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TIJDSCHRIFT VOOR
MARITIEME-EN OFFSHORE-TECHNIEK
SCHIP EN WERF

NIEUWJAAR 1988

Mede namens ons NVTS bestuur wens ik U een gezond, gelukkig en voorspoedig nieuwjaar toe!
Het is telkens weer fascinerend een nieuw jaar voor de boeg te hebben. De herhaling van de jaargetijden geven ons werktuigkundigen het gevoel, met iets ronds, iets draaiends te maken te hebben. Een schijf met maanden, die telkens na één omwenteling door de beitel van de tijd weer 'schoon komt'.

Het gevoel van de tijd in cirkels komt extra in mij op door het jarenlange voorzitterschap van onze NVTS. Met enthousiasme heb ik U op de Nieuwjaarsreceptie mogen begroeten, waarbij de basis van ons bestaan, de Nederlandse Maritieme wereld, steeds werd belicht.

Hoe slecht het ook de laatste jaren is geweest voor onze activiteiten bij het uitoefenen van ons vak, het vinden en uitspreken van pluspunten over onze positie ten opzichte van andere maritiem getinte naties hebben mij geen moeite gegeven. De factoren, geldend als ondersteuning voor scheepsbouw, scheepvaart en off-shore blijven in Nederland aanwezig. Door het land, maar zeker ook door onszelf!
Het blijft namelijk interessant te beseffen, dat onze positie als een producerend én dienstverlenend land bij het vervoer over water, exploratie van zeebodems en makers van maritieme kunstwerken het ons mogelijk maakt scherp te zien, wat *echt* verlangd wordt van onze produkten en diensten, wetend, dat we die kennis in huis hebben!

De scheidende NVTS Voorzitter Van Cappellen.

Het is namelijk hierbij opvallend en vast te zetten dat de uiteindelijke gebruikers steeds minder om de technische eigenschappen vragen, maar meer en meer oplossing vragen voor *hun* logistieke problemen.
U merkt, ik begin weer punten op te noemen. Terwijl we gewoon zien, dat er geen werk is en er ingekrompen wordt bij het leven!
Toch, gezien de niet weg te poetsen positieve factoren, bepalend voor het behoud van onze maritieme activiteiten, moeten we deze probleem-oplossende benadering blijven vasthouden.
Als we dat echt willen, zien we de recente bundeling van krachten in de scheepsbouw dan minder als 'wéér een afslanking', maar meer als 'een overeind blijvend centrum van hoogtechnologische kennis en aanpak', waarin we aantreffen:
– Probleem-oplossend vermogen naar de eindgebruiker, mede mogelijk door de vele specialisten in Nederland (zie de ledenlijst van de N.V.T.S.)
– Kennis en durf inzake ontwerpen.
– Het bereiken van het vereiste prijsniveau met handhaving, ja, vergroting van kwaliteit door een vooraanstaande produktie-technologie.
– Service-verlening, bij vele facetten van de exploitatie.
maar ook:
– Aanpak van andere onderwerpen, direct met de mens en leefomgeving te maken hebbend. Ik noem als voorbeeld de samenstelling van uitlaatgassen, maar ook: *veiligheid*. Opvallend hierbij is, dat bij het bereiken van goede resultaten en afspraken de reder zijn verantwoordelijkheden kent, gesteund door regels van classificatiebureaus; maar ook dat een actieve rol van de overheid geboden is.

Laten wij hierbij hopen, dat deze actieve rol gekenmerkt gaat worden door een consequent beleid, waarbij het abrupt 'zwengelen aan de steuntelegraaf' wel een actieve handeling is, maar verkeerd uitpakt bij het uitvoeren van manoeuvres voor een gewenste positie.
Ik hoop van harte, dat onze Vereniging, welke juist in deze tijd haar waarde toont, een meewerkend voorwerp blijft voor ons allen. We hebben elkaar nodig en we kunnen wat!
Door Uw reacties naar mij toe, Uw geestelijke steun heb ik als Voorzitter, samen met het bestuur en het secretariaat, ook wat kunnen doen, de afgelopen 5½ jaar. Ik dank U hier hartelijk voor en hoop U in de toekomst vele malen te zien en spreken over onze gezamenlijke interesses en taken.

C. W. van Cappellen

VERANDERINGEN BIJ HET TOEZICHT OP RIJKSVAARTUIGEN

Van Dienst Vaartuigen tot Afdeling Rijksvaartuigen

De Dienst Vaartuigen (D.V.) werd als gevolg van een reorganisatie van het ministerie van Verkeer en Waterstaat per 1 januari 1987 organistorisch ondergebracht als de Afdeling Rijksvaartuigen (VR) van de Directie Veiligheid en Toezicht (V) van het Directoraat-Generaal Scheepvaart en Maritieme Zaken (DGSM).
Recentelijk zijn twee adviezen uitgebracht over het functioneren van D.V., te weten:
– het versterken van de functie met betrekking tot het materieel beheer van civiele zeegaande vaartuigen op basis van het in april 1986 door het Kabinet overgenomen 2e ICONA-advies;
– het afzien van de verplichte advisering bij het technisch-economisch beheer van Rijksvaartuigen, op basis van de aanbevelingen uitgebracht door de Projectgroep Deregulering Interne Bedrijfsvoering (cie Van Noort).
Beide adviezen te zamen met de nieuwe plaats van D.V. binnen de DGSM-organisatie, hebben ertoe geleid dat de doelstellingen en daaruit voortvloeiende taken van D.V. ingrijpend zullen wijzigen.
De afdeling Rijksvaartuigen (voorheen Dienst Vaartuigen) zal zich – door onder meer interdepartementale commissies en samenwerkingsorganisaties – hoofdzakelijk richten op:
• het initiëren en vorm geven aan een interdepartementaal vlootbeleid voor de Rijksoverheid.
Daarnaast zal echter de afdeling:
• het veiligheidstoezicht op Rijksvaartuigen gefaseerd overdragen aan andere afdelingen van de Directie V c.q. de Scheepvaartinspectie;
• het technisch-economisch toezicht op Rijksbinnenvaartuigen gefaseerd afbouwen; en
• het taxeren van particuliere binnenvaartschepen en het uitvoeren van schade-expertises op korte termijn beëindigen.

Het door de Interdepartementale Coördinatiecommissie voor Noordzee-aangelegenheden (ICONA), onder het voorzitterschap van mr. B. W. Biesheuvel, uitgebrachte advies over de uitvoering van operationele Noordzeetaken (2e ICONA-advies) bevatte vier hoofdonderwerpen, te weten:
– de vorming van een *kustwacht*, als samenwerkingsorganisatie van bestaande diensten
– de vorming van een *hydrografisch instituut*, door federatieve samenwerking
– de versterking van het *materieel beheer* voor civiele zeegaande vaartuigen van de overheid
– de vorming van een *breed overleg voor operationeel zee-onderzoek*.
De Kustwacht, het Nederlands Hydrografisch Instituut (N.H.I.) en het Overlegorgaan inzake Faciliteiten voor het Zee-onderzoek (O.F.Z.), zijn intussen gevormd.

De versterking van het materieel beheer van civiele zeegaande vaartuigen
heeft vorm gekregen middels:
1. het instellen van de Commissie Interdepartementaal Overleg inzake Zeegaande Vaartuigen (I.O.Z.V.); en
2. het transformeren van de Dienst Vaartuigen tot een beleidsafdeling Rijksvaartuigen (VR)

De commissie I.O.Z.V., samengesteld uit vertegenwoordigers van 7 verschillende ministeries, heeft tot taak alle betrokken ministers jaarlijks te adviseren over:
• het interdepartementaal gebruik van bestaande civiele zeegaande vaartuigen; en
• de verwerving van civiele zeegaande vaartuigen voor de Rijksoverheid en stichtingen of andere instellingen die geheel of overwegend door de Rijksoverheid worden gesubsidieerd.
Als voorzitter is aangewezen het hoofd van de Afdeling Rijksvaartuigen; ook de secretaris is een aangewezen medewerker van deze afdeling.
De Afdeling VR zal haar beleidstaken grotendeels uitvoeren op basis van de volgende hoofddoelstelling:
het bevorderen van een doelmatige opbouw en inzet van de vloot civiele zeegaande (Rijks)vaartuigen.
De Afdeling wil met deze doelstelling een bijdrage leveren aan het door de ICONA ingezette proces m.b.t. de versterking van het materieel beheer van civiele zeegaande vaartuigen.

Ing. F. de Beer
Hoofd v.d. Afd.
Rijksvaartuigen

RESEARCH IN MANUFACTURING OF SHIPS, NOT DONE OR IMPOSSIBLE?*

or: is there a future for computer-integrated-manufacturing in shipbuilding?

*by: Prof. ir. S. Hengst***

SYNOPSIS

Most of the investigations in research and development for ships, shipping operations and shipbuilding have been product related. Attention has mainly been given to hydrodynamics, resistance and propulsion of ships, structural problems and the design of ships. The process of manufacturing did get much less notice in the Western European shipbuilding industry, although a considerable part of the market in shipbuilding and shipping was covered by the European shipyards.

When the share of the market controlled by the Far East was increasing in both shipbuilding and shipping, the concern for the cost of production and consequently for the process of the manufacturing of ships was growing. The energy in Europe was focussed on parts of the process of hull construction and rarely on the process in total.

Moreover, the technological development on the application of modern techniques in shipbuilding was mostly done outside the shipyards, e.g. welding, cutting, numerically controlled machine applications, etc. Shipowners did have no particular interest because they could get cheaper vessels elsewhere. But the shipbuilding industry was faced with quite a problem: practically no attention had been paid to production engineering.

The interest for the R&D on ship-production increased slowly. Is the importance of this research only understood when time is running out or when a shipyard or the industry is loosing their share of the market? (an exception must be made for the Japanese shipbuilding industry, where profound studies have been made of the production systems).

An illustration is the increasing attention for production in shipbuilding in the United States during the early seventies when the shipbuilding industry in the U.S. had no significant share in the international merchant marine market anymore. At that time it was also verified that the shipbuilding productivity was notably less than the productivity in Japanese and European shipyards.

At that time the Maritime Administration National Shipbuilding Research Program was developed, looking into the possibilities of increase of productivity of the shipyards. Not primarily to regain a part of the international market, but mainly because of the fact that it became necessary to improve the productivity of the shipyards which are building for Navy programs. This paper reviews the actual position in research for ships manufacturing and elucidates the strong needs for further research in this area.

Some history

In the first issue of the 'Journal of Ship Production' in 1985 L. D. Chirillo and R. D. Chirillo are presenting a paper which served as a testimony during a hearing on 20 June 1984 by the House Merchant Marine Subcommittee. The paper describes the evolutions of the shipbuilding industry in the U.S. since the second World War. The value of the paper is that, apart from the complete review which is given of the American shipbuilding industry in World War II up till now, that nearly every element or aspect of importance for production in the shipbuilding industry, is being touched (1).

The background of the paper is the need of the U.S. in 1942 during World War II to build 'vessels faster than they were sunk by the German submarines'. The approach by Kaiser is taken as an example. Three quotations from this paper are deserving particular interest:

1. 'until the industrial mobilization, which accompanied the outbreak of war in Europe, the Kaiser organization had never built a ship. Than suddenly, utilizing industrial engineering principles the newcomer, Kaiser, outproduced established shipbuilders. The record-shattering performance was due to Kaiser's introduction of the rudiments of Group Technology, that is, organizing work by the problems inherent in manufacture.'

2. 'Kaiser had to train thousands, including many women, who had no manufacturing experience. Normally two to three months were required to sufficiently train a welder. The Kaiser method turned out many good welders in ten days because they were taught only down hand welding.'

3. 'The Kaiser principle was to organize work to fit the worker instead of vice versa.'

Three elements are becoming apparent from those quotations:
- the aspect of applying engineering to the production process,
- the aspect of training people for new jobs,
- the aspect of organizing the work according to and in line with available labour and means.

In spite of the fact that the American shipbuilding industry, or at least the American industry, had performed maybe the largest series production of ships in W.W.II it were also the American shipowners who went for production facilities outside the U.S. to have their ships, particularly the large carriers, built for the transportation of iron and ore. It were the American shipowners who introduced all welded constructions to the Japanese and who put their experience, which was gained during W.W.II in the hands of the Japanese shipbuilding industry. (As a matter of fact there was no choice: during that time, late forties, early fifties the European shipyards were still struggling to overcome the destruction from W.W.II, the Japanese shipyards had not been destroyed.) So the paper describes a fourth element of shipbuilding which is important to take into consideration that is the transfer of technology.

Another element which was transferred by the Americans to the Japanese industry

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was quality. Dr. W. Edwards Demming promoted quality analyses on the basis of statistical methods. The Japanese industry recognized the power of the system and the introduction of the statistical approach of quality assurance developed by Demming formed one of the main elements to introduce quality circles in Japan.
The aspect of how to tackle complexity was picked up by the Japanese on basis of the airplane industry assemblies which in turn formed the basis for the material control system which is of prime importance to an industry. The Japanese combined the statistical methods with material control systems and from that time on realized significant improvements in productivity of their shipbuilding organization. Three other aspects are becoming very apparent from this paper:

- the capability to work on the basis of a joint effort instead of an individual effort,
- the importance of the cost of labour,
- the rationalization of work which enables a shipyard – using the statistics mentioned earlier – to constantly control the productivity and improve it.

The actual situation in Europe is probably well described by a quotation from dr. Hisashi Shinto when he values the U.S. shipbuilding industry by saying that 'only America can surpass Japan in shipbuilding, but we do not worry because America has a human problem: not enough college educated people in middle management'. The similarity between Europe and the U.S. lies in the lack of education of middle management in advanced methods and analyses in the field of manufacturing.

The development of the conventional way of hull construction to hull block construction and via process lane construction towards integrated construction including outfitting and painting is well described in this paper. The European shipbuilding industry is not given much attention.
Considering the words of a Japanese shipbuilder we may find some indications where the problems and thus the possibilities for the European shipbuilding industry are:
- Can we face our human problems
- Can we introduce college educated people in middle management.

