A Quarterly Magazine from ABS

Winter 2002

Surveyor

ABS

Security risk management is going to be a very visible priority within the marine industry for the foreseeable future. In the period after the terrorist attack on the tanker *Limburg*, and with the pending adoption of the new International Ship and Port Facility Security Code, the issue will have a direct impact on shipowners, ships' crews, flag States, classification societies, charterers and terminal operators in particular. The rational, logical application of risk assessment, risk management and risk mitigation methodologies can greatly enhance the security of the marine transportation sector. ABS and its affiliate ABS Consulting are deeply involved in the development of rational responses to this new threat.

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COVER:

Surveying the tankers of tomorrow. ABS Surveyor Dave Bergsland up among the structural details of the *Polar Adventure*, fourth in a five-ship series of new double-hull tankers building for TAPS' operator Polar Tankers at Northrup Grumman's Avondale Operations in New Orleans. Stories about today's innovative 'green' tankers and the Trans-Alaska Pipeline System (TAPS) begin on page 24.

FEATURES:

Photo Credits

Cover: Joe Evangelista, 2-9, 24-31 ABS collection; 3 (top) courtesy Oscar von Sydow; 12-15 US Coast Guard; 16-20 Holland Jachtbouw; 21, 22 Captain James McNamara collection; 32, 33 Joe Evangelista; 34, 35 Avondale; 36 courtesy Dr. Peter Cheng.

Correction

In the previous issue of *Surveyor*, an image credit line was omitted. The background image of the 1802 tugboat *Charlotte Dundas* used on pages 30 and 31, was kindly supplied by James Bell and James Allan of the National Trust for Scotland, Hornel Library.

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Shipping Shorthand

Every language contains words and expressions whose derivation becomes lost within the mists of time. Slang, patois and particularly business jargon and technical acronyms can quickly accentuate any confusion. The shipping lexicon is rich and colorful. It is characterized by insider shorthand that refers to everything from governmental organizations, to charter parties, to ship types and sizes, some of which can be equally rich in interpretations.

This predilection for brevity has led to a surprising lack of specificity when it is applied to bulk shipping. Tankers and dry bulk carriers have been broken into distinct families that define transportation market sectors – handymax, aframax, suezmax et al – that corral general concepts of vessel dimensions, cargo capacities and preferred routings.

Most everyone in the industry will form an immediate mental image from any one of these terms. Yet the exact meanings are debatable and, in some instances, the derivation is not always what it may seem. For instance, the groupings that include 'max' in their name embody few actual maximums. And, whereas geography may play a part in some of these terms – panamax for example, it would be wrong to apply this same rationale to others – aframax has nothing to do with Africa.

When brokers, charterers or shipowners sit down to plot strategy or talk business, this common language is an essential element in the analysis or negotiations. It establishes basic facts quickly before considering more detailed specifications. For the wrinkled shellback and novice broker alike, *Surveyor* thought it would be interesting to unravel some of this nomenclature and skewer some of the more popular misconceptions.

Sizing Up the Bulk Sector

On Being Handy

The smallest members of the dry bulk nation are the hardworking toughies of the two tiered handy class. They call to mind a past era of cargo nets and stevedores' hooks. They are the odd-job kings, carrying a wide mix of cargo, from bulk parcels to steel products, between ports large and small around the globe. The 'handy' moniker is an apt description of their versatility. Not surprisingly, although they are at the smaller end of the bulk carrier spectrum, the 3,800 plus handies make up the biggest grouping within the world fleet of 6,000 dry bulk carriers.

The group can be divided into two, the smaller, more ubiquitous handy size, and the larger, increasingly popular handymax. Traditionally the term handysize referred to vessels of between 10,000 dwt up to about 30,000 dwt. With time, inflation set in and the upper limit crept up to 35,000 dwt. The trend has continued and the principal broking houses now consider the upper limit of the handysize as being 40,000 dwt so that the sector now encompasses a fleet of about 2,800 vessels.

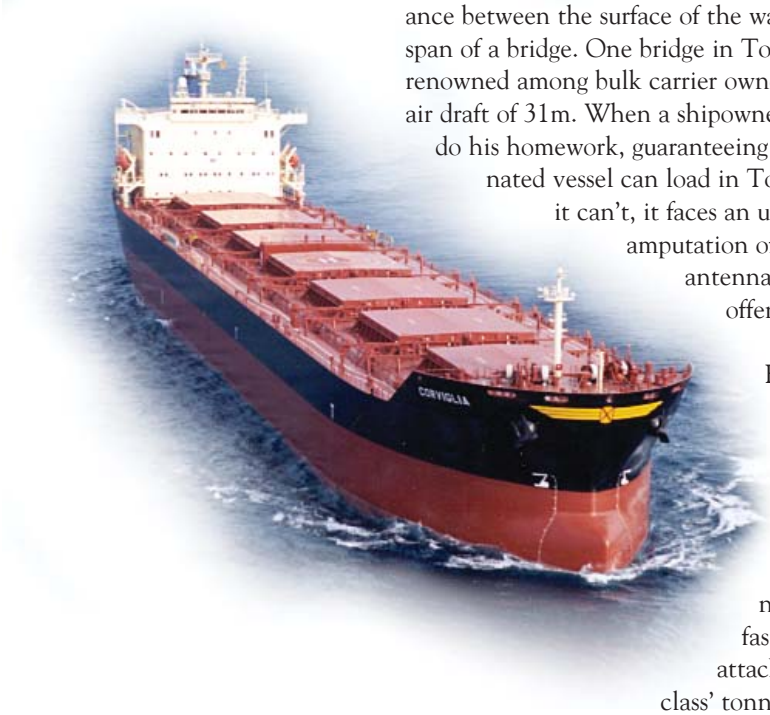
As the handysize tonnage range has expanded, it has tended to push the handymax description upwards in a comparable manner. It is now generally considered to embrace vessels of 40,000 dwt up to 60,000 dwt, although owners' preference tends to be for vessels in the narrower 50-52,000 dwt band. Indicative of the growing demand for this larger vessel, the world's fleet grew by 200 vessels in the 12 month period to July 2002, by which time fleet size matched the ever-popular panamax sector with almost 1,100 ships comprising just over 18 percent of the world dry bulk fleet.

"Handy size ships can find something to do all over the world," says Oscar von Sydow, a 30-year industry veteran and managing director of Gothenburg Chartering. "For example, a ship could leave Sweden with a cargo of sawn timber for Egypt. From Egypt it might go to the Black Sea to load steel products from Constantza or Odessa, bound for Japan. After discharge it could move down to Australia to load grain for the Arabian Gulf. From there it could head for South Africa, to pick up steel products to bring back to the Continent. Their size lets them go virtually anywhere."

Handy ships come as geared or gearless – with or without their own cranes – a key specification for ports without cargo equipment. Some are specialty ships referred to as OHBCs – open hatch bulk carriers – which are designed with larger hatch openings and weather protected gantry cranes for the carriage of higher value products such as newsprint, pulp and steel pipe.

Smaller tonnage has the ability to access ports that may have draft or length limitations, giving them great operational and commercial flexibility. Others have been designed to service specific trades such as the Great Lakes. The unique lock dimensions of the St. Lawrence Seaway places a 23.16-m beam restriction, encouraging the design of vessels with a much higher length-to-beam ratio than for normal trading. The Seaway also imposes restrictions on bridge wing overhangs and requires specific mooring and winch arrangements, further differentiating this 'Seaway size' sub grouping.

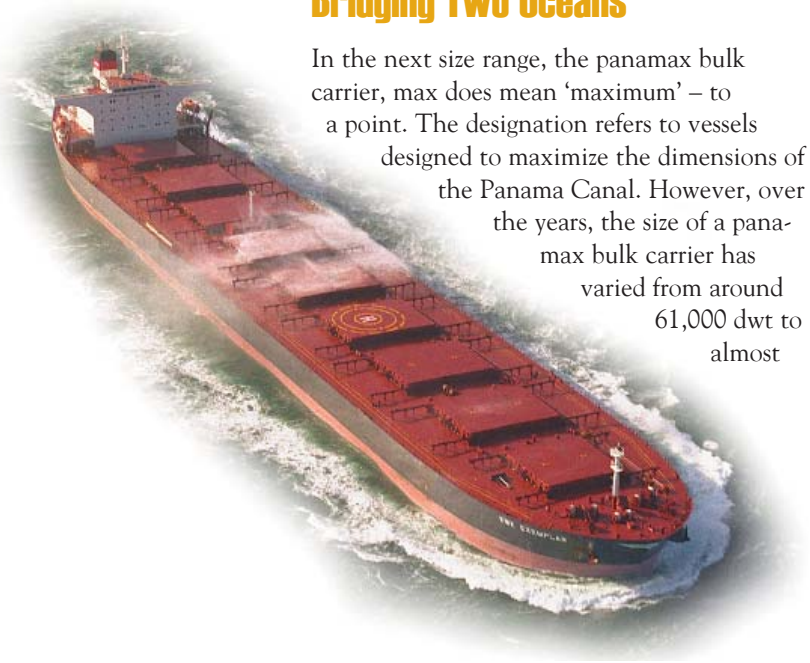
Oscar von Sydow, Managing Director, Gothenburg Chattering



They are also restricted by air draft, the clearance between the surface of the water and the span of a bridge. One bridge in Toledo, Ohio, renowned among bulk carrier owners, has an air draft of 31m. When a shipowner doesn't do his homework, guaranteeing the nominated vessel can load in Toledo when it can't, it faces an unscheduled amputation of masts, antennae and other offending items.

But what does the 'max' in handymax actually mean? There are no hard and fast maximums attached to the class' tonnage, length, draft or other physical characteristic. The term has been bestowed by a market that sees no need for greater definition.

Bridging Two Oceans



In the next size range, the panamax bulk carrier, max does mean 'maximum' – to a point. The designation refers to vessels designed to maximize the dimensions of the Panama Canal. However, over the years, the size of a panamax bulk carrier has varied from around 61,000 dwt to almost 80,000 dwt and these tonnages are still commonly used by brokers to define a size range rather than a specific design.

Lock dimensions in the Canal impose a maximum allowable beam of 106 ft (32.31m) for nearly all ships, and a 39.5 ft (12.04m) draft. Early panamax designs, offered by yards such as Hitachi Zosen, were not sized to transit the Canal fully laden. Since, for a given cargo, a part-loaded larger ship has less draft than a fully loaded smaller ship, the early panamax was intended to maximize cargo lift against port draft restrictions.

