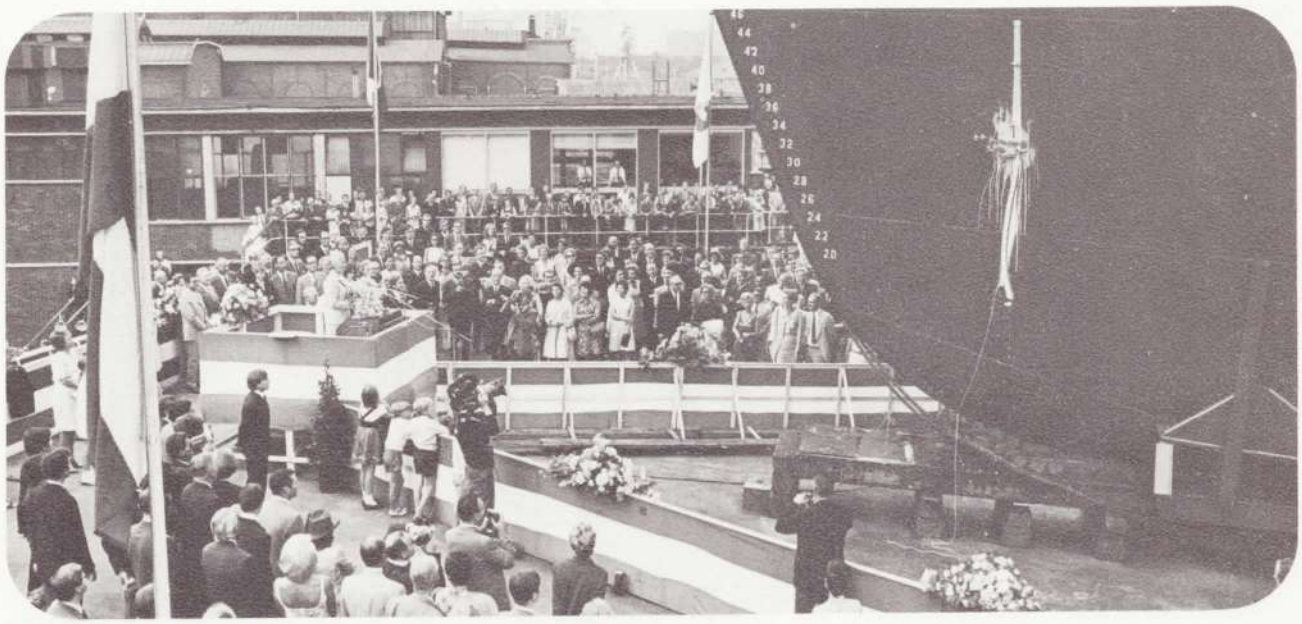
PAGE 4

"Challenger I"

Sixteen months continuous operation on offshore construction jobs and submarine pipelaying in unprotected waters prove the outstanding efficiency of a 27,000 t ore/oil tanker converted into a workship – pipelayer. *by Ir. P. S. Heerema*

PAGE 7

LAY-OUT OF THE DRILLSHIP ‚PELICAN'



The drillship *Pélican* was launched at the IHC GUSTO yard in Schiedam on Friday, 20th August. The ceremony was performed by Mme. Jacques Bénézit, wife of the director of central exploration and production of Compagnie Française des Pétroles (C.F.P.). The vessel, which will be the most sophisticated mobile drilling rig in the world, is being built for the Société Maritime de Service (SOMASER).

Work on the design of a drillship by the Offshore Division of IHC Holland commenced four years ago, at which time it became clear that the search for undersea oil deposits would shift to deeper waters. IHC jack-up rigs are limited to a depth of 330 feet or thereabouts. In addition to an increased depth capability, a drillship offers the advantage of greater mobility and independence of outside assistance. IHC's work in this field led to discussions with C.F.P., who were just then thinking in terms of such a vessel and had conducted a considerable amount of research and development. The ensuing co-operation resulted in the *Pélican,* the most highly automated drillship afloat.