The question remains to be seen whether those two items are the only factors of importance.
So far history has proven that the Japanese have been good pupils of the Americans. Efforts from the American shipbuilding industry to reintroduce the same principles in their shipyards failed. That is to say where it concerns the merchant marine shipbuilding. However, continuous efforts are being made in the U.S. to introduce new methods and advanced technology in the naval construction program.
With the Merchant Marine Act of 1970 a program called the National Shipbuilding Research Program was initiated in the U.S. on behalf of the government and the total shipbuilding industry. Japanese and European shipyards were visited and construction methods were evaluated, Japanese specialists and consultants were introduced in American shipyards to advise on production methods and advanced assembly and production principles. However, the constant improvement of Japanese shipyards with regard to productivity was not analyzed sufficiently to bring the American shipbuilding industry back into the merchant marine market.
Some European shipyards tried to keep up with the Japanese developments in setting up large facilities for the grand scale shipbuilding. In spite of tremendous investments and advanced technological achievements the European industry was not able to match the Japanese developments in massive production volumes. The European shipyards met considerable difficulties in competing with far east shipyards under the prevailing market conditions and many yards have been faced with considerable losses.
In the 'Journal of Ship Production' (2) Cato Fredrik Sverdrup reviews the European shipbuilding industry in the worldwide pattern. The paper confirms the a.m. view.
The conclusion must be that the traditional shipyard as it exists today is not able to compete with the N.I.C.'s like Korea or the Eastern European yards, which are still expanding. The basic problem is that since W.W.II the shipbuilding capacity all over the world has been growing much faster than the demand. Shipyards were being built faster then they were going broke. The most advanced shipbuilding technology can be bought anywhere by anybody and the only conclusion is that other ways and means must be found if the European shipbuilding industry wishes to remain in the market of the shipbuilding.
The survival of the traditional shipbuilding industry in Western Europe has been possible mainly through:
- subsidies to shipbuilders and/or shipowners
- specialization of shipyards in some specific parts of the market
- concentration on the local market which is not yet influenced by the worldwide shipbuilding recession,
- naval orders, a development similar to those in the United States, defense is of prime importance for R&D in, and applications of new technologies, apart from other reasons.

Resistance may be created by the fact that incentives for improved production (by research or any method which is inducing better productivity) or changes in the structure of the shipbuilding industry, cause a problem for the industry as a whole because it means the reduction of the number of shipyards. The question is then: 'who is getting out first?'.
On the other hand we must realize that the competition (not only the far east but also the third world) will continue to maintain at least a 'reasonable capacity' in shipbuilding. This determines that, if Western European shipbuilding will have to create a chance for survival on the long term, a continuous battle in every area of research and development, particularly in the field of production and productivity, will have to be fought, and this conclusion is only valid if continuity on the short and medium term can be assured.

2. Research in manufacturing up till now

One of the problems with research in production in shipbuilding is that it is difficult to measure what the precise results of the R&D effort are. A shipyard will not publish what the result has been of the introduction of any production system or technological improvement in a yard because the shipyard judges the results as an asset for its competitive position. 'Spreading the knowledge means helping your competitor' is often the short term thinking. This is however only true if a significant advance over the competition exists and this is not always the case. Western European shipyards are in comparison with Japanese shipyards behind, not necessary from the technical point of view, but maybe with regard to organization and the efforts put into R&D.
Taking a step back in history and making an analogy: Venice had for a long period a flourishing shipbuilding industry. Some features of this well organized operation were:
- ships were built in large series, under cover,
- the ship was a standardized product,
- stocks of spare parts at many harbours,
- production techniques were guarded carefully,
- delivery times were short, counted in days and not in months,
- through the patronage of trade, shipping and shipbuilding the state assured its safety.

When the ocean-going sailing ship entered into the competition, Venice lost the connection, although the sailing ship went through a similar development. The wooden ocean-going sailing ships had in the middle of the 19th century a delivery time of approximately 3 months, a steel ship had a delivery time of some 2 years. Comparing the methods and circumstances of those days with today's, some questions should be asked e.g.:

1. is our current practice sufficiently pointed at design for production,
2. what are the (limited) possibilities to evaluate the influence of a design on our production facilities,
3. how well do we train our employees,
4. when a shipyard wants to improve production techniques, how great is the dependence on the supplying industry of production equipment,
5. is the information of a production equipment supplier, who will try to prove his case with a magnitude of figures, valid under the particular conditions of a given shipyard,
6. how is the infrastructure of the supplying industry,
7. does the shipbuilding industry recognize the changes in the tranportation markets,
8. what has to be done to evaluate the influence of improved production techniques systematically,
9. how good is the after sales service, and so on.

The viewpoint of the industry (a consequence of lack of knowledge) may be to accept an incomplete answer on anyone of these questions.
It becomes then difficult for a designer to work towards a better production-orientated design, for instance because the price structure of an estimate is most of the time not systematically related to a specific production method. The latter should enable the designer or estimator to evaluate advances in technology and the effect of design changes.
The R&D in the industry reflects this attitude, research is focussed on specialized areas such as:
- ship design methods (3)
- ship design procedures (4).

As a result of this approach the R&D in 'design for production' has been aiming at the reduction of quantities in the first place. Examples are the reduction of the total steel weight, the reduction of metres of welding, pipe etc.
Another approach was the simplification of the geometric forms of a ship (5).
At the same time research was done in the field of production techniques related to improving welding methods (6) (7), assembly techniques (8), or the application of robots (9). Reviewing the kind of research, one can deduct that the R&D has been oriented towards parts of the production process and the related technology, parts of the products or the design of the product. From many publications we can determine that up till now all those efforts have been rather successfull (internationally).
But we are also reaching the limits of the 'conventional' type of shipyard production.

Comparing the shipyard production with other international industries we must assess that the shipbuilding industry in Europe has not been able to effectuate the real interrelation of production technology and product. One may object and say that the production of capital goods is not comparable to other industrial activities, on the other hand the total inventory of maritime industry encompasses many products with a relationship to many other industries.
The valuable contribution which was made a.o. by Caldwell in the early seventies (10), (11), (12), cannot be evaluated by known results from the industry. Similar efforts, which were successful in other industries with regard to:
- advanced production methods
- mechanization and automation
- simplifying the design as a function of the possible mechanization and automation in manufacturing,
- the application of learning effects of series,

have never been fully employed, neither in the design nor in manufacturing in shipyards.

The R&D for production was mainly pointed at aspects as:
- planning and work distribution and
- working methods (13)

Much energy has been put in a variety of subjects but a system to integrate and evaluate 'on the spot and on the yard' appears to be missing.
An attempt to integrate design, construction and production has been made by Goldan (14), who, for the specific application of a semi-submersible type platform, developed a set of parameters enabling a designer to evaluate the effects of different types of design or construction on the cost of production, considering labour, material, effects of series, investments in facilities etc.
Again it must be said that the result of this type of research can hardly be evaluated in the industry because the coordination between the industry and the researcher is non-existent when longer term projects should be initiated to develop reliable shipyard-based parameters, which are necessary for both shipyard and researcher to draw useful conclusions for the industry and further research.
Research which is stimulating the design for cost effective production in the maritime industry is hence still very difficult and may be even impossible. Because even today estimating, planning, cost-control and production are still based on those elements which are characteristic for unique-production methods such as:
- manhours
- materials
- subcontracting
- overhead cost
- various etc.

fig. 1

SUBJECTS OF RESEARCH FOR PRODUCTION

1. ORGANIZATION, MANAGEMENT SYSTEMS
   - quality
   - material control system
   - etc
2. FACILITIES
   - lay-out, plantsize
   - capacities
   - etc.
3. TECHNOLOGY
   - welding
   - panel-line
   - etc
4. PEOPLE
   - training, education
   - management and work practices
   - etc

Will systematic R&D for production be possible?(fig. 1).
Changing an industry, or changing the attitude of an industry towards a cost-effective attitude demands a lot of skill of management. Independent of the type or size of the industry, or the market to be served, it requires an attitude of flexibility.
When the actual developments lead to the conclusion that the limits of the 'old-fashioned way' of shipbuilding- and design technologies are getting too close for the shipbuilding industry to remain competitive and when the expectation is that improving or refining methods for estimating, cost-control or planning do not fundamentally ameliorate the shipbuilding industry the only conclusion can be that we will have to reconsider the targets for R&D in manufacturing in shipbuilding.
Even when the European shipbuilding industry was successful, either by finding niches in the market, or by specialization, or applying subsidies, one target of R&D in manufacturing is to evaluate the production process continuously and systematically and help to formulate realistic goals which can be set for future developments in the industry (fig. 2).

3. Possible future developments

The fact that the shipbuilding industry is operating in an international environment means that technological developments are more or less 'on the street'. The most up-to-date shipyard applying the best and most advanced technologies in design and production can be built anywhere in the world – in theory –, but it remains a traditional unit, well equipped and organized, using cheap labour. There are constraints e.g. the existing over-capacity

SURVIVAL OF SHIPBUILDING
INDUSTRY IN WESTERN EUROPE
POSSIBLE THROUGH:

- specialization
- concentration on local markets
- naval orders

combined with subsidies

STILL

TRADITIONAL W.E. SHIPYARD IS
HARDLY COMPETITIVE IN SPITE OF:

- product specialization
- market selection

fig. 2

(worldwide) in the industry, on the other hand many local reasons may push the formation of (national) shipbuilding industries.

That such efforts are not always effective may be demonstrated by the following quotation from a local newspaper (15): 'the public undertaking committee has said that the Cochin shipyard has been drifting without any long term plan or objectives because of the inability of the government in formulating the financial and economic objectives of the undertaking, even after a decade of its existence.'

It concerns a shipyard which has been set up during the second half of the seventies and put into operation in the early eighties using the best available technologies at that time and supported by a Japanese shipyard. The paper states further:

'in an atmosphere of uncertainty regarding orders, cancellation of orders and total dependence on imported inputs as designs and raw materials, it is impossible for the shipyard to function normally in the planned manner'.

More than anything else this illustrates that, how good or how bad R&D on production and manufacturing may be, strategic planning is a necessity for the survival of a shipyard. It also proves that the goals of a shipyard cannot be set by the available means for manufacturing but the sequence has to be reversed, which can imply changing means and organization. The targets for the R&D will have to be formulated as a function of the goals of an industry.

The starting point is the acceptance of the fact that both shipping and shipbuilding represent a strategic need for Western Europe as a maritime oriented community. Considering the global evolution the following operational aspects shall be taken into consideration:

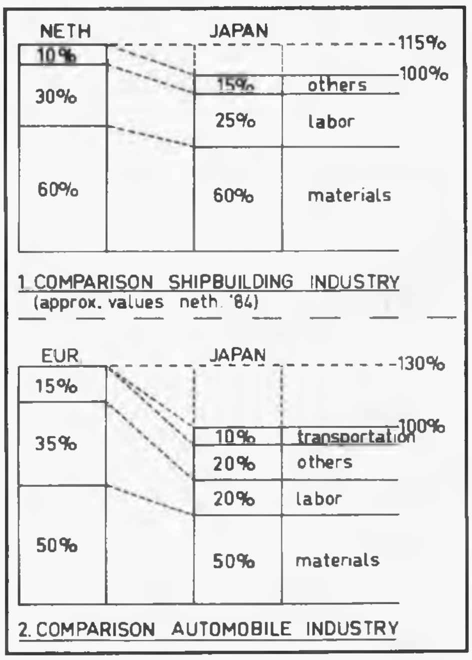
- delivery times will become shorter,
- there will be a continuing pressure on further reductions in manpower,
- more and more price will become a major factor for the operation of the ship-owner, since the relative importance will grow, when crew costs will reduce,
- the importance of flexibility of a shipyard will augment, because of increasing fluctutations as a result from e.g. shorter deliveries,
- the increasing complexity of ships will require higher and better educated people on ships and in shipyards,
- the importance of organizational and social aspects will grow, as a result of increased flexibility, higher level of education etc.

Evaluating these points demands an integrated approach in (re)organizing the means of an enterprise, inclusive R&D.

Concentration of research efforts on the reduction of the costprice of the product, maintaining or even improving the quality, realizing shorter deliveries without disturbing the industry is demanding quite some energy. Most Western European governments became aware of the complexity of the problem and anticipated the struggle the Heavy Industries are facing and very rightly supported basic industries as the steel mills and the shipbuilding industry with subsidies.

For his analysis of the global shipbuilding industry Kerlen (16) introduced the factor 'competitiveness'. He concluded that the Japanese industry is still the most competitive, followed by the Korean and the Netherlands. But in general the level of competitiveness is not very promising in Western Europe. The evaluation takes into consideration price of materials, labour costs and output in production per cgrt. The last factor is internationally accepted to compare the output in production for different types of ships. It could be questioned if this factor, which is of great influence in the formula's, is indeed sufficiently reliable for comparisons of production in shipbuilding. Since the factors are based on similarity they contribute without any doubt to the evaluation of the international competitiveness in shipbuilding.

fig. 3



Considering the international competitive forces (17) it becomes obvious that other factors than the competitiveness of the shipyards play a significant role. Developing R&D programmes for an industry means in this respect that not only the competitive forces between the enterprises are of importance but also the power of the supplying industry, the negotiating power of the buyers in the market (shipowners), the introduction of new products as well as the introduction of new shipbuilding industries have to be considered in the market.

This means that a R&D programme for production in shipbuilding demands an approach which is the result of a market strategy. Considering that the industry is changing very slowly (18), and that the industry has to fulfill the same basic needs as 200 or even 600 years ago, we are, as a matter of fact 'back to Venice'. Which options do we have when survival of an industry is at stake?

Two main directions seem to be imaginable:

- either the R&D activity abides by the industry as it is today, which determines a continuing struggle for 'survival by subsidies' and 'governmental protection',
- or the R&D is focussed on entirely new approaches for the industry.