As of mid-2002, there were 1,085 panamaxes in service aggregating 75.9m dwt. This gives an average size of 69,950 dwt, a significant increase on the earliest vessels of only 61-63,000 dwt but significantly lower than the latest designs being offered by Japanese shipyards that are in the 76-78,000 dwt range. Part of this increased capacity has come from designers increasing the length/beam ratio to maximize the available 950 ft (289.6m) permitted length.

Even at this tonnage it is not yet clear if designers have truly 'maxed' the cargo carrying capability. A series of 83,000 dwt panamax-beam tankers was built in the 1980s indicating that once again, commercial considerations continue to be a key factor in determining exactly what the 'maximum' for any ship type is at any time.

Going Round the Cape

Grain cargoes have always been the mainstay employment for panamax bulkers, the ship size being ideally suited to the average size of parcels moving internationally, particularly in the west-east trades. Cost-effective transportation of low-cost commodities in high demand such as coal and iron ore, often over very long distances, requires greater economies of scale than the limitations of the Panama Canal permits.

These post-panamax vessels are generically termed capesize, a reference to their need to round either the Cape of Good Hope or Cape Horn. It is a simple term that can occasion significantly different interpretations since it can refer to any bulk carrier over 80,000 dwt. When introduced in the 1970s, first-generation capesizes were only around 95,000 to 105,000 dwt. Today, a capesize is recognized as somewhere between 130,000 and 190,000 dwt, still a very wide designation for a specific class of ship. The larger sizes have become increasingly popular leading to the first-generation vessels being commonly referred to as 'baby capes'.

As with the handy sector, the generic capesize term also includes some sub-categories that refer to much more specific trades. The Dunkirk-size is a bulker designed to accommodate the restrictions of the two ore and coal ports in Dunkirk, France. Dunkirk West has a draft limitation of 18m. Dunkirk East has an inside lock limiting beam to 45.05m and draft to 14.2m while the alongside draft restrictions are 13.7m at the coal terminal and 15m at the ore berth.

This class accounts for almost 30 percent of the lifting capacity of the entire world bulk carrier fleet. An indication of the wide variation in vessel size is that the 599 capes in service in mid-2002 aggregated 94.3m dwt, or an average of 157,400 dwt.

Yet this included a significant number of specially conceived VLOCs (very large ore carriers) of up to 365,000 dwt.

Scaling the Tanker Market

Among the most interesting jargon in the wet bulk world are two prominent sets of ship size nomenclature. They have been around a long time, to the point where they overlap and get confused.

One set, the afra scale, is a breakdown of tankers by capacity range that is used to average world freight rates. Introduced in 1954, it has added upper ranges as tanker sizes increased over the past five decades. It is comprised of: general purpose (GP, below 25,000 dwt); medium range (MR, below 50,000 dwt); large range-1 (LR-1, below 80,000 dwt); large range-2 (LR-2, below 160,000 dwt); very large crude carrier (VLCC, below 320,000 dwt); and ultra-large crude carrier (ULCC, below 550,000 dwt).

Afra is an historical, statistical scale, so its range boundaries are rigid. They do not wrangle and identify by cluster the tanker size groups that have developed in response to market evolution. A second, discursive set of terms does that.

This more popular, market-oriented tanker nomenclature breaks the fleet into flexible families that correlate general ship capacities, typical routings and, in round figures, commonly carried volumes of oil, or cargo stem sizes.

Crude oil is typically traded in lots of around 500,000 barrels. Transportation economics tend to call for its shipment in stem sizes of at least a minimum 400,000 barrels. Several tanker families have grown up around key stem sizes. The 400,000-barrel range is carried in a panamax tanker, the 500,000-barrel range in an aframax, the million-barrel range in the suezmax, two million in the VLCC, and three million in the ULCC. As trading patterns and economies of scale evolve, they affect the clustering of tanker volumes in each family – making for gaps and overlaps between the market and afra scales.

Scaling the Tanker Market

Fixed AFRA Scale		Flexible Market Scale	
General Purpose (GP)	10,000-24,999 dwt	Product Tanker	10,000-60,000 dwt
Medium Range (MR)	25,000 - 44,999 dwt	Panamax	60,000-80,000 dwt
Large Range 1 (LR-1)	45,000 - 79,999 dwt	Aframax	80,000-120,000 dwt
Large Range 2 (LR-2)	80,000 - 159,999 dwt	Suezmax	120,000-200,000 dwt
VLCC	160,000 - 319,999 dwt	VLCC	200,000-315,000 dwt
ULCC	320,000 - 549,999 dwt	ULCC	320,000-550,000 dwt

Product Identity

Clean or refined petroleum products move in much smaller stem sizes than crude oil. Most clean shipments have tended to be carried in product tankers of 20,000 to 50,000 dwt. In some restricted regions, like the Caribbean, they move in vessels of just 10,000 dwt. On other emerging long haul routes they may be carried in much larger vessels of as much as 80,000 dwt.

This extended family of tankers between 10,000 and 60,000 dwt lives on a crossroads of cargoes and jargon, and generates a fair amount of identity confusion. They may be called general purpose, product, or handysize tankers by some, or GP, MR and LR-1 vessels by others. The MR range almost always refers to product tankers, while LR-1 may, on occasion, apply to a crude carrier.

Adding to the confusion, the LR-1 range intersects two market groups: the upper end of the handy group and the entire pan-max (as it is strictly called, although the term panamax is more commonly used) group.

A Step Up in Size

Panamax tankers, like panamax bulk carriers, are built to the 106 ft beam and 39.5 ft draft limits for transiting the Panama Canal. But, as with their dry bulk brethren, panamax isn't as concrete a term as it infers. Panamax tankers started out at about 60,000 dwt. Today's newbuildings tend to be grouped in the 70,000 dwt range. They have occasionally reached beyond that in response to compelling visions of emerging markets. Recently, Tsuneshi Shipyard proposed an 80,000-dwt panamax design. And a series of 83,000-dwt panamax-beam tankers was built during the 1980s, in the hope of catching an emerging wave in the long-haul products trade.

Those few upper tier members of the panamax family may, in certain markets, aspire to the lower volume shipments usually carried by their larger brethren, the aframaxes. Aframax tankers first appeared in the 1970s as a family of ships admeasured at 79,999 dwt – the upper limit of the LR-1 range. Today, virtually all newbuild aframaxes are in the 95,000 dwt range, carrying stem sizes of 500,000 to 800,000 barrels.

Not Out of Africa

If you think aframax has something to do with the West African trades, you're not alone. But you'd better think again. The term refers to a family of tankers between 80,000 and 120,000 dwt, but has a more pointed meaning than such a loose definition implies.

Aframax started out as a fiscal descriptor, first used by US oil majors to denote a class of tankers that gave certain advantages in a specific range of trades. Those trades did not involve African ports. They did, however, involve the tax authorities, and a means of dealing with them known as the "average freight rate assessment" scheme, or afra.

All international companies need to satisfy their tax authorities' concerns that the figures they report in internal billing records – the transfer of payments between affiliates under the corporate umbrella – can be considered right and proper. The taxman tends to take special interest in internal freight shipments. And governments have long had a strong interest in the affairs of major international oil companies.

Until 1983, when oil began to be traded on the Mercantile Exchange, it was very difficult to pin down the exact price of oil. Even though there were 'posted prices' there were no Brent Crude quotes and the price of oil

could change with every deal. This raised some complex accounting challenges for the oil majors if they were to satisfy the tax authorities.

For example, they faced the problem of demonstrating that, in the case of internal oil shipments, the company was not hiding profits through fiscal cross subsidization such as charging a profitable affiliate very high freight rates and an unprofitable one an exceptionally favorable rate.

Shell Oil addressed this question in 1954 by developing the afra system. Afra provided figures reflecting external average transportation costs that could be used for internal shipment billing. Afra would be calculated by averaging the charter rates of the world's trading tanker tonnage, grouped according to ship capacity. For each class, there would be figures for long-term charter average, short-term charter average, spot charter average, total deadweight tonnage in the class, and weighted average earnings for the class. The last figure would be the "average freight rate assessment" for all vessels within that size range.

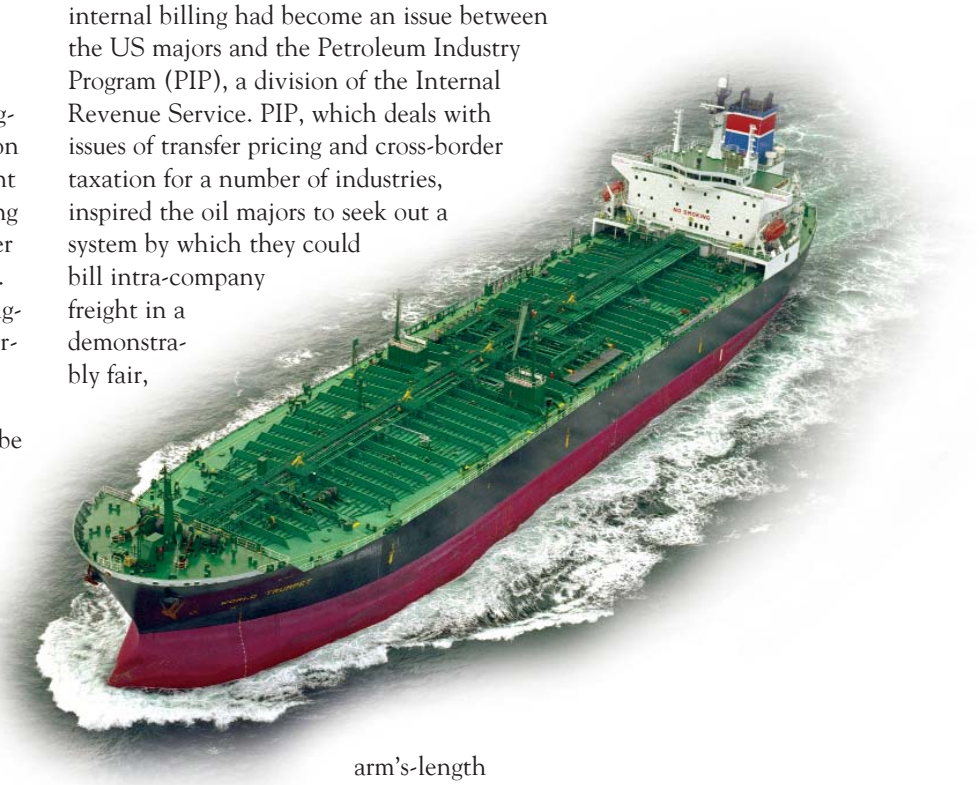
To realize the afra concept as an impartial industry statistic, Shell turned to an authoritative, neutral body, and offered to underwrite the research efforts needed to produce and maintain the data. That body was the London Tanker Brokers' Panel (LTBP), a group of leading tanker brokers that had already demonstrated its collective skills by establishing the Worldscale system of standardized freight rates, at the request of British Petroleum and Shell two years earlier. A short time later, BP came onboard with afra, and the two majors jointly sponsored the LTBP research. They also made the results freely available to the industry.