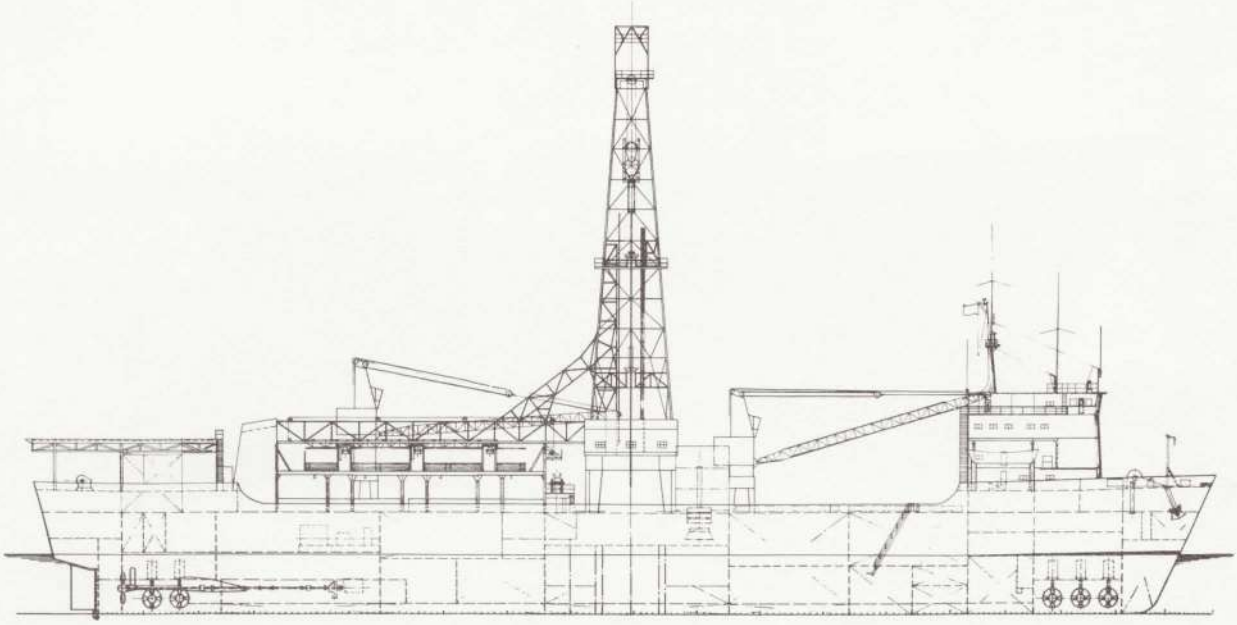
Principal data

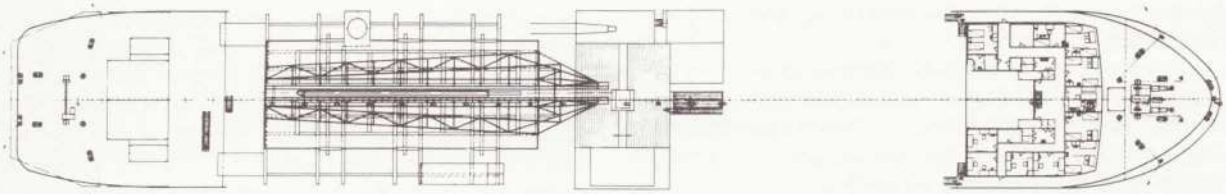
The *Pélican* carries sufficient material to operate for three months at a stretch, during which she can drill two wells to a depth of 15,000 feet. She is equipped to work in temperatures between —15 and +32 °C and her hull is reinforced to withstand ice.

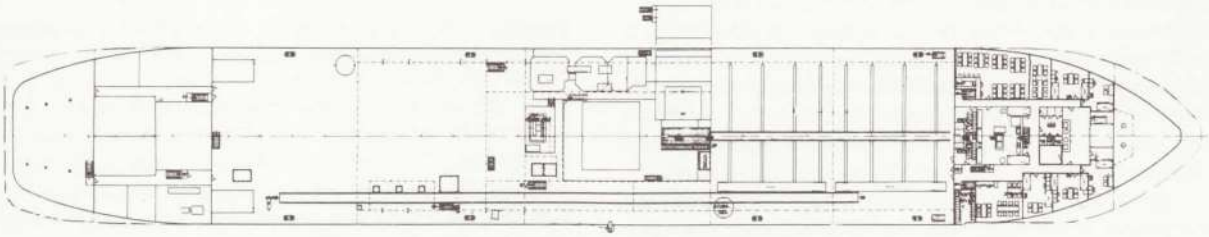
Her principal particulars are:

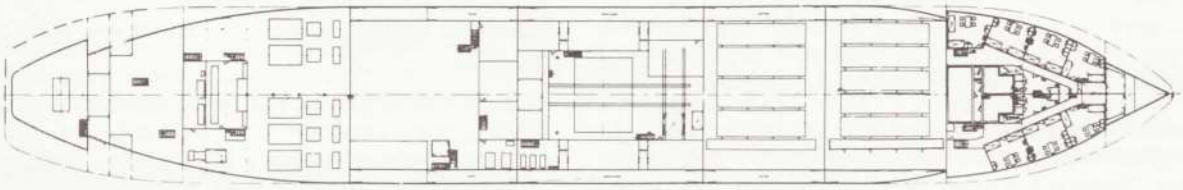
Displacement	approximately 15,000 tons
Length o.a.	149.00 m
Beam	21.35 m
Height o.a.	62.00 m
Total output of machinery	approximately 18,000 hp
Speed	14 knots

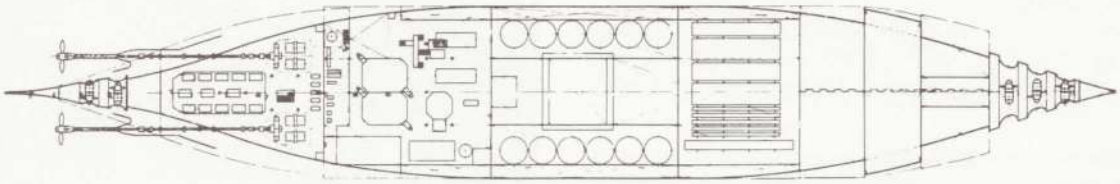
The vessel is propelled by two controllable-pitch propellers. The most important aspect of her design is the Dynamic Positioning System with the aid of which she can be kept in a predetermined position with great accuracy without the use of anchors. This is achieved by means of the two stern propellers and five transverse thrust units (three in the fore part and two in the after part), which are operated in conjunction and are controlled by computers. The computers are mounted in a special room aft of the wheelhouse. Any tendency for the vessel to drift out of position is registered by an acoustic measuring system which, in conjunction with a specially developed control system, emits impulses corresponding to the direction and amplitude of the drift to the











computers, which then actuate the appropriate propellers to correct the movement. All the propellers are electrically driven.
The drilling derrick is situated almost exactly amidships and all the apparatus associated with drilling operations is grouped around it. This apparatus includes a diving bell which can be lowered to a depth of nearly 1,000 ft via a shaft amidships.

More automation

Installed on the after deck is an automatic pipe racking system, by means of which lengths of drillstring are automatically transported to the drilling derrick. Casings are transported from the holds to the foredeck by a special crane, and from there to the drilling floor on a powered trolley. The casing transport system, like the blowout preventer, was designed by the IHC Offshore Division. The drillmaster's cabin, which is situated on the drilling floor, is totally enclosed and air-conditioned, and has heated windows. It can be rotated and affords a clear view of the drilling floor. All drilling operations can be supervised, directly or with the aid of monitor screens, from the cabin. The operation of the dynamic positioning system can also be monitored.

Two swell compensation systems developed by the IHC Offshore Division will be installed on the drilling derrick. These will ensure that the drillstrings and the riser remain in position when the vessel is moving up and down in a swell.

Two deck cranes, one of 40 tons capacity and mounted on the foredeck and the other of 25 tons and situated on the after deck, enable materials to be loaded and unloaded without recourse to outside facilities.

The generating machinery and associated switchgear is situated aft. The main sets, of which there are five, are driven by diesel engines of 3,400 hp each. The "powerhouse" is automated, supervision being exercised from a control room situated aft of the main engines.