The 'new approach' looks to be the most inviting, but involves many uncertainties, which only can be mastered if the industry 'as it is' is taken as the starting point. On the other hand the opportunities offered by the 'new technologies' e.g. the information technology will have to be investigated to the maximum extent.

In strategic terms: the R&D programme should start with an analysis of the 'gap'. It goes nearly without saying that the R&D demands different levels and angles of attack:

- targets being set on industry-level as described above,
- targets being set at company level, based on the goals and strategy developed by the enterprise.

The approach could be to formulate the targets with regard to R&D on company level, by posing as many questions as imaginable:

- how can planning and material distribution be improved by using advanced administrative systems,

- what are the possibilities to develop simulation programmes to compare and evaluate working methods, enabling the reduction of manhours and optimization of materials,
- how can joint research with subcontractors and sub-suppliers be developed without loosing the advantage of an advance,
- will it be possible to reduce overhead-costs and increase capacity, improve simultaneously the quality of the employees and the product.

Formulating the strategy stands for facing the likely impossible, paving the way from a not longer acceptable position.
So far the conclusion might be that the research on manufacturing of ships has been done, but the question remains whether we have been putting our goals in the proper scenery and far enough away. How can a R&D programme for the shipbuilding industry be organized that meets these demands and still remains realistic:
- for the specialization of the shipyard that has found a 'niche' in the market,
- satisfies the government which has been supplying subsidies to an industry which is faced with competitive forces which are beyond the control of a company,
- advise policy makers on restructuring an industry which is on the one side being considered as strategically necessary but on the other side also might be considered as a burden to the economy,
- find incentives for the supplying industry (which knows that shipbuilding has reached a position, which might involve a 50% reduction of the market) to continue to develop products for the shipbuilding industry,
- provide incentives to the supplying industry to participate in product developments which do not only have the appearance of a unique product but also create the prospect of a continuous industrial operation.

The subjects contain an element of conflict of interest related to nearly each party involved. But at the same time they indicate the magnitude of the alternatives which can be generated: the R&D should not loose itself in sideline activities such as computer applications or automation without a well established plan and look for opportunities outside the traditional fields which have been explored for many years. Meanwhile the field to be covered is huge, and only a small percentage of the total research effort has been spent on R&D for production up till now.

Knowing that roughly 70% of the price of a ship (fig. 3) is consisting of equipment, supplies and materials and that only about 30% of the total delivered package are shipyard production costs, it must be realized that, in order to remain in the market as a European shipbuilding industry at competitive level, there is much more to rely on than shipyards (fig. 4). Apart from computer applications, hydrodynamics or structural developments we have to challenge the integration of many research programmes in different institutes in the various European countries. Knowledge and technology is not enough, the desire and capacity to exchange and cooperate is more than essential.

COST STRUCTURE SHIPBUILDING

• MATERIALS			
	- base materials	7%	
	- metal products	6%	
	- equipment	24% ⊕	
	- special supply	3%	
	- system suppliers	15% ⊕	
	- component suppliers	3%	
	- others	2%	
			60%
• LABOR			30% ⊕
• CAPITAL CHARGES, SERVICES			10%
		TOTAL	100%

⊕ PRIME AREA'S OF INTEREST FOR RESEARCH

fig. 4

Strategically the problem may become even more apparent if we put a number of questions on the table:
- should we innovate e.g. develop and specialize in designs,
- is it economically feasible to develop a European standard which enables shipyards and maritime production facilities which place equipment orders with European suppliers to provide and obtain the same service all over the world,
- will it be possible to outperform the competition with a focus on quality,
- what are the requirements and can we adapt organization and management of shipyards to future developments,
- should we develop a European strategy on maritime matters and in doing that take into consideration that the demand in transportation capacity is much larger than the actual Western European shipbuilding capacity,
- should we focus on maritime operations in the European industry and is it feasible to develop a European standard which is accepted by the global operating classification societies.

R&D provide one of the means for a company to meet the goals for which the company is aiming. When the R&D in the field of manufacturing is formulated, all elements which contribute to the performance of a company should be considered. Because fabrication is nearly at the end of the chain of activities and the place to manoeuvre is reducing when the activity lies further towards the end of the line, while all previous actions are influencing the result.
Apart from marketing, sales, design – which should be called 'product development' – , the availability of labour, purchasing (of utmost importance, because of the policy with regard to 'make or buy'), engineering and all other preparatory activities are touching the production in a company. This means that the analysis of manufacturing is demanding an integral approach when we want to improve or develop a manufacturing system for a shipyard.

Considering the apparently opposed requirements as:
- shorter deliveries,
- lower cost prices,
- better quality,
- greater flexibility,
- better educated employees,
- increasing human and social responsibilities,
- etc. etc.

the R&D for the production in shipbuilding is taking the shape of a number of different processes which are running parallel and need to be tackled simultaneously, in a close relation to and dependent from each other.
Some obvious areas for the R&D programmes are:
- product development
- production process development
- product maintenance
- engineering standards
- material management for assembly processes, etc.

The simultaneous attack of the R&D programmes means that the introduction of new technologies is developed together with e.g. introduction of new designs. Each of the programmes will create and face boundary conditions for and from other programmes.
The development and realization of quite complex products cries for R&D on standardization; complexity and standardization do have a relationship. Up till now the standardization has been limited to the component level or subparts thereof. It will be of prime importance to investigate the maximum of the extent of standardization, that is to say the limits of the ability of engineering to standardize elements for production. At the same time we must realize that introducing standardization at higher levels should increase the flexibility in design or production.
Finally the main function of the shipbuilders will have to take part in the total system, the assembly is only one complex activity,

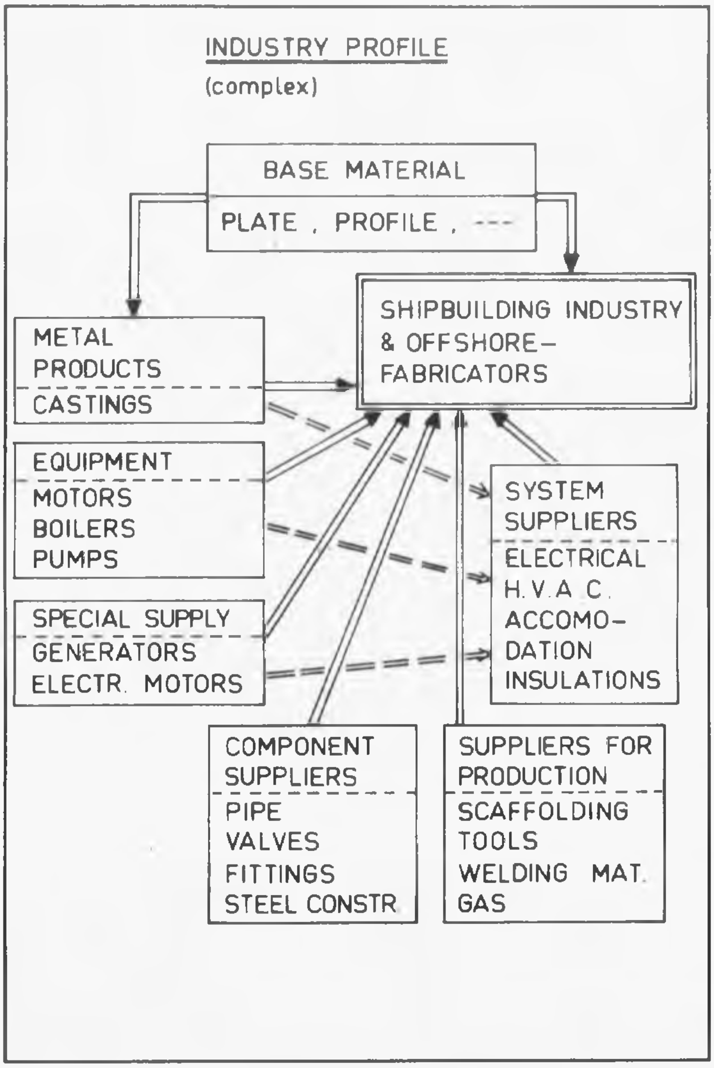


fig. 5

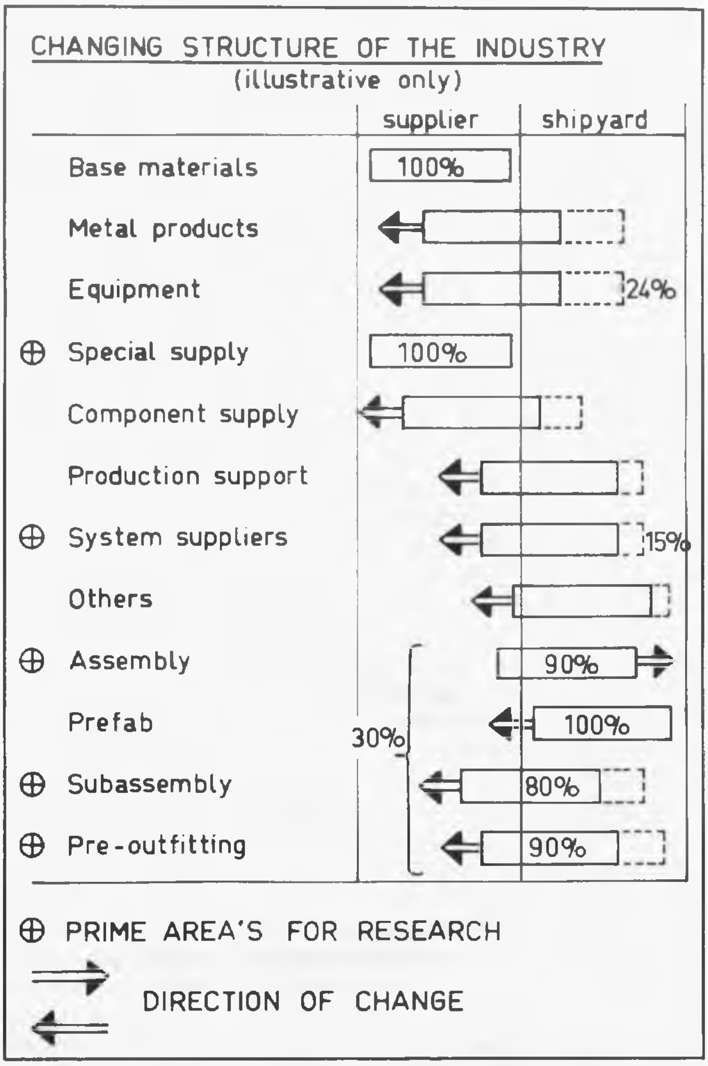


fig. 6

of which the success is decided by and large during the preparation of the process. The fabrication of components and blocks is not necessarily something which has to be done at a shipyard. The yard will provide the boundary conditions as the available infrastructure will set the limits for e.g. transportation and subcontracting.

The possibilities with regard to mechanization, automation and robotization in the industry will be a function of the evolutions as indicated above. A systematic and well thought development of standardization will increase the quality of a product and even increase the flexibility in product development. The R&D should be oriented towards standardization at different levels of production, aiming at diversification within the various (fig. 6) types of ships.

Up to the middle of the fifties diversification for a shipyard meant the fabrication of as much equipment as possible: main-engines, castings, turbines, foundries, machine-shops, pipe-shops, carpenter work, anything required or possible was done in an shipyard, today we call it vertical integration (fig. 5). Gradually more and more equipment was bought outside of the shipyard (fig.6). To embody the industry a different infrastructure was developed with specialized subcontractors and the 'make or buy' decisions became more and more a matter of the availability of a resort of specialized subcontractors. The question is how far this process of horizontal diversification can continue without weakening the position of a shipyard. The main problem might become the strategic market selection of the shipyards, any shipyard may try to cover as much of the market as the physical capacities will allow, on the other hand the advantages of specialization are evident and this might oblige the shipyard to keep manufacturing functions which are indispensible for product development within the production capacity of the yard. The other side of the medal is that a shipyard might be caught in a strategic 'trap': maintaining a capacity for a specialized share of the market, running the risk of 'idle periods' or serving larger parts of the market with the same capacity acting as a jobber at 'cut throat prices'.

The horizontal diversification has the advantage of spreading the capacities, increasing the flexibility and maintaining the capacity. In order to be able to select – i.e. take a make or buy decision – a shipyard has to decide which parts of the enterprise are to be considered as main functions, indispensable (conditional) functions and – not essential – supporting functions for the continuity of the company. The preparations of such decisions do need supporting systematic research providing staff and management with e.g. simulation models to evaluate and compare different options and develop financially and economically justified policies. Any kind of operation should be evaluated. An apparently indisputable statement is that 'the activity of final assembly is typical for a shipyard'. Nevertheless some shipyards prove that this is not necessarily so (Damen Shipyards and Cono Industry Group in The Netherlands). On the other hand, there is no doubt that the shipbuilding industry is getting more and more confined to final assembly of the product. It is recommendable to analyze the industrial developments in the same way as it has been done in other industries, taking the European scenery as a whole. More attention shall therefore be paid to the R&D in assembly technologies for shipyards, which means e.g. the combination of

- logistics,
- material handling,
- development of logically composed, system oriented, packages which are suitable for easy subcontracting,

- development of standards for engineering,
- more 'containerization' of installation work,
- the development of 'user friendly' software for complex data bases which are holding continuously changing information and relations.

The situation with regard to production (manhours and cost) is for The Netherlands comparable to Japan and certainly better than for e.g. the automobile industry (fig. 7), and possibilities for survival remain.
The integral approach remains necessary. In The Netherlands this has been done by setting up a programme which covers all aspects of production development in shipbuilding. The key to success will be the active participation of the shipyards, which is, for reasons outlined above, sometimes difficult, because usable and reliable conclusions of any type of R&D are demanding time and the outcome is not always positive, moreover the so-called 'practical' attitude of the yards does normally not agree with the more abstract approach which is characteristic and necessary for research.