The LTBP began its work by devising tanker size classes. It settled on three that were appropriate to the tanker fleet of that time: general purpose, for vessels under 25,000 dwt; medium range, for vessels between 25,000 and 45,000 dwt; and large range, for those then 'huge' ships over 45,000 dwt.

During the 1970s, tanker sizes increased at almost radioactive rates, and afra categories were added to accommodate the new ships. The ranges covered by the new classes were chosen to keep a manageable, and statistically meaningful, number of ships in each class.

The large range class was expanded and divided into LR-1, ending at 79,999 dwt, and LR-2. This was soon surpassed by 'very large crude carriers' or vessels over 160,000 dwt. Even this wasn't a sufficient border, as the growing VLCC family needed to be split at 320,000 dwt, those above coming under the new category, ultra-large crude carriers.

Oil companies in America had the same problems as their English brethren. In the 1960s, internal billing had become an issue between the US majors and the Petroleum Industry Program (PIP), a division of the Internal Revenue Service. PIP, which deals with issues of transfer pricing and cross-border taxation for a number of industries, inspired the oil majors to seek out a system by which they could bill intra-company freight in a demonstrably fair, arm's-length manner. Noting that BP and Shell were getting along fine with their system, the US oils came on board with afra.

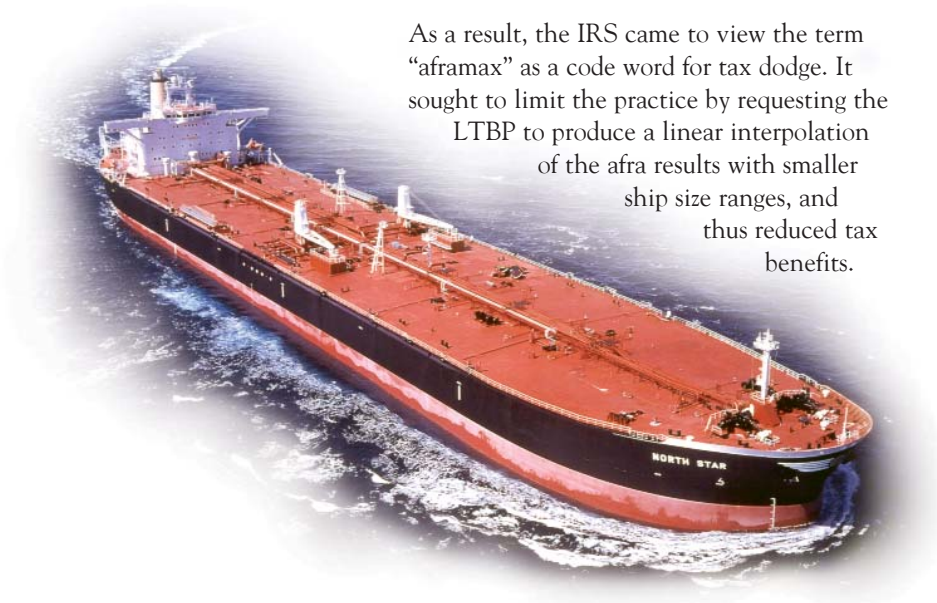


Of particular interest to the US oil companies was that the system was based on vessel deadweight. Due to draft restrictions in many US ports, the oil companies had been using larger ships than strictly necessary for their cargo stem sizes, the rationale being that a large ship, partially laden, has a shallower draft than a smaller ship fully laden. The cargoes they shipped on Caribbean/North Sea to US routes were in the 500,000-barrel range, carried in vessels of about 80-90,000 dwt.

This opened a door of opportunity. Afra results were expressed in Worldscale. Since Worldscale rates decrease as deadweight increases, the majors were able to increase their tax advantages by moving large vessels into lower size classes. They did this by revising the vessels' deadweight certificates.

The LR-1 size class obtained a better WS rate than the LR-2, so all vessels in the subject trades – some as large as 92,000 dwt and above – were re-admeasured down to the LR-1 maximum of 79,999 dwt. In this limited application, the 79,999-dwt admeasurement became known as the aframax. Adoption of this system spurred an ordering binge for aframax tankers, which were either purpose-built to 79,999 dwt, or were larger vessels that could do double duty with bigger cargo stems.

As a result, the IRS came to view the term "aframax" as a code word for tax dodge. It sought to limit the practice by requesting the LTBP to produce a linear interpolation of the afra results with smaller ship size ranges, and thus reduced tax benefits.



It soon became a moot issue. The forward-looking management of BP and Shell had begun moving away from the traditional monolithic corporation accounting structure, to one in which corporate divisions became "profit centers," business lines filing their own profit-and-loss statements. In 1983, they completed this transition and ceased using afra to determine freight rates. The US majors slowly began to follow their lead, most abandoning afra over the course of the next two decades.

Today afra is far from dead or outdated, though rates are no longer pegged to it. In 1983, BP and Shell agreed to sell the rights to afra for £1.00 to the LTBP, which became a registered company supporting its work by selling the afra results. "We still have some 80 clients worldwide for afra – rather a big number for something so esoteric," says LTBP Managing Director Robert Porter. "These clients are largely national governments, oil traders, and even oil majors.

"National governments, especially in the Far East, look to the afra rate as a safeguard measure, on the basis that it is an independent, impartial figure. We're audited by three very tough tax authorities – the US, UK and Germany – which is usually more than enough to assure clients that our calculations are correct, fair and above-board," he says.

"Oil traders buy the service," he adds, "as a way of comparing their performance to a market benchmark." The last US oil major to withdraw was quite skeptical that changing from afra to a market-related system would make any significant difference to their operations. "So they did some research, re-billing three years of internal freights on what they considered a market-related basis, matching the results against what they had actually paid using afra," says Porter. "In the end, they found the total differential between the two was only about $500."

Though most of the world's major oils have broken up their marine departments, they still make internal shipments. And though they have moved away from internal billing on the afra system, some have other reasons for continuing to subscribe to the service. "Oil companies using a bareboat-chartered vessel to carry their own cargoes between their own terminals still have transfer pricing issues to consider, and still have to know what would be the fair arm's-length freight rate," says Porter. "Afra serves to give them a fair market estimate on the days their internal shipments are made. So, afra is still useful to the industry, just in a different way."

A Canal in the Desert

Suezmaxes, on the other hand, do go to Africa. Carrying about 900,000 to 1.2 million barrels, suezmaxes traditionally worked the North Sea, Mediterranean, West African and Arabian Gulf – West trades. Lately, they have found a growing market east of Suez.

The designation originally referred to the size of tanker capable of transiting the Suez Canal when fully laden. Few of the current fleet of suezmaxes do that. Instead, they trade around the Canal, generally discharging to pipeline at Sidi Kareen on the Arabian Gulf, or picking up at Ain Sukhna at the base of the Canal.

The 'max' in this name has undergone several enlargements over the years as the Suez Canal authorities have progressively deepened and widened the waterway. This is an on-going

process that envisages enlarging the Canal so that it can accept laden vessels of up to 300,000 dwt, near the top of the next size class, that of VLCCs.

As a practical matter, the modern suezmax already encroaches on what used to be considered a VLCC at 200,000 dwt. Although some early VLs were that small, and the popular market description continues to define these vessels as being between 200-315,000 dwt, the smaller VLs have not been ordered for years.

The ships have traditionally traded from the Arabian Gulf East and West, largely to the US and Asia. Current preference is for the two million barrel vessel of around 300,000 dwt.

As with other ship groupings, the VLCC class also includes a specialist sub-group, the malaccamax. In this instance the 'max' designation has a very specific limitation factor, the 62-ft draft restriction in the Straits of Malacca. A VLCC able to use the strait can save a day and a half steaming time compared to the Lombok Straits route from Arabia to Japan.

Most recently even an individual operator has adopted the 'max' designation for a new series of specialized VLCC. The Stena V-MAX tanker series are innovative vessels challenging traditional concepts of the relationship between draft, cargo lift, and commerce. The wide-body V-MAX tankers substantially increase the cargo lift on traditional tanker drafts giving them direct access to shallow draft ports such as on the US East Coast.

A Giant Resurgence

The 1970s saw the biggest commercial ships in history built. These were the ULCC class, ranging in capacity from 320,000 to 560,000 dwt. Designed around long-haul economics and the largest traded cargoes of oil, they typically ran between the Arabian and US Gulfs, feeding the growing demand for oil during the 1970s and 1980s.

Changing route economics and the growth of the oil trader have steadily marginalized these behemoths in recent years. Several have headed to the scrap yard in 2002 and the few remaining struggle to find full cargoes.

Today, the Papachristidis controlled, Greek tanker owner Hellespont is seeking to change that reputation with a four-ship order for the first ULCCs built in 20 years. The shipowner sees emerging markets for big cargo stems with route economics that could let new, double-hull ULCCs regain limited market share from their smaller relations. With its first two 400,000 dwt ships at sea, Hellespont reports initial success in attempting changing customer's perception of the ULCC.

"In essence, we have moved away from the traditional Arabian Gulf to US Gulf routing of the first-generation ULCCS," says Alex Papachristidis of Seatramp Tankers, the commercial manager for the Hellespont fleet. "While this route remains the bread-and-butter trade of this ship class, we are looking at a full range of regular trading routes that would include load and discharge ports in Canada, South America, the Mediterranean, northwest Europe, the Baltic, India, and China, or totally new routes, such as between the developing Russian terminal at Murmansk and the US."