Stability

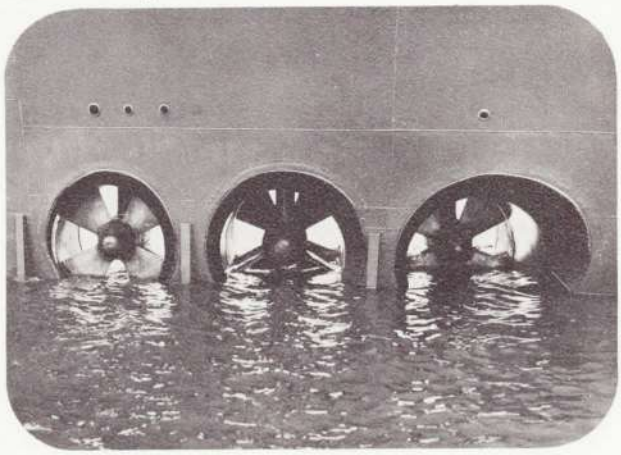
Two stabilization systems are incorporated in order to minimize the angle of roll. One is a detuning system comprising two 500-ton ballast tanks, one forward and the other aft. Filling or emptying these tanks enables the centre of gravity of the vessel — and thus its inherent frequency — to be varied, and coincidence of the latter with the prevailing wave frequency to be avoided. The second system is of the free surface, passive tank type.

Comfortable quarters for a crew of 80 are provided and these are situated forward.

Fuel oil is carried in double-bottom tanks and in wing tanks extending over the full length and depth of the hull. The latter as it were form a double skin and would reduce damage in the event of a collision. For the same reason, a double skin construction is employed in the drilling well.

A helicopter deck, on which provision has been made for the addition of aviation fuel storage and a refuelling system, is mounted above the after detuning tank.

The *Pélican* is scheduled to be handed over to her owners early in 1972.



Operational Experience with ‚Challenger I'

by Ir. P.S. Heerema

by Ir. P. S. Heerema

Heerema Engineering Service was established in December, 1962, and now operates a fleet consisting of the survey drillships *Explorer* and *Duchess*, the oceangoing tug *Husky*, the supply boat *Viking* and a barge for the transport of jackets, platforms, etc.
The company is, however, best known for its operations with the *Challenger*, an offshore workship-pipelayer equipped with an IHC crane, which is described in detail in the following article.
Heerema Engineering Service has meanwhile placed an order with IHC Holland for a second mammoth crane (see Oil Report No. 11), which will be mounted on a sistership of the *Challenger*. The vessel, which is to be modified and made suitable for heavy offshore work, will be renamed *Champion*.

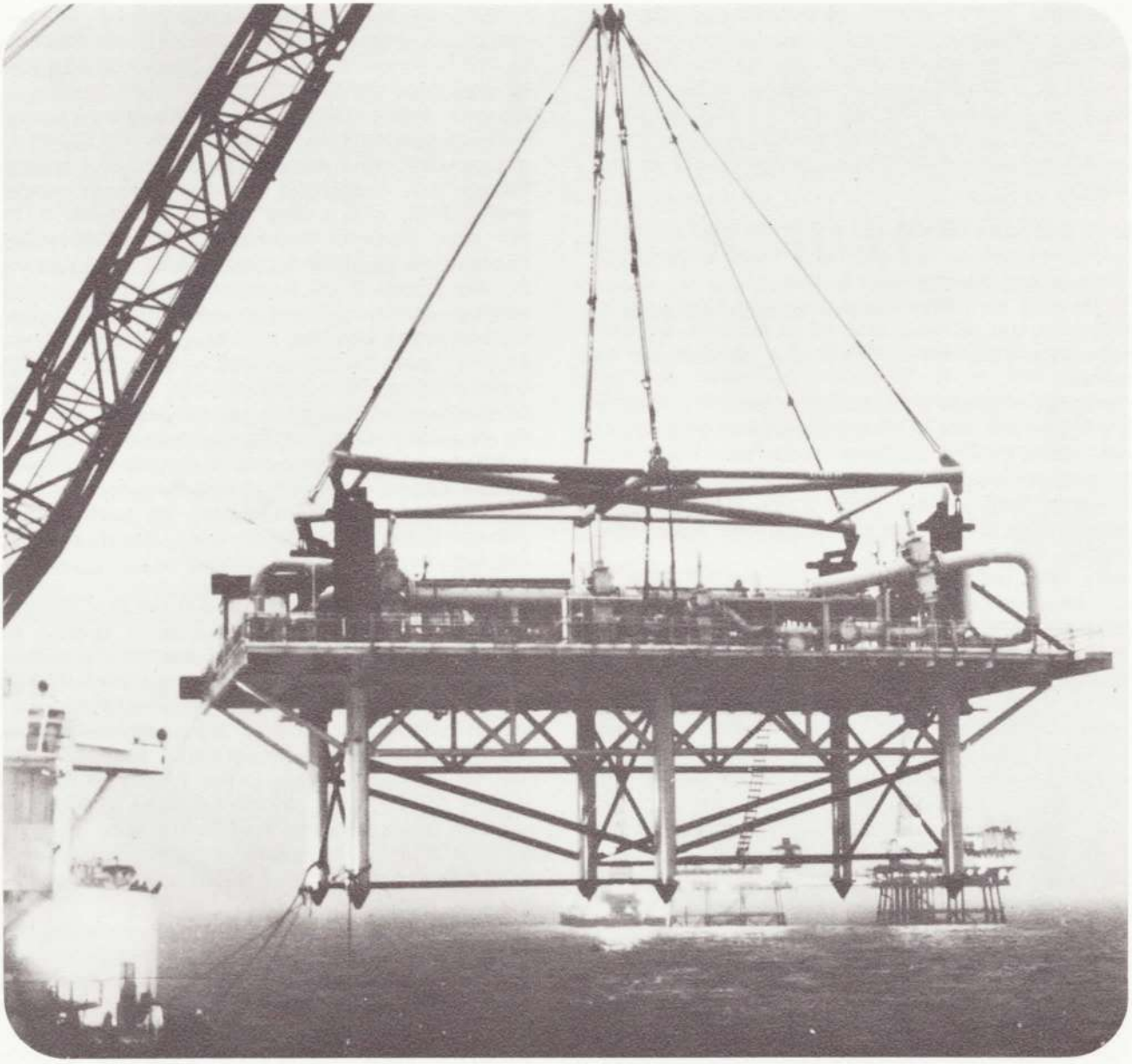
Summary: Sixteen months continuous operation on offshore construction jobs and submarine pipelaying in unprotected waters prove the outstanding efficiency of a 27,000 t ore/oil tanker converted into a workship-pipelayer. Her 600 t/800 t IHC revolving crane, 226,000-ft · lb steamhammer and catenary pipelaying method contributed to her unique performance.