4. Concluding remarks

1. The selling of European developed technology and American management systems gave the Far East shipbuilding industry an excellent opportunity to combine two elements which are vital for a fast growth, which was perfectly joined with trade and shipping.

2. The advance of the Japanese shipbuilding industry in R&D in this area is one of the main reasons for the strong position of the Japanese shipyards in today's world market.

3. There is no consistent policy in Western Europe with regard to R&D, aiming at survival of the European shipbuilding industry, let alone a policy for R&D on production in shipbuilding.

4. Without a combined European policy on trade, shipping and shipbuilding, a continent like Europe puts at stake a vital link for the economical future, which is for a great part depending on safe and reliable maritime transportation and supply lines. A merchant fleet is a crucial factor in this regard, history proves this, but who still realizes?

5. The R&D on production in shipbuilding in Europe does not show any strategy. The research which has been made on a variety of details does not enable systematic searching for a pattern in the complexity of this type of assembly industry.

6. Any initiative of the shipbuilding industry is condemned to fail if the European shipowners will not be stimulated, convinced and protected (cargo) to contribute to support European shipyards.

LABOR COST SHIPBUILDING

- MANHOURS PER C.G.R.T
  - japan: 100%
  - neth.: 105%
- COST PER HOUR
  - japan: 100%
  - neth: 115%
- HOURS PER YEAR
  - japan: ~2000
  - neth: ~1600

LABOR COST IN AUTOMOBILE INDUSTRY

- AVERAGE MHR/CAR
  - europe: 100%
  - japan: 50%
- TOTAL LABOR COST PER CAR
  - europe: 100%
  - japan: 45%

fig. 7

7. The shipbuilding industry in Western Europe has to generate a policy which enables restructuring not only on company level but, which may be even more important, within the total industry, inclusive the supplying industry, setting the pattern for a European programme for R&D.

8. The chances for survival of a European shipbuilding industry capable to meet international competition will be increased by expertise which can be generated through planned R&D programmes for manufacturing.

9. The search for advanced production technologies needs different 'angles of attack':
- the organization of the industry
- the perception of quality
- the integration of design-engineering-production
- systematic analysis of production methods
- conditions for robotization
- development of data base management systems,
- etc. etc.

10. The accumulation of requirements and scope for R&D exceeds the possibilities of any single country of the European community, certainly when results are to be produced which can be introduced in a 5 to 10 year period.

11. The European shipbuilding industry has to conceive a R&D programme, similar to the programmes set up in the U.S. and Japan, the available European knowledge provides a sound basis for success, the main problem is: where is the organization.

12. Computer-integrated-manufacturing will only become a useful tool when basic and detailed process information can be applied in a data base of which the system specifications have been developed in close cooperation with the user. This will require analyses as discussed in chapter 3.

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DEVELOPMENT, TESTING AND EXPERIENCE WITH AN ULTRASONIC RISER PIPE AND PIPELINE INSPECTION TOOL

*by: J. A. de Raad, Ing.**

Abstract
There is an increasing demand to establish accurately the condition of sub-sea pipelines, which have been in service for several years particularly the condition of off-shore platform risers. Fluid propelled tools (without cables) should preferably be developed, capable of performing onstream inspection without disturbing the operational conditions. To comply with this requirement Roentgen Technische Dienst in co-operation with Shell began an ultrasonic inspection tool development programme early in 1984, financially supported by the European Community's Directorate General for Energy and the Dutch Ministry of Economic Affairs. This paper gives an overview of the present achievements of the development project and describes the various and numerous demanding tests of the tool, which were successfully passed prior to field deployment of the tool. After the field test the tools will be commercially available. No basic problems are envisaged in upscaling or even some downscaling of the RPIT. Also a recent wire line test of a 16 in. RPIT in open J-tubes on an offshore platform is described.

1. INTRODUCTION

Subsea pipelines represent a high investment in offshore development and they are often the only means of transport for the produced oil to shore.

Subsea pipelines are designed to the highest standards so they can withstand the extreme conditions to which they are exposed. However, sea currents and waves, mechanical damage, internal and external corrosion are all liable to reduce integrity. Several techniques are available to monitor the condition of the product and its effect on the material of the pipeline, e.g. iron counts, corrosion probes etc. However, they are only indicative for the presence of corrosion, but unfortunately not the severity.

This justifies the development of inspection tools which preferably should provide quantitative data on the condition of the pipeline.

2. REQUIREMENT FOR ABSOLUTE ACCURACY

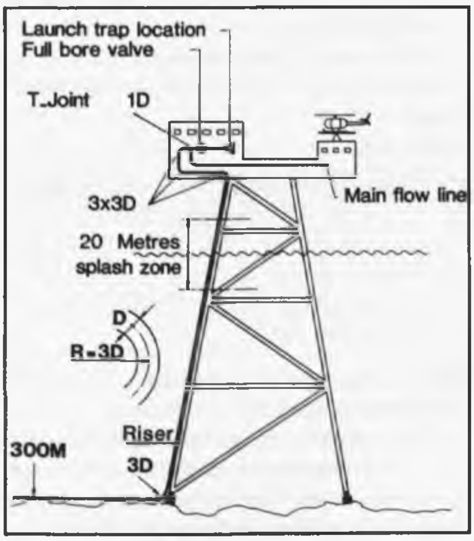
The need for accurate monitoring and inspection techniques has been identified but is not simple to meet.

Inspection tools that apply the magnetic stray flux principle are capable to detect metal loss, see reference 1. However, they are insufficiently accurate in sizing the defect. Variables such as pipe material, wall thickness, sensor type, sensor lift-off due to dirt, wax or scale, degree of magnetisation, tool speed etc. all have their effect on the recorded signal. This combined with the lack of a proportional relationship between signal and defect dimensions leads to inaccurate results, see reference 2. Defect evaluation to assess the structural integrity of the pipeline and the possible need for repair is therefore impossible without verification of the defect with more accurate techniques.

For onshore buried pipelines, verification can be done by visual inspection and externally applied ultrasonic techniques for accurate quantification of the remaining wall thickness at the defect location. For offshore pipelines, however, this is much more difficult. Verification of results with ultrasonics requires removal of the concrete weight coating and insulation as well as thorough cleaning of the pipewall. This is very time consuming and costly, particularly in cases where the pipeline is buried.

In the splash-zone area, access to a riser for external inspection or verification of defects is restricted, but verification of risers which pass through legs of concrete platforms, as is the case with several North Sea platforms, is often impossible. In fact this latter aspect was the justification for the development of a fluid propelled onstream inspection tool capable of measuring the remaining wall thickness accurately and reliably without the need for verification from the outside. Feasibility studies indicated that such a tool should be based on the ultrasonic measurement principle. The project aiming at development of this tool – called the Riser Pipe Inspection Tool (RPIT) – started in early 1984, and will be completed by the middle of 1988.

fig. 1: Riser circuit with bends and launch trap



3. THE CONCEPT

As already stated the inspection of risers from the outside is difficult or sometimes even impossible. Obviously inspection from the inside of the riser pipe by a fluid propelled inspection tool could provide a solution. Figure 1 shows schematically the situation at the platform. It illustrates that many tight bends and other obstacles such as T joints may have to be passed without damage to the tool or pipe itself.

On stream inspection tools are provided with cups or sealing discs and move like pistons through the line i.e. propelled by the oil flow. With launch and receiver traps the tools can smoothly be brought into or out of the riser/pipeline. For reasons of

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space at platforms these traps often have minimal dimensions and restricted accessibility as they may be installed inside the platform modules. As a consequence the RPIT should be as small and light as possible.
It is a complex task to detect internal and external corrosion simultaneously, which can take various forms such as isolated pits, general corrosion and erosion, in combination with the large wall thickness common in riser pipes. The ultrasonic method to measure wall thickness according to figure 2 was therefore selected for the tool.
Ultrasonics need a liquid couplant between sensors and pipewall to transfer the acoustic waves. In oil pipelines this is of course no problem; for gas pipelines the operation of the tool within a plug of liquid e.g. glycol or condensate, enclosed between two sealing pigs or spheres may be effective.

Alternatively non couplant ultrasonic sensors are required such as 'ultrasonic wheels', see reference 3 or 'permanent magnetic acoustic transducers (PMAT)', see references 4 and 5, to measure wall thickness in gas risers.
The measuring range of the tool for oil risers should be equal to the maximum length of a riser and therefore 300 m was selected.
In order to allow inspection of the downstream riser or a pipeline section of particular interest, it should be possible to start measurements either at an externally installed benchmarker or after a pre-set distance has been travelled.

4. DESIGN REQUIREMENTS

Shell and RTD mutually agreed on the following design requirements:

- overall length of a 16 in. tool: max. 2.45 metres
- weight: less than 400 kg
- pressure: 150 bar
- fluid temperature range: 5° to 60°C.
- maximum measuring velocity: 4 m/s
- measuring range: 300 metres without data reduction
- wall thickness range: up to 40 mm.
- accuracy of remaining wall thickness measurement: ± 1 mm.
- able to detect corrosion pits and general corrosion both internal or/and external but not at the same time
- circumferential coverage: 40%
- axial interval of measurement: 2,5 mm.
- bi-directional operation but measurement in one direction only
- capable of passing 3D-90° bends, full bore T joints, valves, symmetrical reduction of 10% nominal diameter and a-symmetrical reductions (dents etc.) of 15% of nominal diameter
- delayed start by time, distance, bench marker or combination
- system capable to provide immediate field report of results.

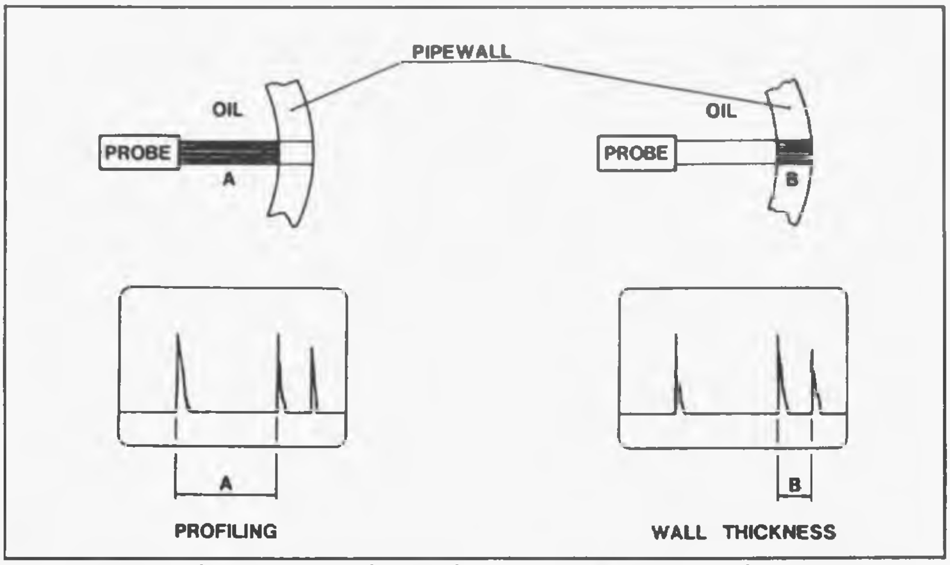


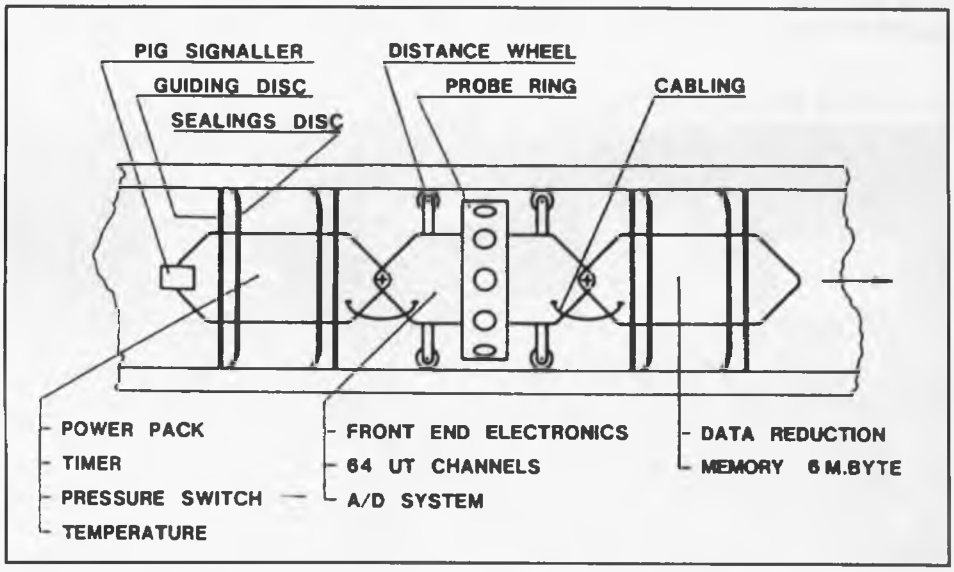
fig. 2: Principle of immersion technique for oil riser inspection tool

As becomes clear from these requirements, the liquid propelled tool has to be operated under on stream conditions. For passage through extreme diameter variations, small bends, T joints and valves at full flow velocity, the tool will consist of several high pressure resistant modules which are connected by universal joints.