Hellespont's strategy depends on being able to find dealmakers capable of putting together 3-million-barrel shipments rather than the standard two million barrel lot. "The advantage to double-hull ULCCs is that an oil company moving six million barrels per month could do it in two ULCCs instead of three VLCCs, without additional discharge costs, or the risk of demurrage on three ships rather than two. We have converted a number of new clients showing them the obvious economics and trading flexibility of these tankers," says Papachristidis.

Worldscale has been the benchmark for tanker charter negotiations for 50 years.

In November 1952, the London Tanker Brokers' Panel introduced Scale No. 1, the first private effort to quantify and list the basic costs of transporting oil between any two regular trading ports in the world.

The premise, based on a wartime practice, was simple. Summing the expenses incurred by an average tanker, operated in an average manner, on a specific voyage, yields a figure indicating the cost per ton of moving oil along that route. That figure, extrapolated to give a meaningful result for any size tanker, can be used by tanker owners and charterers as a standard basis for freight rate negotiations for that route. Now known as Worldscale, this rate list has proven to be a valuable tanker chartering tool for 50 years.

While the concept of a standard rate scale is simple, the calculation of it is of almost alchemical complexity.

The basis of the Worldscale calculation is a hypothetical, laden tanker of 75,000 tonnes capacity, having a voyage speed of 14.5 knots, and running on heavy (380 cSt) fuel oil, of which it consumes 55 tonnes per day for propulsion and 100 tonnes for all other purposes during the voyage. Included in the cost calculations is a fixed daily hire element that figures US $12,000 per day to account for expenses such as crew costs and maintenance.

This hypothetical tanker is then sent on a hypothetical journey, a model voyage from load to discharge port. The costs it incurs on that voyage – port tariffs, canal charges, bunker prices, layovers, and so on – are summed, and divided by the cargo volume. The resulting figure expresses the cost per ton of making that voyage. Do this for every feasible voyage in the world and you have the figure group for Worldscale.

It takes a staggering effort in applied mathematics to do this right. Currently, the Worldscale database calculates some 320,000 voyages, in permutations ranging from one load and one discharge port, to five loads and ten discharge ports. The Worldscale Associations that maintain the accuracy of these figures also follow the market and, at client requests, add some 10,000 voyages per year to the database.

What owners and charterers end up with after all that calculation is the deceptively simple list of dollar figures quoting the rate per tonne of oil for each voyage. An example from the 2001 Worldscale schedule:

FROM YOKOHAMA TO:	US$/TONNE	MILES
ADELAIDE	10.60	10,574
ADEN	12.39	13,038
CHIBA	2.90	50

Those dollar figures are the flat rate, or 100 percent of Worldscale (WS100), for the model tanker on each voyage. Then comes the fun part, as owner and charterer negotiate

around the WS figure, basing their discussions on the size of the actual tanker in question and the prevailing market conditions. The agreed freight rate is expressed as a percentage of Worldscale.

While Worldscale simplifies the process, the actual negotiations can't be called simple. There are many variables within each voyage that need addressing, ranging from specific items like additional port tariffs applied to certain flags, to general trends like market fluctuations.

For example, a 300,000 dwt VLCC and a 40,000 dwt MR product carrier have ship economics different from those of the model tanker. These economics will figure in the freight rate offerings. More important may be unit availability. If the charterer wants an aframax tanker in a hot market, he could end up paying twice the suggested rate, or WS200. Shipowner fortunes have been made in such rare times. More often, the reverse is true, and it's the shipowner who bears the brunt receiving a freight rate of 40 percent of Worldscale (WS40) or less.

While tanker hire may still involve something of a free-for-all, it is a much more organized adventure than it would have been had not the London Tanker Brokers' Panel been commissioned to develop a new freight rate scale a half-century ago.

Introducing the Scale

The 1952 Scale No. 1 was a revision of the MOT-system developed by the British government during World War II. This applied to tankers that had been requisitioned and then chartered back to the private sector, when not needed for war cargoes. This required agreement on a rate that was fair to everybody, but without the protracted negotiations that had been, until then, normal practice in bulk oil shipping.

The government had taken all private sector tankers on a time charter basis for the duration of the War. When leasing them back for oil company use, it needed a freight rate equal to the charter value, so that no one lost out. At the time, charter negotiations, especially for voyages with multiple ports, could become extremely complex, so the Ministry of Transport (MOT) developed a standard rate scale. The United States government, facing a similar need, developed its own version, called the USMC Scale.

The idea of using a scale caught on, and industry continued the practice after the War, negotiating real freight rates as a percentage of the published MOT values. Eventually, the old system became outdated, so BP and Shell approached a neutral industry group, the London Tanker Brokers' Panel (LTBP), enlisting its collective expertise to develop a universal rate scale that could be applied and revised to match industry needs.

At the time, the panel was an informal group of leading London brokers that had been meeting since about 1947, pooling intelligence to suggest freight rates to interested industry parties. The LTBP first convened formally in 1953, and its collective expertise was tapped a second time by Shell the following year, when the oil major developed the average freight rate assessment scheme.

Every few years since, the LTBP has revised the scale to reflect changing market realities. With the 1962 revision, it set up an independent body to produce and sell the scale, which it renamed the International Tanker Freight Scale (Intascale).

Meanwhile, the American Society of Brokers and Agents (ASBA) had been just as busy producing its own scale, the American Tanker Rate Schedule (ATRS). The two systems existed side by side until 1969, when the groups agreed to hammer out harmony between their methods and scales. Renaming the product and changing names to match, they acquired their present identities as the Worldscale Association (London) Ltd. and the Worldscale Association (NYC) Inc., still independent groups deriving income from selling Worldscale subscriptions in their operating areas.

The New York office determines Worldscale for the Americas, and continues to produce the ATRS for Jones Act and other applications. The London office determines WS figures for the rest of the world. They are non-shareholding, non-profit companies, to remain as neutral authorities with results untainted by investor influence.

The editor extends special thanks to Robert Porter, Managing Director of the London Tanker Brokers' Panel, for assistance with this story.

Profile:

Admiral Thomas H. Collins, Commandant, United States Coast Guard

Leadership in a Time of Ch

In December 1862, President Abraham Lincoln concluded his second annual address to Congress with a call for resolve that calls to mind the transforming challenge presently facing the US Coast Guard.

"We can succeed only by concert. It is not 'Can any of us imagine better?,' but 'Can we all do better?,'" Lincoln said. "The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise with the occasion. As our case is new, so we must think anew and act anew. We must disenthrall ourselves, and then we shall save our country."

Today, the Coast Guard faces the challenge of thinking anew and acting anew, as it enters a new phase of its history. With a new level of national recognition, respect and responsibility, the United States' Fifth Armed Service is facing a move from the Department of Transportation into the new Department of Homeland Security. This is destined to bring it new duties and responsibilities that will both expand and challenge its organizational structure and the balance within its mission portfolio.

Leading the Coast Guard as it rises to the challenge of great change is newly appointed Commandant, Admiral Thomas H. Collins.

"The country, the Administration, the Congress and the President recognize as never before the importance of the full range of Coast Guard missions," he says. "They see the competencies and capabilities that make us very relevant to the country's needs at this point, particularly in the maritime portion of homeland security."

Such sentiments were expressed by both Secretary of Transportation Norman Mineta and Secretary Designate of Homeland Security, Governor Tom Ridge, in their statements to the House Select Committee on Homeland Security. "The need for improved homeland security is not tied solely to today's terrorist threat. It is tied to our enduring vulnerability," said Ridge, noting that the Coast Guard is the lead federal agency for maritime homeland security.

"Our transportation system will be the means by which the enemy will arrive in our midst or use to deliver the weapons to be used against us," wrote Secretary Mineta. "Therefore, in this increasingly global system, our transportation security is the key to the protection against and prevention of terrorist threats. That is why the Coast Guard and the Transportation Security Administration will function as key components of the Department of Homeland Security."

The Border and Transportation Security Division of the new Department will comprise the Coast Guard, the Customs Service, the Immigration and Naturalization Service, the Transportation Security Administration, and the Animal and Plant Health Inspection Service. The combined force of these agencies is expected to yield greater control and coordination over people and goods entering the country.

These enhanced security duties have already produced one major change. Late last year Congress made the Coast Guard a formal member of the intelligence community. This means that, for the first time in its history, the Coast Guard can tap into such equipment as satellite systems, and to such personnel as the CIA's overseas network, for assessing maritime threats.

Multi-Mission Preservation

Collins sees managing the Coast Guard in its adaptation to this new role as his main mandate. It will involve reorganization, modernization, and growth, while dealing with the challenges of protecting homeland security. It is a multi-level evolution for a multi-mission organization.

The USCG is a civil law enforcement authority and regulator, in addition to being an armed force of the United States. Its unique

hallenge and Change

set of authorities and competencies have served the country on many fronts, in the broad areas of maritime security, transportation, safety, environmental protection and national defense. Collins aims to see that multi-mission character preserved.

"We spend a lot of time talking about homeland security because that's the big issue on our minds today, as it should be," says Admiral Collins. "But I want to reassure everyone that our intent is to remain a leader in maritime safety and marine environmental protection. We're not walking away from that one iota. We consider ourselves a world leader in those two areas and we're going to maintain that position."

The importance of preserving that multi-mission character was underscored by Secretary Mineta in his statement to the House of Representatives. "To maximize the Coast Guard's effectiveness in the new department, it is essential that the Coast Guard: (1) remain intact; (2) retain its essential attributes as a military, multi-mission, and maritime service; (3) retain the range of critical Coast Guard missions; and (4) be adequately funded to fulfill it missions," he said. "Its multi-mission assets are critical to each of its five fundamental, overlapping roles: Maritime Security, Maritime Safety, Maritime Mobility, Protection of Natural Resources and National Defense."

"Security and safety go together," says Admiral Collins. "I am frequently asked if the safety mission will suffer with involvement in homeland security. But safety and security are not oil and water. They're very closely aligned. You make a very positive investment in security through maritime safety and vice versa. I think our ability to have and maintain good port security is based partly upon the relationship we've built up through our safety and environmental activities in the nation's ports."