More and more oil and gas will come from offshore fields; offshore oil and gas fields move farther from shore in ever less sheltered waters.
To develop an offshore field you need structures to drill from and set your production facilities on, and submarine pipelines to bring your oil and gas to market.
To install offshore structures you basically need a big crane, pile driving equipment and welding equipment on a floating platform. Usually this crane and subsequent equipment are placed on a barge, the cheapest floating base. Such a unit is towed from one location to the other and to and from the coastal harbour base.
With fields farther out in more unprotected water, it can be questioned whether square, pontoon-shaped barges are the best solution to the problem. Offshore equipment should be able to ride out the severest storms, because it cannot always run for shelter, which might be too far off and too dangerous to reach. Therefore offshore units should have a high bow, and preferably be self-propelled; a ship, big enough to form a stable platform for the crane, could fill the requirements.
We found a suitable ship in the 27,000-t tanker *P. G. Thulin:* she was almost wide enough (83 ft) but not quite; for lifting 800 t over the side, she had to be 96 ft, so we widened her and named her *Challenger*.
Her big dimensions of 634′ by 96′, heavy weight and deep draft, with trimming possibilities from 22′ to 34′, make her an extremely stable floating platform, far better than any of the biggest derrick-barges. Her most outstanding features are seaworthiness, mobility, speed and stability in bad weather. She has one of the biggest revolving cranes (superbly built by IHC Holland), lifting 800 t with fixed boom and 600 t fully revolving, both at 90′ radius.
When we heard that the Menck 1500 proved a most successful piledriving hammer, with 135,000 ft · lb drop energy, we asked the factory for the biggest hammer they could build, and they came up with the Menck 2500, with a drop energy of 226,000 ft · lb: the most powerful hammer in the world today. Furthermore the *Challenger* has drilling equipment, a 100-t Baash Ross powerswivel, jetting, cutting, welding, and compressed-air equipment. Her mooring equipment consists of twelve 25,000-lb anchors on $2^{3}/_{16}$″ lines; the drums exert an active pull of 1000 tf and a holding force of 250 tf.
All this resulted in a much more expensive unit than the usual derrick-barges, more expensive in first cost and in running cost, because of the extra personnel for the engine room. To obtain the same or even lower daily cost to the customer, the workship has to have more paydays in a year – which she can obtain by her mobility and speed.