5. SOPHISTICATED ELECTRONICS

The modules forming the pig train, schematically shown in figure 3, contain electronics and high capacity batteries sufficient for many hours of operation. A dormant mode is incorporated for travelling long distances. Special attention has been given to the design of a sturdy construction for the whole pig train, as well as to the use of vibration and shock resistant electronics. Part of the electronics have been miniaturized to save energy and to reduce space. Figure 4 shows the 35 storey printed circuit board package of the central processing and data storage unit as example of compactness of the electronics, see also references 6 and 7.
The electronics operate up to 64 specially designed ultrasonic probes, equally distributed in a circular array and simultaneously measuring inside and outside corrosion while the tool is moving at full speed. The displacement encoder (odometer) forms the pacemaker of the system, and ensures that with every 2,5 mm tool displacement (or multiples, if tool velocity is more than 5 m/s), all probes in the array measure the internal profile of the pipe and/or the remaining wall thickness. In this way, an extremely fine grid of measuring points can be created so as to obtain a true picture of the pipeline's condition.
The measured values are stored in a 6 Mbyte solid state memory. This memory capacity is sufficient to store either internal profile data or values of remaining wall thickness collected over a distance of 300 metres. If the values of both measurements have to be stored simultaneously the memory capacity is sufficient for a distance of 150 metres of pipeline. All values are stored together with their co-ordinates

fig. 3: Lay-out of riser pipe inspection tool (RPIT)



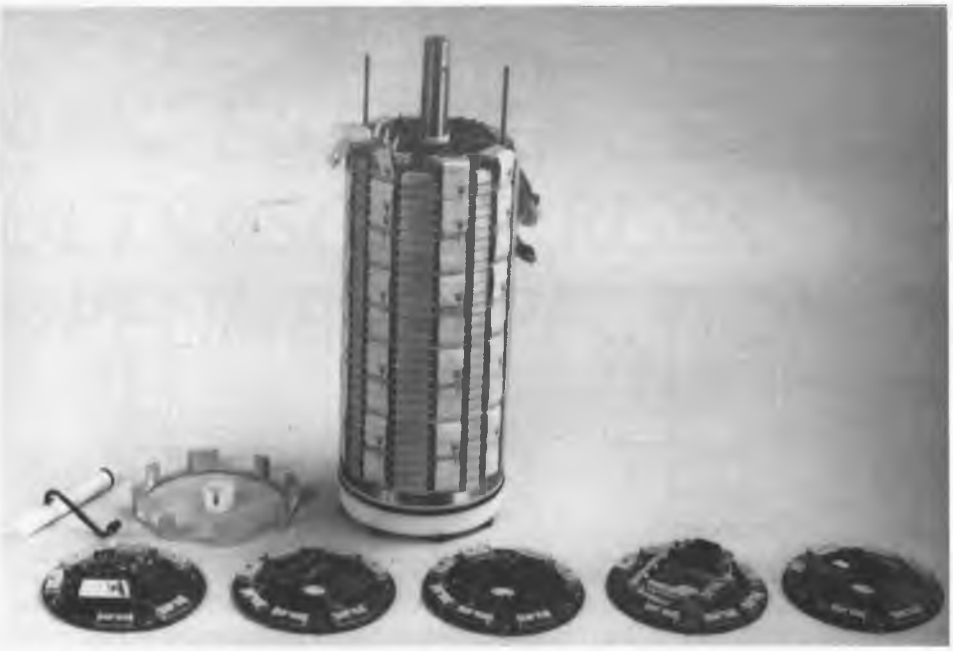


fig. 4: Multi storey printed circuit board package with central RPIT processor and 6 MBYTE memory cards

and circumferential position.
Also other data can be stored, such as time, tool speed, fluid pressure, temperature and the results of the function checks regularly made during the inspection run.
For delayed start it travels in safe dormant, energy saving mode to the section of interest to either measure internal or external corrosion or both simultaneously.

6. DATA PROCESSING AND RECORDING

The 16 in. RPIT and necessary peripheral electronics is shown in figure 5. Its design and the use of a powerful desk top computer allow on-site field reports within a few hours.
After retrieval of the tool the data will be passed on to a portable tape storage facility. The desk-top computer is used to process the data to make a field record of the riser condition. This system enables the use of several coherent display modes e.g. numerical, statistical, mapping, cross-sections and quasi 3 D display of internal corrosion. Colours are also used to enhance patterns and allow quick interpretation of results.
Figure 6 shows a mapping example, where colours are applied to identify thickness ranges.

7. SPECIFICATION AND TESTING OF THE RPIT

At the very beginning of the RPIT project a technical specification was mutually agreed upon, a summary of requirements is given in chapter 4. Not only the measurement performance was carefully specified but also the dynamic performance with regard to its capabilities to travel through a pipeline without the smallest risc of getting stuck or causing damage to the pipeline e.g. valves. As such actual pipeline operators were heavily involved in the compilation of the specification.

As a result of this demanding specification numerous tests were to be passed with the tools to be developed to prove its overall performance and behaviour. Some of these tests required sophisticated and expensive facilities like a high speed test loop and high pressure tank.
Only after successful completion of all these tests Shell management would consider validation of the tool and allow 'the potential obstacle' in their pipeline.

As such the additional opportunity given for a wire line test of the RPIT to inspect open J tubes of an offshore platform, where fluid propulsion was excluded, was eagerly accepted as a useful experience to increase confidence in the overall tool performance.

fig. 5: 16 in. RPIT with electronics to store, process, transfer and record data

8. TEST FACILITIES

To check overall performance of the ultrasonic tool in one test facility would require an extremely expensive test loop operating at high speed and high pressure simultaneously.
For economic and practical reasons it was decided to build a 16 in. test loop to check dynamic and measurement properties and a separate high pressure tank for static tests including temperature.
Not only the total cost was lower but the two facilities could each be located at appropriate places and moreover provided more testing possibilities and flexibility.

8.1. The test loop

The 16 in. test loop with a length of 100 metres as shown on figure 7 is located at the Koninklijke/Shell Laboratories at Amsterdam. The photograph shows a 16 in. RPIT in front of the launch trap. The loop is constructed in such a way that worst case riser conditions can be simulated. In this water loop, tool speeds up to 4 m/s can be obtained at a pressure up to 10 bar. The loop contains 'obstacles' such as:
- ball valves
- barred T joints
- a diameter restriction
- a dent
- 3 d bends
- vertical sections.

To allow quick testing, professional launch and receiving traps are installed. At several places along its 100 m length spool pieces can be inserted e.g. pipe sections with known artificial reflectors or corroded pieces of pipe to evaluate the RPIT performance under conditions identical to the field.

In this test loop also the RPIT behaviour with regard to a sudden stop, restartibility (also in reverse direction) and by-pass pressure could be studied.
Because of the long distance for the RPIT to travel from the launch to the receiving location, this can be up to 50 km, the loop was also intended for endurance tests to check the RPIT on damage and wear of the discs.

8.2. The high pressure test station

To check static performance of the RPIT a test facility was built according to the diagram of figure 8. This high pressure station is located at RTD – Rotterdam and provided with a skid facility for easy tool handling as shown in figure 9.

Overhead hoisting facilities allow quick and easy handling of the ultrasonic tools with weights of a few hundreds kilograms. The photograph also shows the adjacent storage tank with inhibited water. A high volume and additional high pressure pump allow to obtain a pressure of 150 bar within 20 minutes. A full test cycle; loading – pressure – unloading can be executed within 1 hour.

Figure 9 also shows a 20 in. RPIT dummy on the RPIT launch – receive tray. Height and angle of this tray can be varied to match with the launch or receive trap position in situ.

9. SPECIFIED TESTS

The tests were divided into three distinct categories:

- static mechanical performance tests in the high pressure tank
- dynamic mechanical performance tests in the 16 in. test loop
- measurement performance tests in the 16 in. test loop

9.1. Static mechanical performance tests

These tests in summary included pressure e.g. 150 bar for several hours as well as pressure cycle tests, e.g. 10 cycles between 0 and 150 bar.

Also tests were done during temperature cycling to check the stability of the tool. The tests should prove proper functioning of probes with the RPIT operating at its full measuring sensitivity.

9.2. Dynamic mechanical performance tests

The RPIT had to pass a wide variety of dynamic tests. Tests checking various aspects of RPIT behaviour were done at speeds varying between 0.1 and 4 m/s.

To mention a few of these tests:
– mechanical fitness for purpose:
Several runs with all 'obstacles' installed in the loop.

– by-pass characteristics:
Here the RPIT should show its 'by-pass' characteristics for the unlikely event that it would block the pipeline to pass.

* Manager Dept. Development & Systems Roentgen Technische Dienst – RTD – Rotterdam.

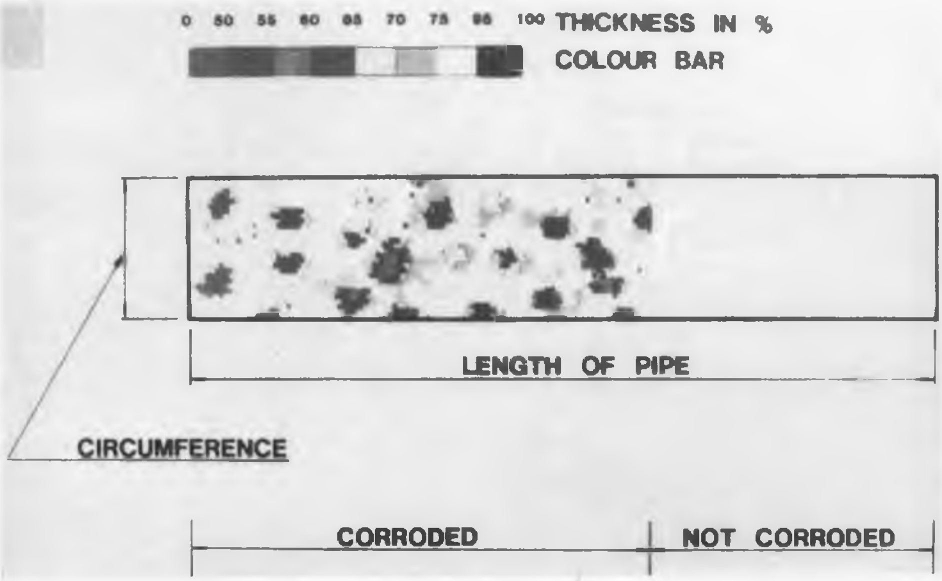


fig. 6: Coloured enhanced mapping of RPIT results showing ISO-thicknesses

fig. 7: 16 in. RPIT in front of launch/receive trap of 16 in. testloop located at Shell laboratories

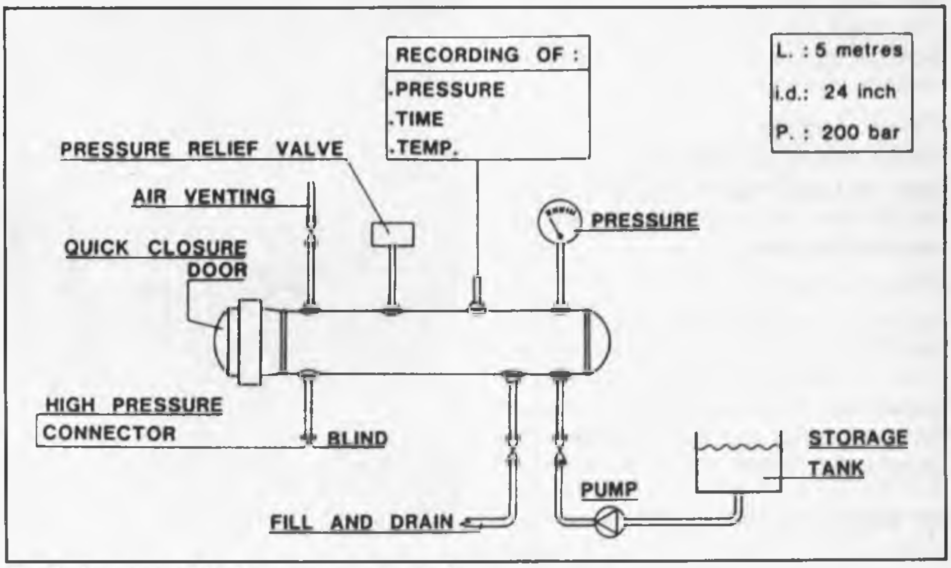


fig. 8: Lay-out of high pressure test tank.

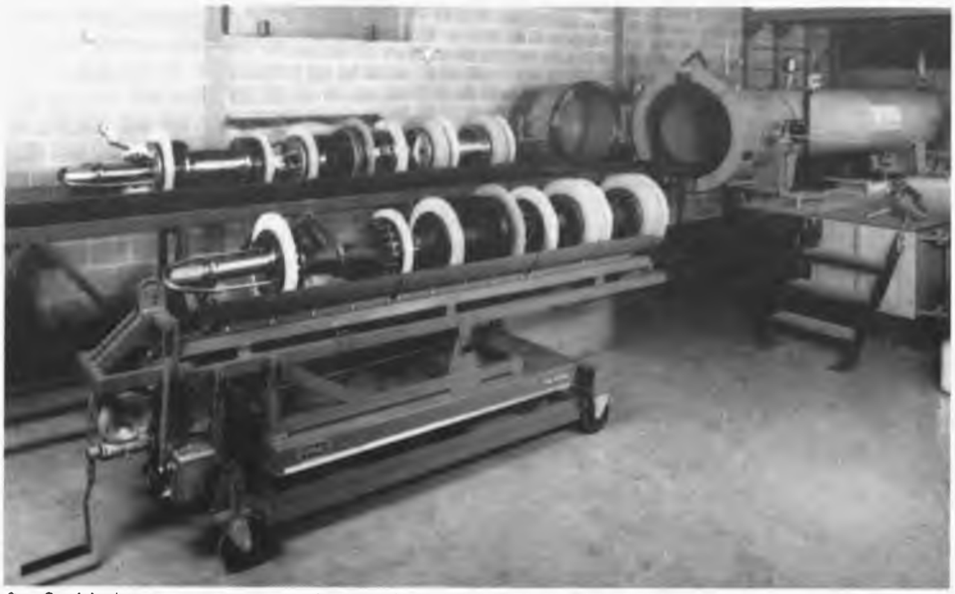


fig. 9: High pressure test tank with 16 in. RPIT on skid and 20 in. RPIT dummy in front of tray

– endurance:
With all extreme obstacles removed (except the valves and bends) the RPIT had to prove its long distance capabilities.

9.3. Measurement performance tests

In summary this involved:
– Calibration:
As specified, the inaccuracy should be within ± 1 mm.