He also stresses that the Coast Guard will continue to rely on other organizations for support in its regulatory duties. "We have been very aggressive within the International Maritime Organization regarding security and environmental protection, and we will continue to be," he says. "In this effort we'll need partners in the maritime community, like ABS, to work together with us. The partnership we have with ABS is going to continue as we build the Deepwater project and in classing certain aspects of it. That partnership needs to be as strong as ever."

Guided by Destiny

Collins came to the Coast Guard through the kind of circumstance that makes you believe in destiny. He learned about the Coast Guard as a young man, watching his older brother apply to the Coast Guard Academy and prepare for his admissions interview. But the brother took ill and never made the appointment. Young Tom, however, became intrigued by the service, and applied.

Graduating from the Academy in 1968, Collins went on to graduate studies in humanities at Wesleyan University and the MBA program at the University of New Haven. Returning to the Academy, he taught political science and history before being assigned to sea, beginning his rise through a series of postings that would each add to his broadening familiarity with the organization and the way it does business.

This included a stint as Chief of the Office of Acquisition from 1994-96 where he had a lead role in developing the acquisition strategy that would become the Integrated Deepwater Systems project for the Coast Guard's total systemic renewal. Deepwater, as it is known, is a truly innovative approach, in which the Coast Guard will renew all its hardware in a single program under the unifying vision of a single overall contractor or 'systems integrator'. The systems integrator subcontracts the components of the task. It is a project with a two-decade timeline segmented into five-year blocks.

Awarded this past June to the team led by Lockheed-Martin and Northrup-Grumman, the $17-billion contract covers everything from the biggest cutters to the smallest aircraft, and includes the data and communications systems that will link them together and link the Coast Guard with other government agencies.

The contract includes 91 ships and 145 airplanes and helicopters, as well as upgrades to 49 cutters and 93 helicopters. It was approaching difficult budgetary obstacles when the 9/11 attacks added a dash of urgency to project initiation.

"Deepwater is a different procurement strategy, an approach based on performance requirements, not equipment specifications," says Admiral Collins. "We didn't design the solution, we identified the performance we needed from the overall system, and asked the vendor teams to design a system that would deliver that performance, at the total lowest life-cycle cost."

Though innovative and cost-effective, the proposal wasn't given a rubber stamp. "We worked very hard to put all our ideas on the table, and welcomed review by all sorts of specialists. We took their best thoughts and rolled them into our plan. This wasn't ivory-tower evolution, but a very open, collaborative project. The program is an example of excellent stewardship."

Support at Last

All this effort requires two things the Coast Guard has found it very difficult to obtain in the past: money and people.

For years, the Coast Guard took a back seat to other programs in the Department of Transportation, generally receiving funding unequal to the cost even of maintaining services, let alone replacing aging equipment. It has been successfully performing an immensely difficult mission using aging boats and planes already past their life expectancy.

During WWII, the Coast Guard had 36,000 people in port security alone (of a total uniformed force of 240,000). By 2000, after years of budget cuts, total staff was down to 34,000. Administrative parsimony forced the Coast Guard to cut back cutter days and flight hours by 10 percent in 1999.

Those days seem just a dark memory now. The 2003 appropriations reflect the new level of support the service finally enjoys, with a budget providing $7.1 billion in funding, the highest level in its history. Turning around the trend of the previous decade, the equipment buildup is being accompanied by an intense recruitment effort. By the end of 2002, uniformed staff will be up to 36,000, as 2,200 new recruits arrive. The same number is expected to join in each of the next two years as well.

This year, the Coast Guard received its first allotment of $320 million for the Deepwater project, with $500 million expected in 2003. But the Deepwater timeline was calculated prior to 9/11, and so the first of the new ships will not be on line for several years. In the meantime, the old equipment is straining. In the West Coast fleet alone, the agency lost 194 cutter days last year due to unscheduled maintenance and casualties. It seems that, in recent years, the Coast Guard has been held together by its famous 'esprit de corps' as much as anything else.

Relying on People

Recognizing that the Coast Guard's strength has always been its people, Collins is working to ensure that the attention-grabbing power of new technology and new priorities does not overshadow the people that will use them.

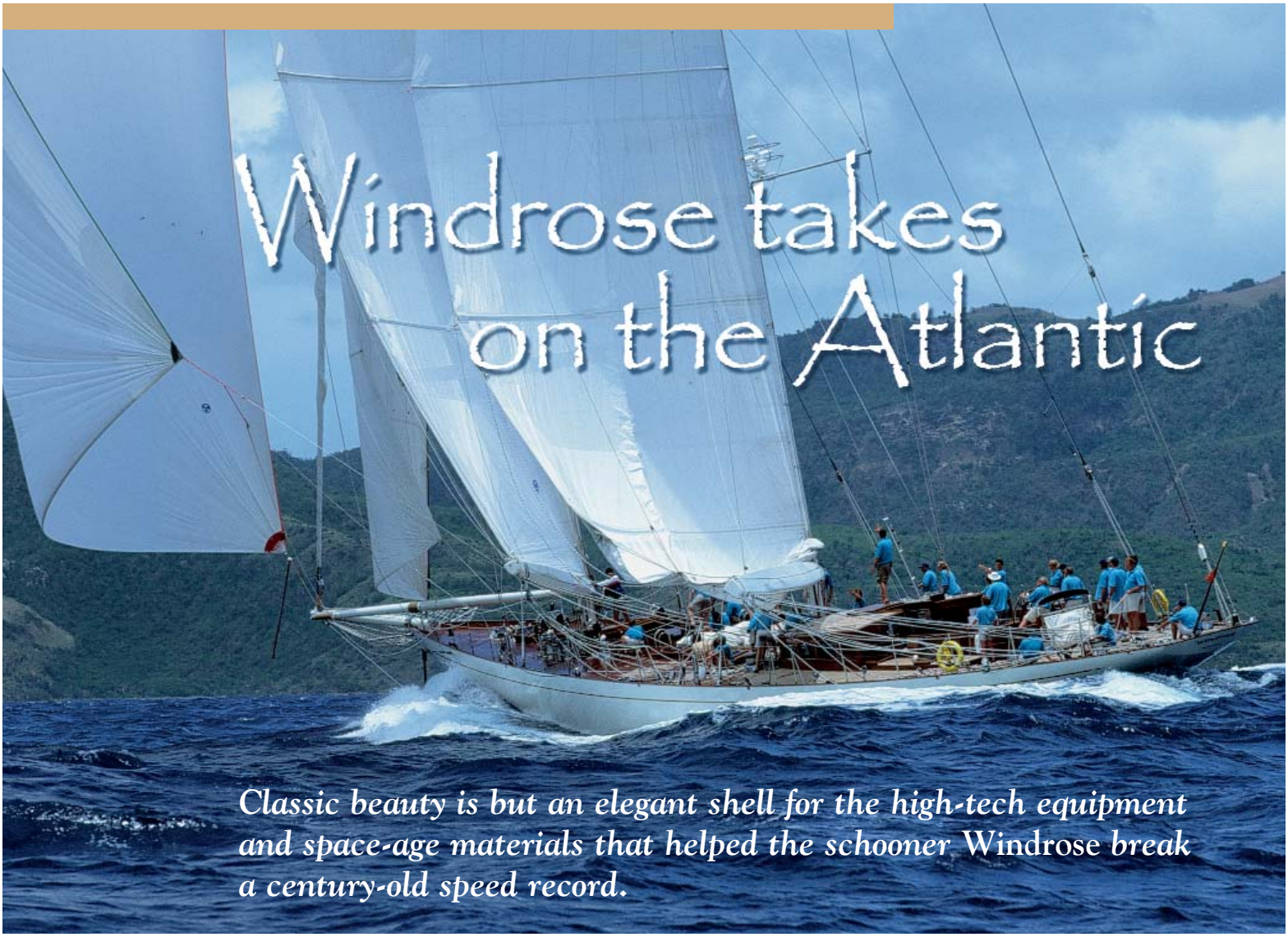
Besides his official mandate of managing this stage of Coast Guard evolution, he has also taken on a personal mandate: to ensure the service remains a people-first organization.

"Deepwater is extremely important to the future of the Coast Guard," says Admiral Collins, "but the success of the equipment depends on our people.

"I have three themes: readiness, stewardship and people," he says. "At the heart of it all is people. We are a very people-oriented organization, but I would like to drive that up a notch. By that I mean that we enroll the right people and offer them the right opportunities; that we be a diverse organization, a learning organization; and that we invest in our people, in terms of compensation, benefits, training and education.

"With this people-first approach, we will invest in our people, in their professional abilities, and build them for success. If we build our people for success, our organization will be tremendously successful. So, how we build the work environment, living conditions and opportunities for personal growth and development are for me extremely important things."

Decisions made during this time of change and challenge will direct the future of the Coast Guard for years to come. Reflecting on this, Collins says, "In the history of any organization, you can point to times where important things have materially changed, in what was done, how it was done, or how it was structured. For the Coast Guard, this is one of those times. I am honored to be the one chosen Commandant at this critical time."



Windrose takes on the Atlantic

Classic beauty is but an elegant shell for the high-tech equipment and space-age materials that helped the schooner Windrose break a century-old speed record.

On 21 May this year, the schooner *Windrose* crossed the finish line at Lizard Point, England 11 days, 10 hours, 25 minutes and 10 seconds after her departure from Sandy Hook, New Jersey. In so doing, she beat a racing record set in 1905 by the famed *Atlantic*.

The achievement shone a special light on the talents of designer Gerard Dijkstra and builder Holland Jachtbouw. With *Windrose*, the young shipyard proved it could produce a desirable marriage of classic appearance with futuristic technology. Using advanced analytical tools and building materials, she had been designed to be as lightweight and powerful as possible, without sacrificing function, form, or safety – to which ends the shipyard selected ABS class and MCA certification.

Her hull, refined from skeg to bow in tank tests at Delft University, is built of Alustar, a strong, lightweight aluminum alloy. The interior is a high-tech composition with a classic face, a sturdy foam-sandwich construction under a heavy mahogany veneer. Below its traditional teak deck, generators rather than service batteries power vessel systems. Above, carbon-fiber masts and spars provide lightweight strength to support up to 1,900 sq m (20,441 sq ft) of sail. The 152-ft *Windrose* has a full displacement of just 156 tons.