It was a fortunate coincidence that the Gulf of Suez Oil Co., daughter of Amoco, wanted to develop an offshore oil field in the Gulf of Suez. They wanted to install 2 drilling platforms and 2 production platforms in water-depths ranging from 110′ to 240′, and to lay some 12″ and 18″ pipe, with various tie-ins and risers. Since there were no fabrication facilities nor loading facilities in the vicinity of their El Morgan Oilfield, they had the problems of where to fabricate the structures, how to transport them to the Gulf of Suez and how to install them, for which a floating crane of at least 500 t lifting capacity would be required.
The advantages of the *Challenger* for transport and installation of the facilities were so obvious, that the contract was signed long before the *Challenger* was operational.
In July 1969 the voyage started with a load of 2 four-pile production-platforms and one eight-pile drilling-

complex, together with decks, separators, pumps, connecting bridges, submarine pipes, etc., in total some 7000 t of weight. For stability she had to take in some 10,000 t of ballast water. On 26th August 1969 the *Challenger* left Rotterdam fully loaded, sailed around Cape Good Hope and arrived 37 days later at the Gulf of Suez, averaging 14 knots on the 11,500-mile trip.

The engineering of the loading, to make the ship stable and the load safe against the dynamic forces introduced by the ship's movements in the heaviest storms, with a presumed maximum roll of 60° (30° to each side) took quite some attention. Everything was done to the satisfaction of Lloyds, who insured the load for 0.75 % of the value, whereas Lloyds would have asked 7.5 % of the value had the load been transported on seagoing towed cargo-barges, of which at least three would have been required – they would have needed some 110 days (with luck) to travel the 11,500 naut. miles almost half around the world, against the *Challenger's* 37 days. Lloyds however, did get a shock when they saw the loaded ship leave port and their employees are said to have taken bets among themselves on the safe arrival . . . The *Challenger* arrived with the load undamaged –

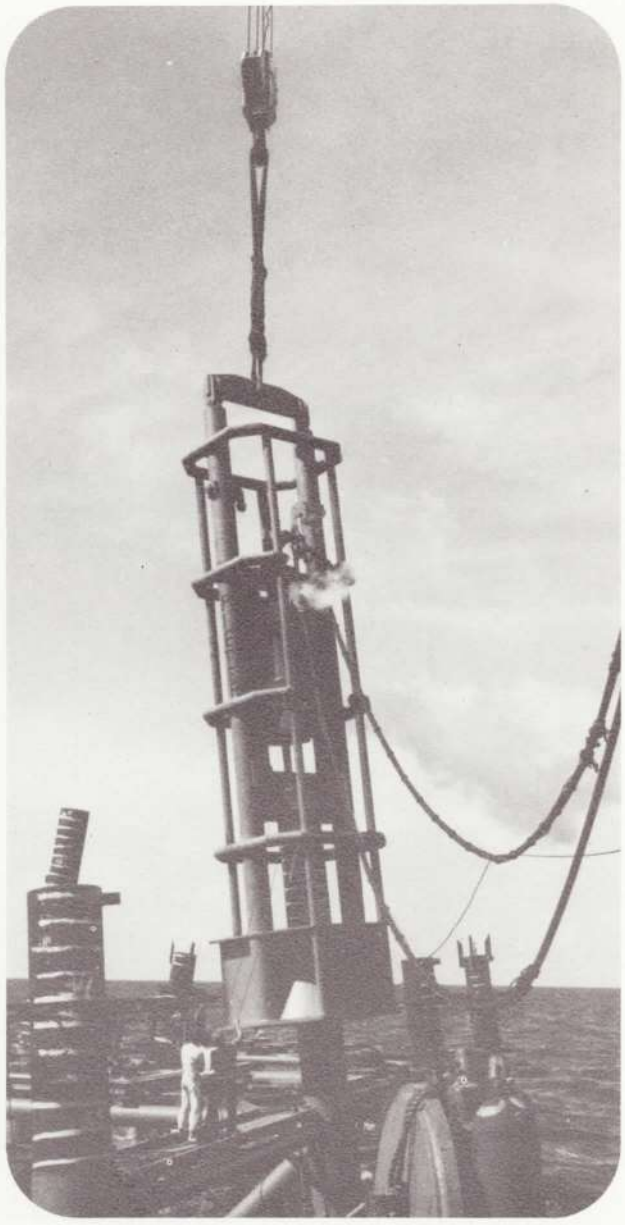


much to the surprise of many, and to the relief of all.