– Reliability of measurement:
This aspect is the most important of all of the RPIT features. The ultrasonic riser pipe inspection tool is specially built to provide unambiguous wall thickness values. As such the RPIT should not present values which can be questionable. To check the reliability a severe test was to be executed on a homogeneous spool piece with a length of 5 metres with a nominal wall thickness of 16 mm. On this spool piece the RPIT at several speeds and optimum measurement sensitivity should show 'not to generate a single false reading'.
This means that all measurements on the spool piece, being 72,000 wall thickness readings, should be correct.

– Memory capacity:
Several runs to be made, even at 4 m/s, to check the total measurement performance and collected data against the known data from the test loop.

– Auxiliary systems:
The test also included the safety feature of the RPIT to switch on above a programmable pressure-threshold. Furthermore remote start by time and distance as well as the use of the benchmark system was tested at full speed.

10. RESULTS OF TESTS

As becomes obvious from previous chapters the tests specified were extensive, severe and required a lot of manpower to execute. These painstaking tests however were invaluable with respect to small but essential improvements now incorporated in the tool as well as to become fully acquainted with the RPIT. This from the viewpoint of the operator but also it enabled the potential client to obtain full appreciation of its capabilities and restrictions.
It should be noted that all tests although conducted by the RTD RPIT project team were without exception witnessed by Shell specialists. It was Shell who evaluated and judged the RPIT behaviour and checked the results against the mutually agreed requirements. This warranted the best objectivity.
It was established that the RPIT complied with the whole specification and as such the tool could be 'validated'. Based on all successfully passed tests management responsible for offshore operations could be convinced that the 'validated' RPIT, although considered as a 'potential obstacle', is a valuable inspection tool to prove integrity of the riser pipewalls.

fig. 10: RPIT hoisted over J-tube in platform leg

11. WIRE LINE FIELD TEST

Pending the field test of the 20 in. RPIT the opportunity was given to test the 16 in. RPIT in open J tubes. On the Dunlin Alpha platform, installed several years ago, new flowlines have to be pulled through the J tubes. High forces which are anticipated act on the J tubes during the flow line pulling operation and therefore a thorough integrity check was required. Those J tubes are partially embedded in the concrete platform and crude oil storage cells, and inaccessible from the outside to check the integrity of critical areas, see figure 11.
It was established that a slightly modified RPIT could be applied to verify presence or absence of inside or outside corrosion. Since fluid propulsion was excluded, a wire line operation was the only option available to traverse the RPIT down and up the J tube. This required a pulling wire through the J tube to be operated from a separate marine vessel.
A second winch and wire was to be operated at the platform itself. Both wires were connected with the RPIT in between.
By careful synchronous operation of winches the RPIT could be moved with an almost constant speed through the J tubes. Divers stationed at the bottom end of the J tube, at 150 m below sea level, monitored the whole operation at the most critical moments. Figure 11 shows schematically the situation. Figure 10 shows the modified RPIT hoisted over the J tube in the platform leg.
The experience collected during the RPIT validation tests enabled an appropriate and professional J tube application. Thorough on- and offshore preparation enabled quick deployment. It only took a few offshore days to complete this complex operation on 4 J tubes including running a cleaning/gauging pig through the J-tubes, prior to deploying the RPIT.
Because the whole RPIT and read-out facilities are designed for quick data presentation it was possible to report results on site. During inspection of a next J tube the results of previous J tube could be presented and evaluated. This successful test was also a good trial for the future offshore test of the 20 in. RPIT.

12. CONCLUSIONS

– Despite the stringent specification laid down for the Riser Pipe Inspection Tool it was successfully designed, constructed, tested and validated.

– Extensive onshore validation tests were

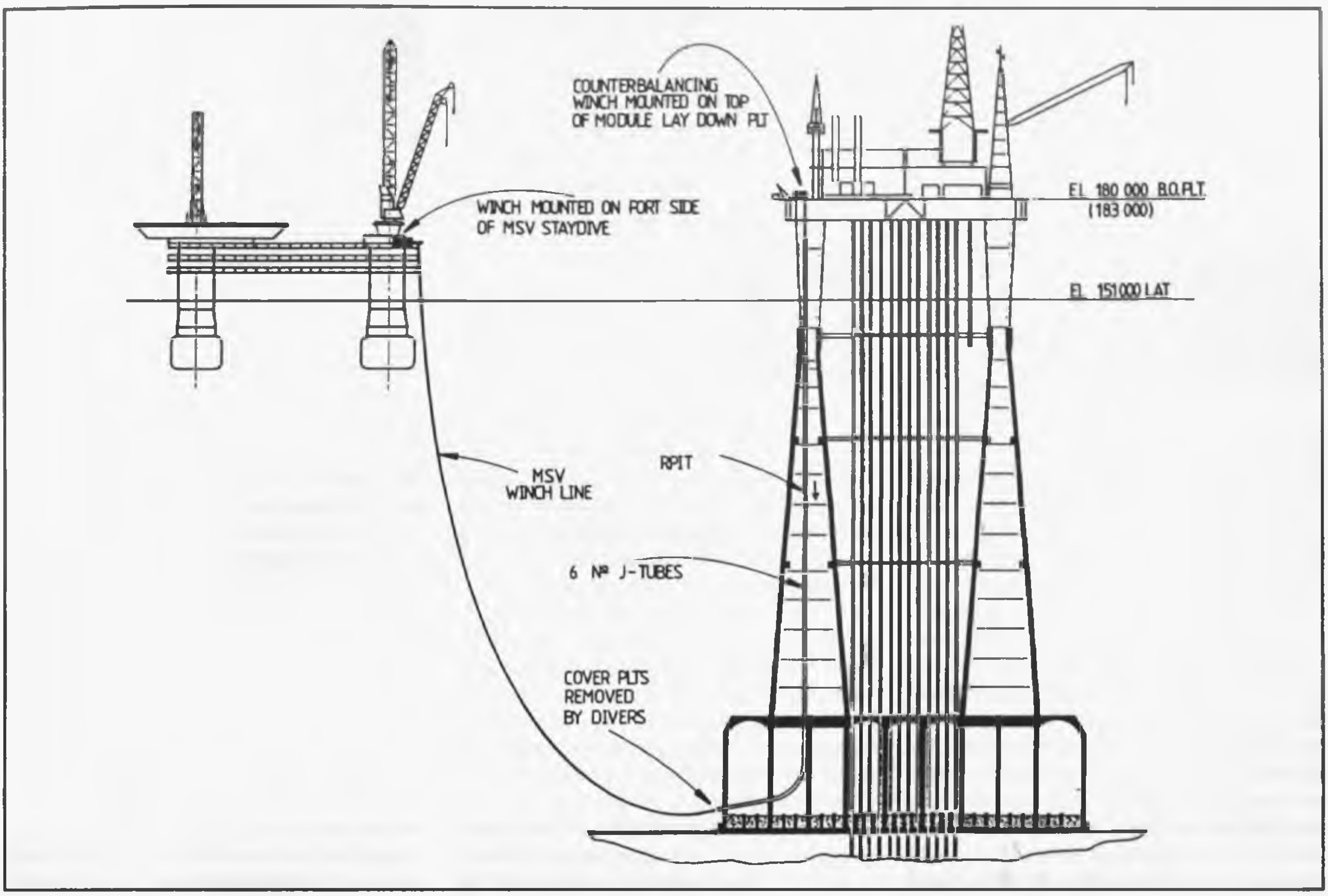


fig. 11: Lay-out of wire line RPIT development for J-tubes

not only useful and essential to prove performance of inspection tools but were also of paramount importance to allow one to become acquainted with the merits of such tools.

– Cooperation of the development team, pipeline specialists and potential users was obtained and proved to be invaluable. It is worth mentioning that a group of specialists of different industrial cultures and technical disciplines cooperated so well to the benefit of the project and the tool required.

– At present a 16 in. and 20 in. RPIT does exist. Its modular design does allow for a 24 in. RPIT with some additional hardware. Further upscaling or even some downscaling forms no basic problem.

– The first wire line field test proved the capability and usefulness of the RPIT and its immediate onsite data presentation.

– The forthcoming future fluid propelled offshore test of the 20 in. RPIT should prove its 'fitness for purpose'.

13. THE FUTURE

Although the RPITs with their 40% circumferential coverage are considered 'fit for purpose' to inspect riser pipes, for other applications one might require full circumferential coverage. The available technology permits construction of such inspection tools.
For inspection of gas risers the application of a liquid slug (glycol or condensate) will be investigated. This slug provides the acoustic couplant necessary for conventional ultrasonic probes.
The range of the present RPITs is limited to 300 m. Application of larger solid state memories will extend the measuring range.
Mass-storage memories of several Gbytes are considered for data collection. This would allow inspection of long distance pipelines. For long distance inspection also data reduction is under consideration.
Using appropriate algorithms only relevant data will be stored and no memory wasted on values over a preset threshold value.

Acknowledgement

The author wishes to express his appreciation for the relentless efforts of all involved within Shell and RTD as well as sub-contractors to make this project a remarkable success.

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NIEUWSBERICHTEN

Nieuwe opdrachten

Bezemer – Dordrecht

Bezemer – Dordrecht B.V. – gespecialiseerd in lieren, engineering en kathodische bescherming – heeft in 1987 een aantal grote opdrachten weten te verwerven op het gebied van kathodische bescherming voor steigers in Indonesië. De totale waarde van deze opdrachten is enkele miljoenen guldens en houdt ook de levering in van een groot aantal rubber fenders. De anoden en de fenders zijn bestemd voor havensteigers in de Molukken.

Voorts werd recent een opdracht geboekt voor het installeren van een 8-punts ankersysteem, dat gebruikt gaat worden voor het leggen van een gasleiding met een diameter van 33 cm en een lengte van 18 kilometer. Hiertoe wordt op een ponton 4 dubbeltrommel waterval lieren; twee met een trekkracht van 30 ton en twee van 70 ton geïnstalleerd. De lieren worden op afstand bediend. In verband met de locale bepalingen worden deze lieren dusdanig geïsoleerd, dat het geluidsniveau beneden de 75 dB(A) blijft. Het gehele ontwerp van de installatie is door Bezemer Engineering uitgevoerd.

Voor een grote buitenlandse oderneming wordt een zogeheten 'umbilical' lier installatie gebouwd, geschikt voor een fibre optical umbilical kabel van 5200 meter lengte en een diameter van 30 mm.

Deze speciale kabel is geschikt voor het overbrengen van stuurcommando's naar een ROV (onbemand onderwater vaartuig) dat op grote diepte in de oceaan opereert. De lier met deze kabel is in staat om 20 ton met een snelheid van 15 m/min. naar de oppervlakte te brengen. Deze grote snelheid is nodig om de ROV snel door waterlagen te hijsen, waarin zich grote wervelingen voordoen. De lier is van een speciaal 'twin-capstan' type en wordt electrisch-hydraulisch aangedreven. De uitvoering van de lier is explosieveilig.

Offshore

Aker Norcem neemt Norwegian Contractors over

Het Noorse concern Aker Norcem (cement, offshore, constructie) heeft recent het overblijvende pakket aandelen, dat nog niet in haar bezit was, van het offshore-constructiebedrijf Norwegian Contractors overgenomen. Aker Norcem betaalde 88 miljoen dollar voor het tweederde deel dat eerder in handen was van het Selmer Sande bouwconcern. NC werd in het begin van de jaren 70 opgericht en is nu bezig het dertiende grote betonplatform te bouwen, ditmaal voor het Gullfaks-veld in de Noordzee.

Volgens deskundigen betekent deze investering een risico, omdat het lang niet zeker is dat NC zo gemakkelijk opdrachten zal verwerven, als dit in het verleden het geval was. Vorig jaar had het bedrijf een omzetpiek van 307 miljoen dollar, maar het voelt nu de gevolgen van de dramatische val in de olieprijzen van vorig jaar. Aker Norcem denkt echter dat NC's ervaring en expertise het mogelijk zullen maken aanzienlijk bij te dragen aan andere facetten van Aker Norcem's activiteiten, waarmee een jaaromzet van ca. 200 miljoen dollar worden bereikt en waarin 17 000 mensen werk vinden.

Aker Norcem gelooft dat de incorporatie van NC een positief effect zal hebben op de voornemens van het concern om op de internationale markt door te breken. Na een aanvankelijk succes met de levering van betonplatforms op het Britse Continentale Plat realiseerde NC zich dat diversificatie op andere typen betonconstructies aanbevelingswaardig was. Het bedrijf levert nu betonmoffen voor olie- en gaspijpleidingen en drijvende betonplatforms. In het binnenland bezit NC goede kansen op opdrachten voor de ontwikkeling van de Heidrun- en Draugen-velden en de beveiligende betonconstructies die nodig zullen zijn voor het Ekofisk-veld.

Diversen

Italië bouwt 's werelds duurste passagierschip

De Italiaanse staatswerf Fincantieri heeft onlangs opdracht gekregen voor de bouw van 's werelds duurste passagierschip. De Genuese Costa Crociere investeert bijna 270 miljoen dollar in een cruiseschip van 50.000 brt.

Het schip krijgt accommodatie voor 1.600 passagiers en wordt beduidend kleiner dan de schepen die Carnival Cruise Lines pas bij Wärtsilä heeft besteld, maar wel veel duurder. De Italiaanse order wordt voor maar liefst zestig procent door de overheid gefinancierd en voor het restant door Costa Crociere, dat al zes cruiseschepen in de vaart heeft.

Met deze opdracht heeft de werf het eindelijk een keer gewonnen van de West-duitse en (vooral) Finse concurrentie, die de laatste twee jaar order op order binnenhaalde. De hoge prijs is echter illustratief voor de zwakke concurrentiepositie van Fincantieri in vergelijking met de buitenlandse concurrentie. De werf heeft twee cruiseschepen van 150 miljoen dollar per stuk voor het Amerikaanse Sitmar in aanbouw, maar ook hier is sprake van uitgebreid financieringspakket van de Italiaans overheid.