Atlantic's record was a romantic challenge from a bygone world, when most of its rulers were sportsmen. In 1905, Kaiser Wilhelm II put forth a sportsman's challenge to all well-found sail yachts of over 80 tons. He would sponsor a transatlantic race, from New York to England where, at Lizard Point off Cornwall, the Imperial German warship *Pfiel* would be waiting to bestow on the winner the golden Ocean Cup.

Propellers had to be removed for the race, and steam power assist could not be used to hoist sails. Eleven ships answered the call: eight schooners, one yawl, and two square-rigged barques. One of the schooners was the 185-ft, 206-ton *Atlantic*, whose owner, American millionaire Wilson Marshall, had hired world-famous skipper Charlie Barr to take the vessel to victory.

Scots-born Barr had steered American boats to victory in three consecutive America's Cup regattas – *Columbia* in 1899 and 1901, and *Reliance* in 1903. Under Barr's captaincy, *Atlantic* won not only victory but also a place in history. She made the crossing in 12 days, 4 hours, 1 minute, 19 seconds, for an average of over 200 miles per day.

Not everyone aboard was enraptured by this epic contest of frail human endurance against the tireless sea. Wilson Marshall had invited a handful of guests along for the thrill of sailing, but Charlie Barr was giving them the ride of their lives. As the story goes, when Marshall ventured topsides during a gale to request letting up a bit on the sail, Barr ordered him below, shouting, "You hired me, sir, to win this race, and by God that's what I'm going to do!"

Barr sailed north to the ice limit, taking the great circle route that would shorten his trip to 3,013 miles (the shortest possible course route is about 3,000). He pressed the boat through gales and rough seas all the way, and once made 341 nautical miles in 24 hours. He drove himself as relentlessly as he did boat and crew, exacting the limits of performance from all. Like many icons of achievement, he died young – a heart attack at age 46 – but, they say, his ghost can still be felt topsides.

Atlantic's remarkable record defied all comers for three-quarters of a century. The challengers in recent decades have included determined millionaires and large syndicates, all backing high-tech vessels attempting to take the record from the old wooden sailing ship. A few have been successful. A hydrofoil

trimaran was first, crossing in 10 days in 1980. In 1988, the 244-ft four-masted monohull *Phocea* did it in 8 days, 3 hours. In 2001, the 125-ft catamaran *PlayStation* set the new world record at 4 days, 17 hours, 28 minutes, 7 seconds.

With each victory by a new vessel type, the speed crossing record was divided further into categories. *Atlantic*'s time remained a record, but in the more romantic, though no less daunting, sub-category of fastest crossing in a transatlantic race for displacement sailing yachts.

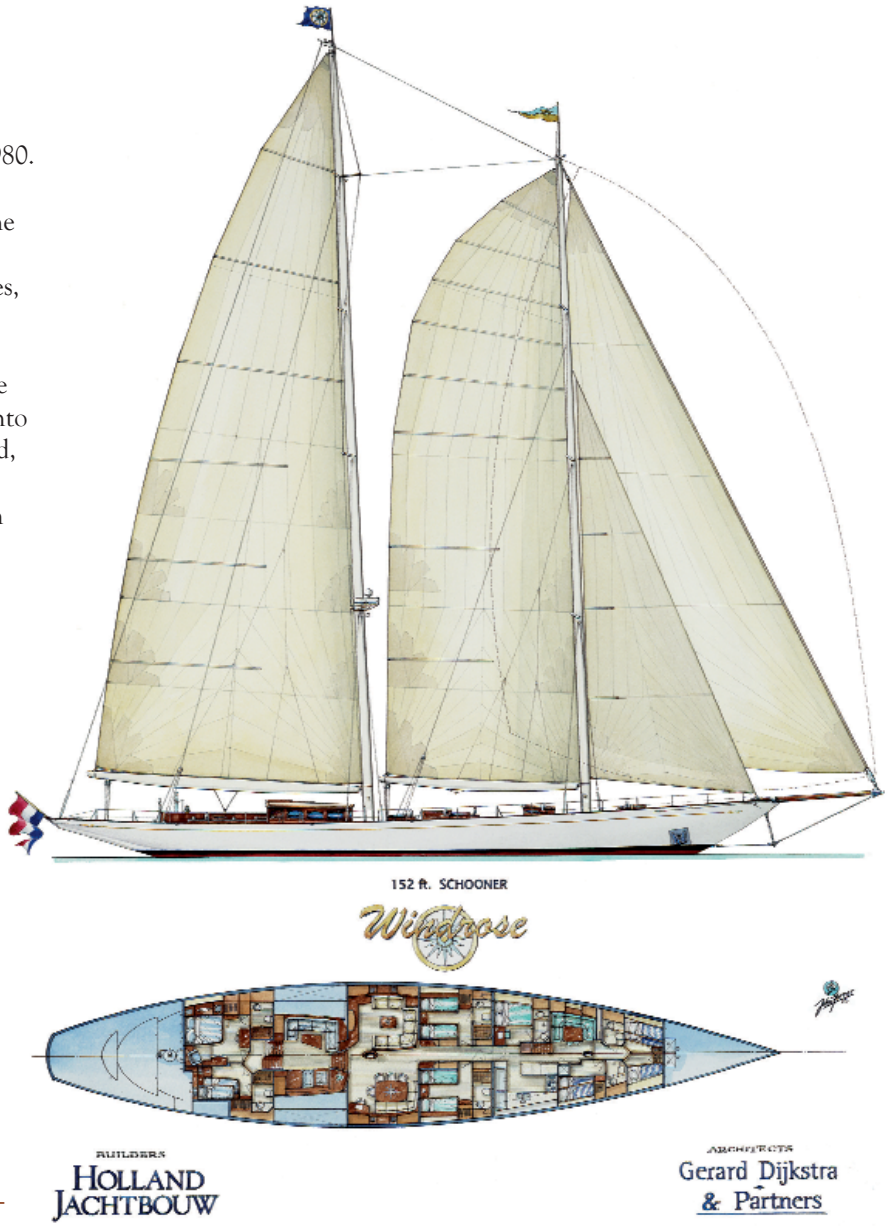
Aboard *Windrose*, designer Gerard Dijkstra served both as navigator to skipper Simon Dierdorp, and as reporter to the world. On the Holland Jachtbouw website (www.hollandjachtbouw.nl) is an archive of the "onboard daily reports" that he posted from *Windrose*. They give an idea of the risk and reality in the romance of challenging a record.

(16/17 May) Windrose is excellent to control. Every once in a while she heels in the gusts and puts her scuppers under, but she rights herself without deviating from her straight course. Occasionally the gennaker collapses, but by quick action of helmsman and trimmer she fills each time gently. Adrenaline runs high…all seems under control, but there is no room for error.

The Genoa, staysail, Code Red, and mainsail we have up, with the wind increased to 45 knots and gusting higher, are too much sail above our heads. Broach under Code Red. Code Red blows out. We have pushed too hard. We are now running in winds 45-plus and seas at 12 to 15 feet, boat speed average 14 knots, surfing at 20 knots, with maximum at 26.5.

(18/19 May) 1100 hours: A front is on its way and with a fast-falling barometer the decision is taken to lower the main again and set trysail. None too soon for the afternoon finds us sailing in winds 42 kts steady, gusting 49. Rain and poor visibility. We sail with trysail, staysail and Genoa sail. Still with true wind angle 150. Occasionally seas wash the deck and the crew…

…The roller furler hydraulics (for the Genoa) breaks down, unidentified leak, we have one emergency furl left. Will save that for when it is really needed. Otherwise, we still can furl by hand, but that takes some time and requires somebody on the bowsprit end.



1800: Winds "moderate" down to 38 kts, sky starts breaking and barometer starts rising. The gale has been blowing for 36 hrs and we are still in good shape…

"We crossed the line on 21 May at 20 hrs, 30 min, 30 seconds," he wrote in the final onboard report, recording *Windrose*'s triumph. "Happy to have had a safe crossing without major injuries or damage. Happy to have bettered *Atlantic*'s time."

"We realize why *Atlantic* made such good time," he added. "She had heavy weather most of the way. You need a series of gales and depressions to keep a big boat moving. In the last five days, that's what we had

and *Windrose* sailed over 300 miles each day."

It was a special triumph for Dijkstra. He had tried to beat *Atlantic* once before, in 1997, aboard a classic sloop he had redesigned named *Adix*. In this latest contest, *Adix* was racing against *Windrose* – surely one of the few times a man can be said to have raced against himself.

Though the record was beaten, *Windrose* will not have an entry in the record books. The official transatlantic mega-yacht race of 2002 had been cancelled in the aftermath of the 9/11 terrorist attacks in the US. This was not an official race, just a sportsman's challenge from *Windrose* to *Adix*. But for Dijkstra, the contest was about time, not typography. When both vessels finished ahead of *Atlantic*'s time, his White Whale could be considered caught.

Putting a fine point on that moment of joy, he wrote in the last day's entry, "We bettered her time, but did not better her record, which was a racing record and can only be broken during a race. But that's just semantics to us. We have finally put the ghost of Charlie Barr to rest. *Windrose* feels like a real schooner now."

SURVEYED WITH LOVE

A lifelong sailor and classic boat lover, Senior Surveyor Hans van Leeuwen with ABS Rotterdam took special pleasure in the Windrose *project. Here he records his impressions of the project for* Surveyor.

"Quite a number of motor and sail yachts have been built to ABS class at various Dutch shipyards over the last 20 years, though *Windrose* was our first at Holland Jachtbouw.

Most of these luxury yachts were of aluminum construction, something in which ABS has quite a lot of experience. Its *Rules for Building and Classing Aluminum Vessels* has been in use for years. Holland Jachtbouw, which started out building in steel, was aware of ABS' experience with aluminum hulls, and invited us about three years ago into a discussion about an aluminum schooner they were planning. It was to be a luxury charter/racing schooner, constructed as lightly as possible but with no concessions to safety. She was also to be fully classed and in compliance with MCA requirements, so that she could work as a charter vessel.

The material of choice was Alustar H321, developed by Dutch manufacturer Hoogovens-Aluminium and accepted by ABS for having higher strength than the normally used aluminum 5083-H321. During these discussions, I had the opportunity to see the preliminary designs prepared by Gerard Dijkstra & Partners. Being a sailor myself, with a weakness for classic yachts, it was love at first sight. She is a real beauty.