The installation of the drilling- and production-platforms and of the submarine lines went smoothly as planned. Pipe was laid by applying an untried and unprecedented method, without a stinger and without underwater support: the catenary-tension-method. The ramp, with welding station, can pivot in the direction of the tangent to the catenary that the unsupported string assumes, more or less like a chain. A certain prestressing force, applied to the string, keeps the bending stresses within limits. This prestressing force is applied by a special unit, consisting of hydraulically driven rubber tires which grip the pipe and transfer their torque into longitudinal force in the pipeline string. With this system, we picked up pipe in deep water, relaid it towards an existing platform, made tie-ins, set risers, etc., all without a stringer and without davits.

The weather in the Gulf of Suez is usually bad to very bad, with 30 % of the time wind force 7 or more and 12½ % of the time wind force 8 or higher, sometimes up to 11.
Since we averaged on *construction work* 9 % downtime for weather, it may be realized that we continued working during wind force 7 and sometimes even during force 8. On *pipelaying jobs* we had 23 % downtime, showing that pipelaying sometimes took place during wind force 7. The limiting factors usually were not the movements of the ship, but rather the ability of the tug to pick up and set anchors; a big traditional pipelaying barge might have experienced considerable downtime in the same area.

The Gulf of Suez job completed, we took off at the end of May 1970 to Trinidad, again around Cape Good Hope, for another job for Amoco: an eight-pile 12-well drilling structure had to be installed in 190 ft of water some 22 miles off the east coast of Trinidad at the unprotected Atlantic side.
The structures (jacket, piles and two decks) were fabricated in Holland; they were towed on our



seagoing cargo-barge by the *Friesland* of Wijsmuller across the Atlantic, to meet the *Challenger* coming from the Gulf of Suez.
The jacket was too heavy for the reach at which the crane would have to lift her, so she had to be launched, i.e. moved over some kind of rail until she tipped and slided down. This operation is at best hazardous, and downright dangerous in the kind of heavy, long, continuous Atlantic swell prevailing east of Trinidad. We decided therefore to look for a sheltered bay on one of the neighbouring islands, deep enough (at least 200 ft) to prevent the possibility of the jacket touching bottom during launching. Man-of-War Bay in the N.E. of Tobago at some 100 miles from location seemed suitable and the 750-t jacket was taken there and launched successfully. The tow back, against strong Atlantic currents, sometimes of up to 3 kn, proved quite dangerous, and the drag of the jacket exceeded our expectations. It took us several days to get back to location, trying first with one tug, then with two and finally with three tugs of over 10,000 hp altogether.

The uprighting and placing of the huge jacket was routine work for our big IHC-crane, but the pile-

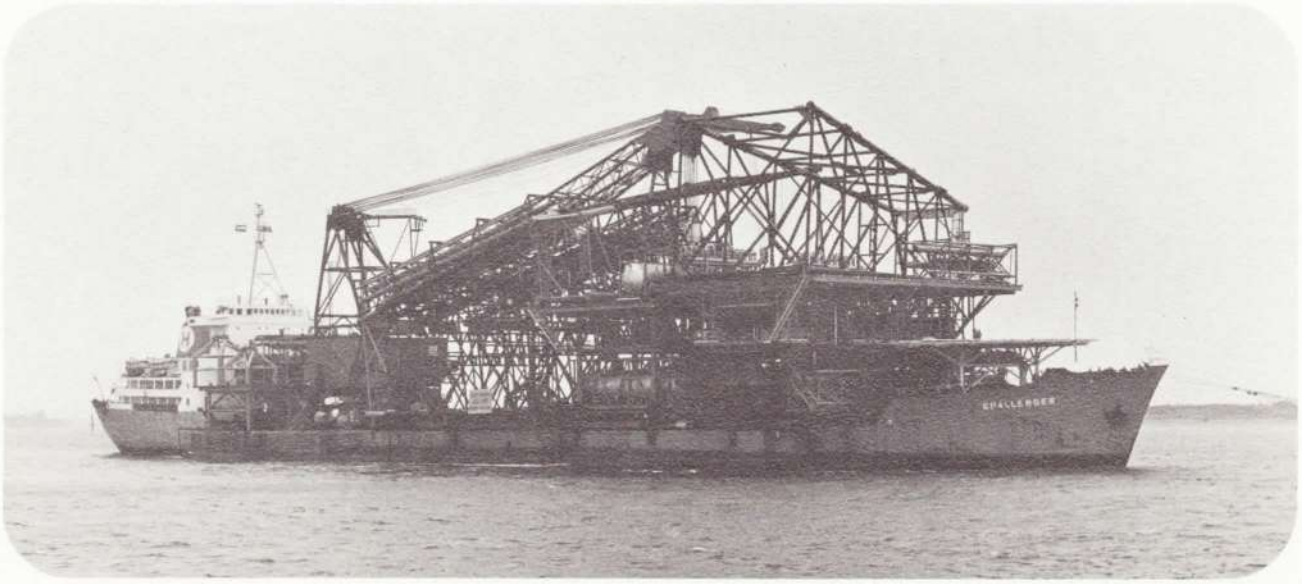
driving proved extremely heavy: the 36″ piles had to be driven to some 250 ft penetration, and at 100 ft the usual hammers like the Vulcan C-200 already reached refusal. Fortunately the Menck 2500, with a ram weight of 55,000 lb and energy per blow of 226,000 ft · lb, saved the day. It took quite some time to get this untried hammer (at present the most powerful of its kind in the world) to work properly, but it really did the job.