Transport 8-12-'87

Overslag in Delfzijl en Eemshaven

De overslag in Delfzijl en de Eemshaven is in de eerste helft van 1987 met ruim elf procent gestegen tot 2,645 miljoen ton. Hiervan was 960.000 ton afkomstig van of bestemd voor binnenschepen. Zeeschepen waren goed voor 1.685 miljoen ton en vissersschepen voor de resterende 616.000 ton.

Wat betreft de zeevaart nam met name de overslag van ro/ro-lading, droge bulkgoederen en van lading in de sector 'overig stukgoed' fors toe, en wel respectievelijk van 8000 tot 50.000 ton, van 1015.000 tot 1108.000 ton en van 322.000 ton tot 401.000 ton. De overslag van natte bulkgoederen steeg met 7.000 ton tot 126.000 ton.

In totaal bezochten in de eertste helft van dit jaar 2633 schepen Delfzijl en Eemshaven, 36 schepen meer dan in dezelfde periode vorig jaar.

Transport 8-12'87

Steun voor nieuwbouw van zeeschepen

De minister van Economische Zaken heeft de Regeling Generieke Steun Zeescheeps nieuwbouw 1987 gepubliceerd. Hierin worden de subsidie-percentages vastgesteld voor de bouw van niet-militaire zee

hepen van 100 GT (Gross Tons) en een inimale contractwaarde van ƒ 4 miljoen. e regeling heeft een terugwerkende ·acht tot 1 januari 1987.
et subsidiepercentage is afhankelijk van ꜫ waarde van het contract en loopt, volꜫns een bepaald schema, van 5% voor eine schepen (contractwaarde tot ƒ 60 iljoen) tot 19% voor grote schepen neer dan ƒ 60 miljoen).
oor de periode van 1987 t/m 1989 is een ıbsidiebedrag beschikbaar van ƒ 150 mil-en, verhoogd met een bedrag van ƒ 47 iljoen dat resteert uit 1986. De subsidie-ınvragen zullen in volgorde van binnen-omst worden behandeld, waarbij de rege-ıg de mogelijkheid heeft dat contracten, e door uitputting van het budget voor 987 of 1988 niet aan bod komen, worden oorgeschoven naar het volgend jaar.
m te voorkomen dat de beschikbare iiddelen geconcentreerd worden bij echts één of enkele werven, is een limiet er werf per jaar vastgesteld van 21% van e gemiddelde produktiewaarde van zee-heepsnieuwbouw van de betrokken erf in een referentieperiode.
m samenwerking tussen werven te be-orderen en de beschikbare middelen zo ffectief mogelijk te gebruiken, is het mo-elijk dat een werf zijn limiet geheel of edeeltelijk aan een andere werf over-raagt.
e minister schrijft in zijn brief dat, tegen e achtergrond van de noodzakelijke capa-teitsreductie in de sector, het de bedoe-ıg is dat slechts de ondernemers voor ıbsidie in aanmerking komen die daad-erkelijk hebben laten zien dat ze orders unnen binnenhalen. Tot slot merkt De orte op dat de Europese Commissie de egeling nog moet goedkeuren, en dat ventuele verlagingen van de in EG-ver-and afgesproken plafonds gevolgen kun-en hebben voor de steun-percentages.
(Med. EZ. 23/87)

onati nieuwe ertegenwoordigers Tangye

nlangs werd bekend dat Tangye Ltd. uit irmingham U.K. in Nederland voortaan al worden vertegenwoordigd door Do-ati Nederland B.V. te Oud-Beijerland.
let programma van Tangye: hydraulische ijzels, cilinders en pompen, past uitste-end binnen het programma van Donati ef- en hijstechniek. Vanzelfsprekend be-chikt men over een ruime voorraad on-erdelen en over faciliteiten voor onder-oud en reparatie.
onati Nederland B.V. is bereikbaar onder elefoonnummer 01860-19255, voor alle ıogelijke vragen over het Tangye pro-ramma.

tormvloedkering Vaterweg

e Raad van de Waterstaat heeft minister mit-Kroes van Verkeer en Waterstaat geadviseerd in principe te besluiten tot de aanleg van een stormvloedkering in de Nieuwe Waterweg met aanvullende dijkversterkingen langs de benedenrivieren. De raad baseert zijn advies op een zeer uitvoerig rapport van zijn Commissie voor de Waterhuishouding en op dat van de Commissie voor de Scheepvaartwegen en Havens.
Uit het rapport van de Commissie voor de Waterhuishouding blijkt dat een stormvloedkering aanzienlijke voordelen biedt boven het voortgaan met het lopende dijkversterkingsprogramma. Deze voordelen doen zich in het bijzonder voelen in Rotterdam en Dordrecht.
Tot de besluitvorming van de raad heeft mede bijgedragen het positieve advies van de Commissie Stormvloedkering Nieuwe Waterweg, dat in November '87 aan de minister werd uitgebracht.
De Raad van de Waterstaat heeft in zijn oordeelsvorming vooral laten meewegen, dat met de bouw van een stormvloedkering – in vergelijking met voortzetting van het lopende dijkversterkingsprogramma in het benedenrivierengebied – een aanzienlijke tijdwinst kan worden geboekt. De raad acht dit van belang voor de veiligheid in dit gebied. Hij dringt aan op voortvarendheid bij de bouw van een stormvloedkering.

De haven van Hongkong

In het eerste kwartaal van 1987 bezochten meer dan 3500 schepen de haven van Hongkong. Dat is weer 10% meer dan in dezelfde periode in 1986. Het overslagtonnage steeg met 18%. Hiervan was 20% bestemd voor doorvoer. Ook andere getallen uit deze periode duiden op de sterke groei van deze haven: er kwamen 164 containerschepen en 43 tankers meer aan dan het jaar daarvoor. Als deze trend zich doorzet zal de haven van HK binnen één tot twee jaar Rotterdam als containerhaven voorbijstreven.

Zeevaartschool 'Abel Tasman' Delfzijl

Binnen de Noordelijke Academie voor Scheepvaart en Techniek (NAVSET) 'Abel Tasman' is met ingang van 1 augustus 1987 ten gevolge van een splitsing van HBO en MBO een aantal veranderingen opgetreden.
De HBO-afdeling, waaronder de Algemene Operationele Technologie (AOT)-opleiding en de Rangenopleidingen vallen, zijn i.v.m. een fusie van de Groninger HBO-instellingen, onderdeel geworden van de Rijkshogeschool Groningen en ondergebracht in de sector Technische, Laboratorium- en Maritieme opleidingen.
Tot sector-direkteur is benoemd de heer B. Paul, (voorheen direkteur van de NAVSET) en tot afdelingsdirekteur in deze sector is benoemd de heer A. J. Twigt (voorheen adjunct-direkteur van de NAVSET).
De AOT-afdeling zal gefaseerd uit Delfzijl verdwijnen en binnen enkele jaren geheel in de stad Groningen worden gegeven. De Rangenopleidingen zullen voorlopig nog gehuisvest blijven in de Zeevaartschool te Delfzijl.
De MBO-afdeling, waaronder vallen de opleidingen voor: Stuurman KHV, Scheepswerktuigkundige KHV, Maritiem Officier KHV, alsmede de opleiding tot Geïtegreerd Scheepsgezel, is een zelfstandig leven gaan leiden onder de naam: Zeevaartschool 'Abel Tasman'.
Tot direkteur hiervan is benoemd de heer K. Metzlar (voorheen adjunct-direkteur van de NAVSET) en tot adjunct-direkteur tevens plaatsvervangend direkteur is benoemd de heer P. C. Los (voorheen adjunct-direkteur NAVSET).
Het adres van de nieuwe Zeevaartschool 'Abel Tasman' blijft: Zwet 1, 9932 AA Delfzijl (Postbus 54, 9930 AB Delfzijl). Ook het telefoonnummer blijft onveranderd: 05960-10219.

Sandfirden Technics (v/h Laan & Kooy)

Per 10 december 1987 heeft Sandfirden B.V. te Haren alle aandelen van Laan & Kooy B.V. te Den Oever overgenomen.
Laan & Kooy B.V. te Den Oever is al 40 jaar actief in de verkoop en service van o.a. Scania, Valmet en Guascor dieselmotoren als ook in het verbouwen en repareren van voornamelijk visserijschepen.
Sandfirden B.V. te Haren is een snel expanderende holding company, die tot op heden actief was in het management van een 14-tal gespecialiseerde K.H.V.-schepen. Teneinde deze basis te verbreden is tot voornoemde overname besloten.
Door deze transactie zal Laan & Kooy gaan opereren onder de naam 'Sandfirden Technics (v/h Laan & Kooy)', waarbij de bestaande activiteiten en de personeelsbezetting ongewijzigd zullen worden gecontinueerd.

Netherlands Safety Training Association

Op 13 oktober 1987 werd te Amsterdam de Netherlands Safety Training Associati-on opgericht. De oprichting van deze associatie is het resultaat van gesprekken die in het afgelopen jaar zijn gevoerd tussen een aantal instituten werkzaam op het terrein van veiligheidstraining om te komen tot samenwerking en kwaliteitsbeheersing van hun aktiviteiten en regulering van erkenningen. De associatie staat in beginsel open voor alle instituten werkzaam op het gebied van veiligheidstraining.
De instituten die de associatie hebben opgericht zijn:
– Dutch Offshore Training Centre (DOTC) te Den Helder
– Maritiem Trainingscentrum (MTC) te Vlissingen
– Ridderikhoff Trainingsscholen te Coe-

vorden en Stellendam
- Traininginstituut Brandbestrijding (TIB)
- ANSUL Nederland B.V. te Lelystad.

De belangrijkste doelstellingen van de associatie zijn:
- Het bevorderen van de instandhouding van het vereiste kwaliteitsniveau van relevante safety-trainingen (kwaliteitsbeheersing);
- Het streven naar regulering van erkenningen, zowel nationaal als internationaal.

In de loop der jaren is een groeiend aantal instituten en bedrijven zich gaan bezighouden met de veiligheidstraining voor de olie- en gasindustrie, als gevolg van een toenemende behoefte aan dit soort training bij een groeiend aantal offshore-werkers.
In deze groeiperiode echter, werd vanuit de veiligheidssektor van de oliemaatschappijen meermalen vernomen dat men twijfelde aan de kwaliteit van de ontvangen training, in het bijzonder in het geval van contractor-personeel. De geschetste omstandigheden zijn de basis geweest voor de oprichting van de Associatie.

Schoonmaken waterbodems
Minister Smit-Kroes van Verkeer en Waterstaat heeft het saneringsprogramma waterbodem 1988-1989 naar het parlement gestuurd. Daarin wordt een opgave gedaan van de lokaal sterk verontreinigde waterbodems, die in die jaren bij voorrang moeten worden schoongemaakt. Het gaat hier om lokaties in rijkswateren die verontreinigd zijn door zogenaamde klasse-IV-specie. Hoewel de financiering van de waterbodemsanering nog niet is opgelost, kan – naar oordeel van de minister – met het opruimen van het vervuilde slib op elf lokaties, o.a. in het Botlekgebied, niet langer worden gewacht. Deze lokaties die op korte termijn moeten worden aangepakt zijn plaatsen waar de vervuilingsbronnen zijn gesaneerd, zodat ze niet opnieuw langs deze weg kunnen worden besmet.
Het saneren van de waterbodems op deze plaatsen is urgent, omdat het aquatisch ecosysteem door verspreiding van de vervuiling wordt aangetast. Vaak moet baggeren op deze plaatsen ook gebeuren ten behoeve van de diepgang voor de scheepvaart.
Met het opruimen van het sterk verontreinigde slib op de 11 lokaties is naar schatting in het totaal een bedrag van 25 miljoen gulden gemoeid. Het is de bedoeling, dat de schoonmaakoperaties vóór 1990 hun beslag hebben gekregen.

Technische informatie

Nieuw Binnenschepenbesluit
In juli 1987 is het nieuwe Binnenschepenbesluit in werking getreden.
De nieuwe Binnenschepenwet voorziet in de afgifte van een certificaat van onderzoek voor schepen nadat is gebleken dat het schip voldoet aan de wettelijke regels. Deze regels hebben onder meer betrekking op de constructie, de uitrusting, het vrijboord, de stabiliteit van het schip, en op de sleep- en duwverbindingen van schepen. Tevens kunnen regels worden gesteld ter bevordering van de veiligheid, gezondheid en het welzijn in verband met de arbeid aan boord.
Het certificaat is verplicht gesteld voor bepaalde categorieën schepen. Globaal aangeduid zijn dat:
- schepen met een laadvermogen van 15 ton of meer;
- sleep- en duwboten;
- schepen die, de bemanning uitgezonderd, meer dan 12 personen vervoeren;
- schepen met een lengte van 15 meter of meer, niet bestemd voor bedrijfsmatig vervoer.

Onder de naam Binnenschepenbesluit is de complete en letterlijke wettekst verkrijgbaar via de boekhandel en de Staatsuitgeverij in Den Haag. Een praktische inhoudsopgave vergemakkelijkt het opzoeken. De prijs bedraagt 29,– gulden.

Waukesha Lips sterngaurd lijn- en nettensnijder
Waukesha Lips, dochterbedrijf van het Drunense scheepsschroevenbedrijf Lips B.V. heeft recent de verkoop op zich genomen van de door Waukesha Bearings USA geproduceerde 'Sterngaurd' lijn- en netten snijder.
Het is een door Waukesha Bearing verder ontwikkelde versie van de reeds met veel succes toegepaste 'Spurs' cutter, een asgemonteerde cutter tot een maximale schroefasdiameter van 180 mm. Er zijn twee uitvoeringen, een schroefas gemonteerde- en een schroef gemonteerde, afhankelijk van grootte, asdiameter en beschikbare ruimte.
De WL cutter die uit een met de schroef meedraaiend en een stationair deel bestaat, snijdt door de schroefbeweging lijnen of netten door vóórdat deze in schroef of erger nog in schroefasafdichtingen komen.
De WL cutter is vervaardigd van gehard roestvrijstaal en is gelagerd in een eenvoudig kunststof lager, welke tijdens een schroefwisseling vervangen kan worden, waardoor de cutter dezelfde levensduur heeft als het schip.
Anti blokkering is voorzien door een stopper met breekpen die op het stationnaire deel gemonteerd is. Wanneer staalkabels of kettingen in de cutter zouden komen, komt deze overlastingsbeveiliging in werking. Duikers kunnen, wanneer de overbelasting is opgeheven, de stopper weer monteren.
Verdere inlichtingen:
WAUKESHA LIPS V.O.F. Postbus 6 5150 BB DRUNEN Tel.: 04163-88299.