One thing that stood out strongly during this project was the very serious and dedicated approach by the enthusiastic teams from Holland Jachtbouw and Gerard Dijkstra & Partners. In terms of cooperation, it was quite a success, and was immediately followed by a contract to class another new vessel.

For me, the project was a personal as well as professional pleasure – and a special pleasure to attend this beautiful yacht during her successful sea trials in the North Sea."

50 years after German grain merchant Alfred C. Toepfer launched his first bulk carrier, the plucky shipowning company carrying his name sails on.

In an elegant house in historic Hamburg, the Schmidt family charts the future of AC Toepfer Schiffahrtsgesellschaft (ACTS). A small, family-owned company, ACTS has roots as venerable as the 19th-century home it uses for offices. Its first ship met the sea 50 years ago, when it was part of the industrial empire of merchant and philanthropist Alfred Carl Töpfer (1894-1993). Today it operates six containerships on routes that span the globe.

But Toepfer loved the sea and in 1957 broke with S&B to become an individual shipowner. Heading the new ACTS was former S&B director Gerhard van der Linde, who would manage the company for the next 16 years. In 1966, van der Linde recruited as his successor a 33-year-old manager named Peter Schmidt, to whom he passed the mantle in 1973. Schmidt proved worthy of the trust. Two decades later, he rescued the company from near ruin, and is today its sole owner.

A HALF-CENTURY BEFORE THE MAST

A.C. Toepfer received his trading license in 1920, using as starting capital his entire savings of 10,000 Marks – the equivalent, with postwar inflation, of about $175. By 1970, he had built this modest investment into a worldwide grain trading and shipping enterprise valued at DM 10 billion (about $3 billion).

Toepfer launched his first vessel in 1952, a general cargo vessel intended to support his grain activities. The ship was owned in partnership with Bremen-based ship managers Schulte & Bruns (S&B).

The ACTS fleet of containerships, with capacities ranging from 2,200 to 3,400 teu, trade between China, Europe and the US. These modern, highly productive vessels are a far cry from the glory days of large, mixed fleets hauling foodstuffs, feedstocks and automobiles. But, like many family-owned companies, ACTS has made business tools of adaptation and metamorphosis.

For example, applying some technical creativity, ACTS became a main conduit for the Volkswagen Beetle's entry into America. Between 1961 and 1972, its ships hauled 264,221 Volkswagens, along with tens of thousands of less beloved European vehicles. These ships weren't the specialist car carriers of today, but general cargo carriers doing double duty as car carriers. They brought coal or grain from America, backhauling the cars on vehicle decks specially designed to fit the cargo holds.

With the expiration of the VW contract in 1972, ACTS left car carriage and entered the timber trades. By decade's end it was running 13 log carriers between Europe and Africa. ACTS got creative with bulkers again in 1982. That year, it converted the 50,000-dwt bulk carrier *Wien* into the fleet's first container carrier and chartered the new ship to Hapag-Lloyd. At the time, the 1,409-teu vessel was Hapag's biggest containership.

Wien's success opened ACTS to the developing world of container carriage, and to several joint containership ventures in Europe – US trades. But a big shakeup was coming. During the 1980s, the aging A.C. Toepfer decided to withdraw from business and devote his remaining years to charity. He split his empire into several independent parts. One is multinational grain conglomerate Toepfer International. Another is ACTS, which began the 1990s as a partnership between Peter Schmidt and Hamburg holding company BGS. They split up in 1995. Schmidt retained ACTS, and BGS took control of ICL, a containership venture they had begun together in 1986.

It was a time for both champagne and antacid. Schmidt had to choose a single venue in which his small, newly independent company could grow. Selling ACTS' aging multipurpose ships, he cast his lot with the still developing container business.

In 1994, ACTS entered into a partnership with family-owned US carrier Lykes Lines, surrounding a newbuilding program for four ABS-classed, 2,480-teu container carriers at the FSG shipyard in Flensburg, Germany. The companies first met in 1991, when ACTS/US Inc. took four Lykes vessels under management. In this arrangement, Lykes did not wish to be shipowner of record, so ACTS took that role, intending to operate the vessels under long-term charter back to its partner. But circumstances forced Lykes to file for bankruptcy protection in 1995, causing the delicate financing scheme to collapse when the financially strapped shipping company had to drop the charters. This left four ships without employment prospects – the two already trading, one ready for delivery and one still under construction – and left ACTS on the hook for it all.

Schmidt saved the company from disaster, finding employment for the two working ships, and selling the two still in the yard. Today Schmidt, having proven himself a good steward, stands ready to pass the Toepfer legacy to his sons Jan Christian and Kim. That legacy is a company that is back on solid ground and ready again for growth.

As ACTS optimistically enters its second half-century, it prepares to face the two main threats to today's small shipowner: a shrinking banking industry and a growing regulatory regime.

"We would like to add several more ships to the fleet," says fleet manager Captain Claus Schmidt, Peter's younger brother. He joined ACTS in 1975 as captain, accepting this shoreside duty in 1998. "It is more difficult for a small company to get financing these days, but you can, if you have charters to help you get over the first hard years after a new purchase. So, we are keeping our eyes open both for available ships, and for reasonable charters."

Captain Claus favors ships in the 2,500-3,500 teu range. "Such a size will always be able to find employment," he says. "I don't think these giant ships have a very long future. They remind me of the huge tankers everybody used to want. Eventually, the market determined the most useful size for a tanker, and the giant ones faded away. That hasn't happened yet with containerships, but it will."

A traditional, hands-on manager, Claus Schmidt expresses concerns for the future of the maritime industry in the way operations and crew relations have been affected by a growing regulatory regime.

"Safety is definitely served by ISM and ISO," says Captain Schmidt, "but the question is, how much is necessary to accomplish the stated goals. Most well-run companies had about 80 percent of the requirements in place long ago. But satisfying auditors that you are doing your job puts a terrible strain on a small company. In an office like ours, for example, more than 20 percent of our staff's time is devoted to ISM paperwork."

He sees a special threat in regulatory pressures that make small shipowners turn to big ship managers to solve their problems. "Today, there is a tendency to contract all the work, treat the crew like temporary help and make the ship no longer a home for them. "Once, the seaman was so proud of his company, he identified himself as a Laeisz man, a Toepfer man, a Hapag man, etc.," he says. "It is a pity to lose that. At least, we don't allow it. Our crew are at home with us."

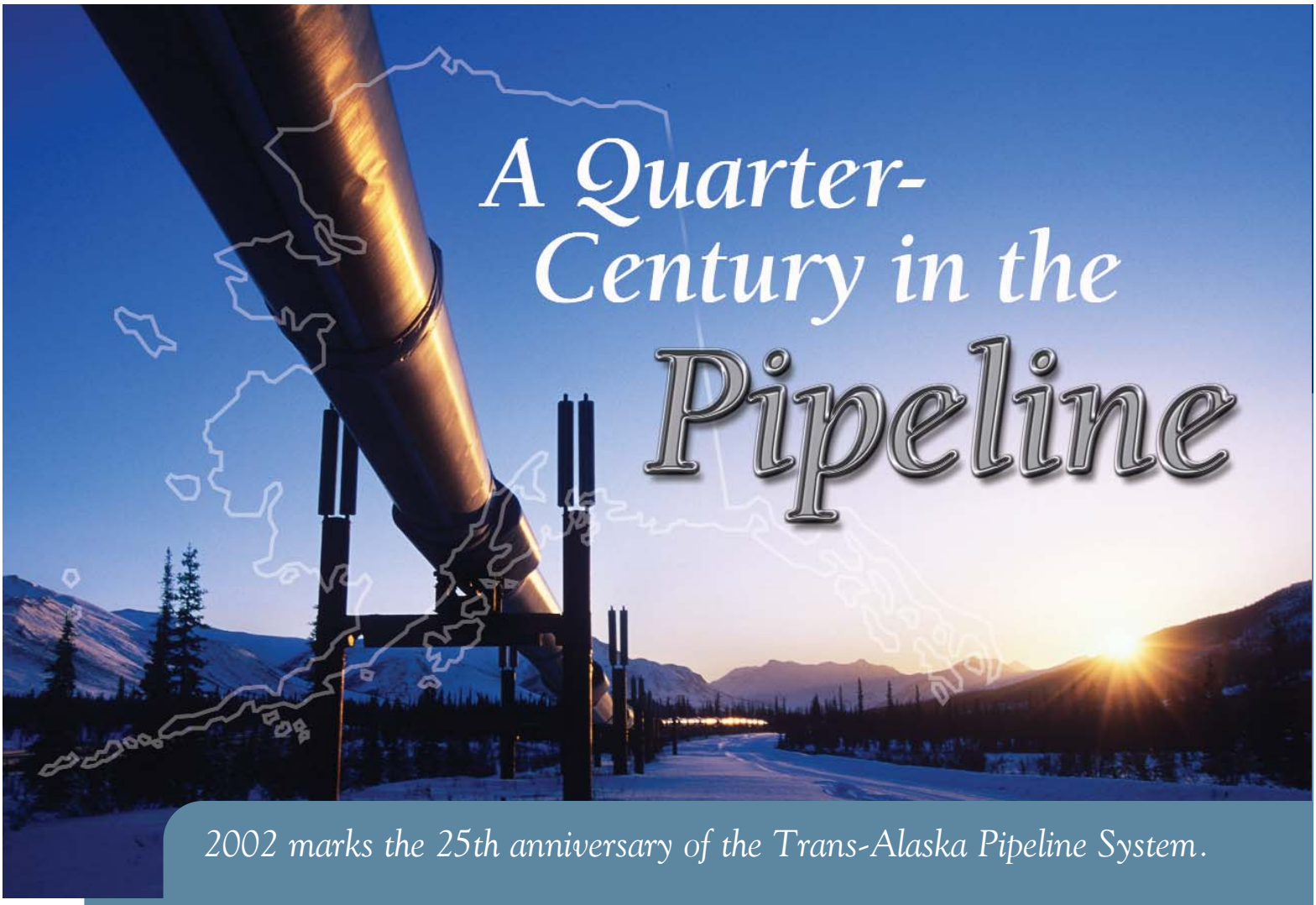
A.C. TOEPFER: MERCHANT, PHILANTHROPIST, AND SHIPOWNER

A merchant mariner loses his job because he's colorblind. Germany gains 64 national parks. Peter Schmidt heads a respected, family-owned shipping company in the historic heart of Hamburg. Apparently unrelated circumstances, but linked by the life of Alfred C. Toepfer (1894-1993).