The setting of the two decks, with the cargo barge riding wildly on the swell, was no joke, but succeeded without mishap.
In the second week of August, the *Challenger* took off for the North Sea, where two Shell-Esso jobs were waiting. The first one, comprising the laying of the 8″ pipe and the two risers posed no special problem.

The second one, however, being the heavy lift for Shell U.K. Exploration and Production Ltd., (operating on behalf of Shell and Esso), consisted of the IHC Holland built BT. lower deck of the production-platform at the Leman Field, North Sea. The total weight was 705 t; the radius was 98 ft. This lift is – to my knowledge – the heaviest ever performed offshore by a revolving crane at this radius. Sighs of relief were uttered at various quarters when the heavy deck rested safely on the piles: it has about double the weight a 500-t derrick-barge could lift at this radius, and the placing feat demonstrated clearly the capacity of the crane and the stability of the *Challenger.*

My conclusion is that sixteen months of continuous operation have fully proved the outstanding features of this workship, and I hope she will contribute considerably in the further development of offshore oil- and gas-fields, more particularly of those in the North Sea.

*) Published in "De Ingenieur", Febr. 1971.



Services from exploration to exploitation

that means...:

IHC GUSTO provide know-how and experience, gained in the construction of equipment for the offshore industry, such as jack-up rigs, heavy floating cranes, drilling tenders, underwater storages, single buoy mooring systems and drillships.

GUSTO STAALBOUW are specialists in the design, fabrication and erection of many kinds of steelwork onshore and offshore, i.e. drilling platforms, production platforms and wellhead protectors and the hooking up of these at offshore locations.

SBM INC. not only handle the design and marketing of single buoy mooring systems but also undertake turnkey projects embracing feasibility study and/or bottom survey, supply operation and maintenance of SBM terminals.

TERMINAL INSTALLATIONS INC. were established for the transportation, unloading and installation of single buoy mooring systems and other offshore operations. These operations are carried out with the aid of a specially equipped seagoing vessel the 'Installer I'.

PIPELINE STABILIZATION LTD. specialize in burying, anchoring and otherwise stabilizing underwater gas and oil pipelines. The combined know-how of the partners, has resulted in several patent applications in this field.

FORAMER are among the foremost drilling contractors outside the U.S.A. and have carried out several projects using the jack-up rig 'Ile de France' and the drilling tender 'Ile de la Réunion'. The company will also undertake the operation of the drillship 'Pélican'.

R. J. BROWN & ASS. offer total capabilities in the engineering and management of both land and marine pipeline systems. The objectives of this company are to provide the full scope of services necessary for a succesful and economic installation.

IHC HOLLAND - LETOURNEAU MARINE CORP. have been founded as an initial step in the development of a world-wide enterprise for the design and construction of a new generation of heavy drilling jack-up rigs. Assembly of the large offshore structures will take place all over the world in order to reduce transportation and insurance costs.

IHC OFFSHORE DIVISION, which organization embrace the above-mentioned companies, is situated in Schiedam, P.O. Box 11, Holland.
Detailed information on any of these companies will be gladly furnished on request.

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