Nieuwe uitgaven

VOOR PAMPUS
De ontwikkeling van de scheepsbouw bij de Koninklijke Marine omstreeks 1860.

door: A. van Dijk. Uitgave De Boekerij b.v. Amsterdam. 176 pagina's. Meer dan 80 zwart-wit afbeeldingen. Prijs *f* 49,50.

Het boekwerk 'Voor Pampus' is het vierde deel van de in samenwerking met de Afdeling Maritieme Historie van de Marinestaf uitgegeven serie *'Bijdragen tot de Nederlandse Marinegeschiedenis'.* Het boek werpt een nieuw licht op wat zich voor de komst van de eerste ijzeren pantserschepen in Nederland afspeelde. Het betreft vooral alles wat zich afspeelde rond de drijvende batterijen. De aandacht gaat daarbij niet alleen uit naar de ontwerpen, de plannen, de motivatie, de besluitvorming en de gedachtenwereld in die tijd maar ook hoe alles technisch tot stand kwam. Bijvoorbeeld hoe het afzagen van linieschepen en fregatten tot platbodemschepen technisch werd uitgevoerd. Het bleek een tijd te zijn waarin men niet veel geld voor de marine over had, doch de Marinestaf zich inspande om er gezien de middelen en de stand van de techniek, het beste van te maken. Duidelijk blijkt welk een kostenverhogende invloed de slechte staat en het geringe aantal dokken dat voor onze marineschepen ter beschikking stond gehad hebben. Het boek levert een bijdrage aan de verklaring van de snelle aanpassing van de Nederlandse maritieme industrie welke nodig was om aan de nieuwe eisen en omstandigheden te kunnen voldoen. Het zeer deskundig geschreven boek, waarin veel detailkennis en feiten in de tekst, foto's, figuren en in de zeven bijlagen zijn vastgelegd, vormt een waardige aanvulling op de kennis van onze maritieme historie.

Dr. Ir. K. J. Saurwalt

NEDERLANDSE VERENIGING VAN TECHNICI OP SCHEEPVAARTGEBIED

(Netherlands Society of Marine Technologists)

Voorlopig Programma van lezingen en evenementen in het seizoen 1987/1988

Berging 'Herald of Free Enterprise'
door H. J. G. Walenkamp en ing. G. van Wijk van Smit Internationale
Wo. 13 jan. 1988 Amsterdam
Do. 21 jan. 1988 Vlissingen

Project Bedrijfsontwikkeling Scheepsbouw**
door Dr. Ir. M. Goldan, projectleider.
Do. 14 jan. 1988 Rotterdam
Di. 19 jan. 1988 Groningen

Scheepsbouw en Ontwikkelingshulp**
Sprekers van het Min. van EZ en DGIS
Wo. 3 feb. 1988 **Aula TU Delft**
20.00 uur

Ontwerp en Beheer van energie opwekking- en distributie installaties
door Ing. J. van Vliet van Croon Electrotechniek
Di. 23 feb. 1988 Groningen
Wo. 24 feb. 1988 Amsterdam (afd.verg.)
Do. 25 feb. 1988 Rotterdam (afd.verg.)
Do. 17 mrt. 1988 Vlissingen

N.B.:
Dit programma zal in de komende maanden worden aangevuld en eventueel gewijzigd.
* Lezingen in samenwerking met de Netherlands Branch van het Institute of Marine Engineers.
** Lezingen in samenwerking met de afd. Maritieme Techniek van het KvI en het Scheepsbouwkundig Gezelschap 'William Froude'.

1. De lezingen in Groningen worden gehouden in Café-Restaurant 'Boschhuis' Hereweg 95 te Groningen, aanvang 20.00 uur.
2. De lezingen te Amsterdam worden gehouden in het Instituut voor Hoger Technisch en Nautisch Onderwijs, Schipluidenlaan 20, Amsterdam, aanvang 19.00 uur. Vooraf gezamenlijk aperitief en broodmaaltijd om 17.30 uur.
3. De lezingen in Rotterdam worden gehouden in de Kriterionzaal van het Groothandelsgebouw, Stationsplein 45, aanvang 20.00 uur. Vooraf gezamenlijk aperitief en broodmaaltijd, aanvang 18.00 uur.
4. De lezingen in Vlissingen worden gehouden in het Maritiem Instituut 'De Ruijter', Boulevard Bankert 130, Vlissingen, aanvang 19.30 uur.

VERENIGINGSNIEUWS

Personalia

G. Koedijk
Tijdens een druk bezochte receptie in de sociëteit van de Kon. Roei- en Zeilvereniging 'De Maas' te Rotterdam nam de heer G. Koedijk afscheid van vele relaties en vrienden, bij het neerleggen van zijn functie wegens het bereiken van de pensioengerechtigde leeftijd, als Directeur Overheidsbetrekkingen van de Texaco Petroleum Maatschappij Nederland B.V.
De heer Koedijk werd bij zijn afscheid benoemd tot Ridder in de Orde van Oranje Nassau.

DE VERENIGINGSDAS
Wist U al dat de Nederlandse Vereniging van Technici op Scheepvaartgebied een eigen das heeft?
Hij is verkrijgbaar in twee kleuren, bordeauxrood en anthracietgrijs met het Verenigingsembleem in zilver, onderstreept door de nationale kleuren.
Vele van onze leden kunt U herkennen aan die das. Zo'n das kunt U niet missen. Er is nog voorraad van beide kleuren, bestel dus spoedig door overschrijving van *f* 12,50 per das (dus laag geprijsd!) op giro 325478 van de Ned. Ver. v. Technici op Scheepvaartgebied te Rotterdam onder vermelding van 'Verenigsdas rood of grijs'.

JUBILEUM SYMPOSIUM

1903 – 1988 XVII^e LUSTRUM

90 jaar

Ter gelegenheid van de viering van het 17de lustrum van het Scheepsbouwkundig Gezelschap 'William Froude' en het 90-jarig bestaan van de Nederlandse Vereniging van Technici op Scheepvaartgebied wordt op dinsdag 10 mei 1988 een ééndags symposium gehouden met als onderwerp:
"De toepassing van nieuwe technologische ontwikkelingen in de Nederlandse Maritieme sector"
Een zevental prominente sprekers uit verschillende disciplines van de Nederlandse maritieme sector zullen dit onderwerp belichten.
Het symposium, dat wordt afgesloten met een panel discussie, wordt gehouden in de aula van de Technische Universiteit te Delft.
Rond het middaguur zullen een aantal afstudeerprijzen worden uitgereikt waarna gezamenlijk de lunch zal worden gebruikt.
De dag wordt besloten met een borreluur.

Ballotage

Voorgesteld voor het GEWOON LIDMAATSCHAP:

H. C. J. AAL
Sales engineer Air Products Nederland, Waddinxveen
Prikkewei 14, 9245 HS Nijbeets
Voorgesteld door K. M. Gorter
Afdeling: Groningen

F. P. BUIJL
HWTK Boskalis, Papendrecht
Hendstehof 28, 8861 TT Harlingen
Voorgesteld door A. E. van Dodeweerd
Afdeling: Groningen

J. F. GROB
Oud docent Scheepswerktuigkunde
Pijlemeeth 49, 1851 EG Heiloo
Voorgesteld door W. Schuring
Afdeling: Amsterdam

M. C. KRANENDONK
Ass. project manager C. Kranendonk B.V., Rotterdam
Akkerwinde 17, 2951 HB Alblasserdam
Voorgesteld door D. Clarijs
Afdeling: Rotterdam

Ir. A. C. M. LUTEIJN
v.W. Crommelinlaan 10, 2061 HK Bloemendaal
Voorgesteld door W. J. Mom
Afdeling: Amsterdam

E. D. MAANDAG
SWTK Winterport Tankers, Spijkenisse
Muiderwaard 305, 1824 XH Alkmaar
Voorgesteld door P. C. van Vliet
Afdeling: Amsterdam

Ir. F. L. SCHRAM
Hoofd Scheepsbouw tekenkamers Kon. Mij. 'de Schelde', Vlissingen
Ridderspoorlaan 43, 4382 PH Vlissingen
Voorgesteld door Ir. J. W. de Nijs
Afdeling: Zeeland

Ir. M. J. H. SLEGERS
Projectleider R&D Kon. Mij. 'de Schelde'
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Voorgesteld door Ir. J. W. de Nijs
Afdeling: Zeeland

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Constructeur Transport Efficiency, Groningen
Vaart W.Z. 2, 9963 PH Warfhuizen
Voorgesteld door A. A. van der Bles
Afdeling: Groningen

Voorgesteld voor het BELANGSTELLEND LIDMAATSCHAP:

P. G. M. WESTERHOF
Sales engineer Aandrijftechniek, Landré & Glinderman, Diemen
Leigraaf 170, 6651 GJ Druten
Voorgesteld door A. E. Molenaar
Afdeling: Rotterdam

Voorgesteld voor het JUNIOR LIDMAATSCHAP:

MEJ. F. M. GOUDEAU
J. v. Beierenlaan 55, 2613 JA Delft

R. J. HEEMSKERK
Meije 85, 2411 PL Bodegraven

A. H. HUBREGTSE
Kanaalweg 24, 2628 EC Delft

R. M. L. G. M. INDESTEEGE
Oostsingel 57b, 2612 HD Delft

H. R. MALIEPAARD
Van Santenlaan 90, 1701 BS Heerhugowaard

P. C. H. J. M. VAN MECHELEN
Burgwal 16, 2611 GJ Delft

R. H. T. M. OVERES
Burgwal 16, 2611 GJ Delft

R. TACKENBERG
Derde Werelddreef 79, 2622 HC Delft

O. M. WEILER
Oude Delft 140a, 2611 CG Delft

F. H. C. J. VAN WELL
Maasdijk 9, 4941 GB Raamsdonkveer

M. WEMELSFELDER
P. J. Troelstrastraat 92, 3354 BN Papendrecht

J-P. DE WILDE
Dalkruid 15, 2914 BD Nieuwerkerk a.d. IJssel

A. L. R. WINCKERS
Kievithof 5, 2636 EL Schipluiden

Allen student T.U. Delft afd. Mar Techniek
Voorgesteld door Prof. Ir. S. Hengst voor de afdeling Rotterdam

Eventuele bezwaren, schriftelijk binnen 14 dagen aan het Algemeen Secretariaat van de NVTS, Heemraadssingel 193, 3023 CB Rotterdam

Agenda

Telematica-symposium
De Technische Universiteit Delft organiseert op 14 en 15 april 1988 een internationaal symposium over 'Telematica – Transport en Ruimtelijke Ordening'. Het symposium, dat zal worden geopend door minister Smit-Kroes van Verkeer en Waterstaat, vindt plaats in het Congrescentrum in Den Haag.
Ontwikkelingen in de elektronische technologie zullen een grote invloed hebben op het toekomstige transport en de daarmee samenhangende ruimtelijke beslissingen. Eén van deze nieuwe technologieën is 'telematica'. Telematica (een samenvoeging van Telecommunicatie en Informatica) houdt zich bezig met informatie-overdracht in transport, industriële en logistieke processen, door het gebruik van computergestuurde communicatienetwerken. Hoewel de meeste van deze netwerken nog niet volledig operationeel zijn, zullen ze grote maatschappelijke, indusriële en ruimtelijke gevolgen hebben. Zo zullen computerverbindingen kunnen leiden tot meer thuis werken en als gevolg daarvan tot een afname van het woon-werk-verkeer. Dit zal grote gevolgen hebben voor de ruimtelijke ordening. Daarnaast kan telematica zorgen voor een goede bewaking van het goederenvervoer. Dit leidt tot kwaliteitsverbetering en kostenverlaging.
Het symposium zal een overzicht geven van de stand van zaken van de telematica en de gevolgen van de telematica voor het toekomstige transport en de ruimtelijke planning.
Het symposium behandelt 4 thema's:
1. Telematica als een nieuwe technologie.
2. Telematica als een vervanging van fysiek transport.
3. Telematica als optimalisatie van bestaande transporttechnieken en -processen.
4. Telematica als onderdeel in ruimtelijke reorganisatie.

Het Telematica-symposium richt zich op planners, beleidsmakers en wetenschappers die zich met dit onderwerp bezig houden, zowel binnen de overheid als in bedrijven. De voertaal tijdens dit symposium is Engels.
Voorafgaand aan het symposium vindt op 13 april 1988 in de Aula van de TU Delft de Bedrijvendag van de TU plaats. Het thema van deze bedrijvendag is 'transport', zowel van personen, goederen als informatie. Tijdens deze bedrijvendag zal het onderzoek worden gepresenteerd, dat de TU Delft uitvoert op het gebied van transport. Deelnemers aan het symposium hebben vrije toegang tot deze Bedrijvendag.
Het symposium wordt georganiseerd door het Centrum Vervoers- en Verkeerswezen van de TU Delft. De kosten voor deelname aan het tweedaagse symposium bedragen *f* 325,– (bij opgave voor 1 maart 1988) en *f* 375,– (voor opgave na 1 maart 1988).
Aanmeldingen zijn mogelijk bij het Centrum Vervoers- en Verkeerswezen, dhr. H. M. Soekkha, Stevinweg 1 (kamer 4.77), 2628 CN Delft. Telefoon: 015-78 66 34.