The chain of events stretches back to mid-19th century Germany, when merchant mariner Carl Julius Toepfer reluctantly swallowed the anchor after nine years before the mast, on discovering that colorblindness would prevent his advancement to ship's officer. The dejected sea dog took a shoreside job, as messenger with the Steinway piano factory near Hamburg. There he found his place, rising to become factory manager. Over time, he passed on to his son Alfred the lessons of his life and his love of the sea.

Alfred Toepfer became a billionaire grain merchant and shipowner. A man of service as well as business, his charitable works grew to include several public foundations promoting German culture, offering scholarships to generations of students, and erecting replica historical buildings in Hamburg. Elected chairman of Germany's new National Parks Foundation in 1956, he pledged to then President Theodor Heuss to create 25 new national parks. Under his leadership, the organization created 64 parks in 25 years.

In 1951, Toepfer founded the shipping line Alfred C. Toepfer Schiffahrtsgesellschaft (ACTS). As he pulled out of business with advancing age, Toepfer split ACTS from his group in 1985, handing control of it to the good stewardship of director Peter Schmidt. Piloting ACTS through the stormy ensuing decade, Schmidt became its sole owner, and now stands ready to pass the legacy on to his sons.



A Quarter-Century in the Pipeline

2002 marks the 25th anniversary of the Trans-Alaska Pipeline System.

Alaska is 2.2 times the size of Texas, stretching 2,000 miles westwards to the tip of the Aleutian Island chain. Its coastline traces 6,000 miles – more than that on the US mainland – and its outer continental shelf encompasses 600 million acres in the Arctic Ocean, Bering Sea and Northern Pacific.

While obviously the northernmost US state, Alaska also has the distinction of being simultaneously easternmost and westernmost. The Aleutian Island chain crosses the 180 degree longitudinal meridian dividing the hemispheres.

Alaska may also be the country's most oil-rich state. As of 1 January 2002, its proved oil reserves totaled 4.8 billion barrels, just behind Texas (4.9 billion) and ahead of California (3.6 billion). But at the completion of a three-year study in 1998, the US Geological Survey concluded that the potential for recoverable oil on the Alaskan coastal plain is upwards of 16 billion barrels.

The first Alaskan oil fields were discovered in Cook Inlet, near the predominantly gold and copper mining region surrounding Prince William Sound. They began production 100 years ago, peaked at about 400,000 barrels per day and, until the opening of the Trans-Alaska Pipeline System (TAPS) in 1977, were virtually the entire source of Alaskan oil. The estimated value of Alaskan oil at the time was about $360 million. Today, with output down to a million barrels per day (from a high of 2 million), Alaska supplies nearly 20 percent of all US crude oil production.

Such figures were mere imagination in 1968, the year ARCO and partner Humble Oil (now ExxonMobil) announced the discovery of oil reserves in Prudhoe Bay, part of a remote area known as the North Slope bordering the Beaufort Sea section of the Arctic Ocean. It was good news in Washington, where concern was mounting over US dependence on foreign oil, then at 34 percent and growing. The following year, oil development lease sales for the North Slope brought Alaska a windfall of $900 million.

But the oil was 800 miles north of the nation's northernmost ice-free port at Valdez. Some companies considered using icebreaking

Which of the 50 US States is Biggest?

Northernmost?

Easternmost?

Westernmost?

Alaska.

tankers to haul out the oil directly. But it was generally agreed that a pipeline to Valdez was the best way to reliably and safely bring the riches south.

The Alaskan pipeline concept was a controversy from the start. Then US Interior Secretary Stuart Udall declared a moratorium on Alaskan land selection in response to native Alaskan concerns about use of traditional lands. The land freeze prevented pipeline construction and ultimately led to the Alaskan Native Claims Settlement Act of 1971 mandating, among other things, percentage participation by Alaskan natives in the state's developing oil and gas industry.

In 1970, North Slope development went into further hibernation, delayed chiefly by environmental lawsuits. But in the wake of the Arab oil embargo of October 1973-May 1974, the US Congress voted to bypass all legalistic entanglements and authorize construction of the pipeline. The Alyeska Pipeline Services Company, then a consortium of eight major oil industry companies, began work on design and construction of storage facilities, the pipeline, and the Valdez marine terminal.

The Trans-Alaska Pipeline System (TAPS) became the biggest privately funded construction project in history. A marvel of engineering and technology, the pipeline conquered geological and physical challenges of unprecedented scale. The 48-inch diameter pipeline scales three mountain ranges and crosses more than 800 rivers and streams – either underground, above ground, or cleverly suspended in bridge constructions. System engineers devised new ways of combating earthquake movements and of dealing with the permafrost challenge. The high temperature of the crude oil would thaw the layer of permanently frozen soil under much of the line, causing subsidence and sinkholes.

On 20 June 1977, after three years of labor by a workforce of 70,000 and a capital investment of $8 billion dollars, the trans-Alaska pipeline opened and the first North Slope oil began its journey south.

In the 25 years since completion, the trans-Alaska pipeline has conducted over 13 billion barrels of oil safely to Valdez, whence it is shipped in TAPS tankers to terminals along the US West Coast. The pipeline currently transports about 17 percent of all US-produced crude, and is expected to continue operations for several more decades – provided that its lease is renewed.

In 1974, prior to construction of the TAPS, Alyeska was required to secure right-of-way permits for the pipeline to cross state and federal lands. Known as the Federal Grant and the State Lease, these permissions – over 500 Federal and 800 State permits were issued for a period of 30 years. These expire in 2004.

The renewal process for a second 30-year lease is currently underway.

Today, Alyeska directly employs about 900 people statewide, plus provides jobs for a further 1,300 independent contractors. Headquartered in Anchorage, Alyeska is a consortium between:

- BP Pipelines (Alaska) Inc. 46.93%
- ConocoPhillips Transportation Alaska, Inc. 26.79%
- ExxonMobil Pipeline Company 20.34%
- Williams Alaska Pipeline Company, LLC 3.08%
- Amerada Hess Corporation 1.50%
- Unocal Pipeline Company 1.36%

Many eyes are studying the technical lessons of TAPS operation and the procedural experience of its lease renewal. Prudhoe Bay was just the beginning. There is much more oil and gas in northern Alaska, and producers need to flesh out the long-term picture of its development costs. Their prime target for development is the coastal area of the Alaskan National Wildlife Reserve (ANWR), one that is vociferously defended by environmental lobbies.

In its 2001 declaration supporting responsible oil development in the coastal regions of the ANWR, the Alaska State Chamber of Commerce boldly stated that Alaska's reserves "could replace Saudi oil imports to the US for 30 years" – if approval were given to recently-introduced legislation allowing development of the ecologically sensitive area.

The Chamber's declaration also asserts that "the vast majority of Alaskans, including the native residents of Kokavit, the only community within the ANWR, support coastal plain development." This is understandably since state oil revenues supply approximately 80 percent of funding for the Alaskan state government and have paid for numerous public works, including vast road-building and rural electrification projects.

Alaska's royalty share of oil production is 12.5 percent, meaning, for example, that if oil is $20 per barrel, Alaska gets around $5 million per day, or $1.8 billion per year. Half of the royalty goes into the state's Permanent Fund, which today tops $22 billion. Approval of further production, then, promises to bring new meaning to the state motto "North to the Future."

HIGH-TECH TUBE SPANS THE PERMAFROST

The Trans-Alaska Pipeline is a marvel of technology, engineering and forethought. The 48-inch diameter steel pipe runs 800 miles across some of the most inhospitable terrain imaginable. About 75 percent of the land along the route contains permafrost, a permanently frozen layer found at varying depths beneath the surface. The standard approach to pipeline construction at the time of TAPS creation was simple burial. That could only be applied to slightly more than one third of the Alaskan pipeline because heat transmitted from the relatively hot crude oil threatened to thaw and destabilize the permafrost layer. Protecting the permafrost became one of the major challenges to pipeline designers.

The innovative solution was to elevate long segments of the line on vertical support members (VSMs), insulating or refrigerating the segments needing permafrost burial. Sections above ground were built in a zig-zag configuration, to allow for pipe expansion or contraction under temperature changes, and to compensate for earthquake movement. Ground movement is constantly monitored by a sensor system throughout the route.

Just 320 of the pipe's 800 miles could be placed below ground. In some places it is buried conventionally, but in others, nature required concessions. In certain thaw-unstable areas, where the line had to be buried to avoid rockslides or pass beneath roads, the pipe was simply insulated, while in a few others, it was not only insulated but also buried in a special 'refrigeration ditch' designed to keep permafrost frosty by circulating chilled brine through the earth via six-inch tubes.

Buried alongside the pipe are metal ribbons of zinc or magnesium, as sacrificial anodes to inhibit corrosion. In this part of the world, the same power that creates the atmospheric effect known as the Northern Lights also exists within the earth, generating electrical currents in the ground surface. Known as telluric currents, they can be picked up by the pipeline and lead to structural damage. The anodes provide a ground to safely return these currents to earth, significantly reducing the risk to the pipeline.

Even the VSMs, ostensibly no more than an artful, beefy trestle, are high-tech systems. They protect the permafrost through an internal refrigeration system that uses anhydrous ammonia to chill the soil should its temperature rise above that of the air.

Hindsight arguments over the quarter-century of TAPS operation have maintained that the pipeline was "gold-plated," laden with redundant systems and new technologies that contributed to its record-breaking cost overruns. But time – and an extremely low incident rate – has proven that the heavily redundant systems approach was the right one.

PREVENTION AND RESPONSE IN PRINCE WILLIAM SOUND

The Ship Escort Response Vessels System (SERVS), established in 1989 shortly after the *Exxon Valdez* spill, is charged with preventing oil spills by assisting tankers through Prince William Sound. Since that time, every laden tanker transiting Prince William Sound is escorted by two vessels, one of which is a specially-equipped prevention/response vessel or tug. The SERVS is supported by more than 350 fishing vessels throughout Prince William Sound, on contract with Alyeska to provide oil spill response assistance.

SOME MILESTONES ON THE TAPS TIMELINE

(Most information courtesy the Alyeska website: alyeska-pipe.com)

1968
March 13: Atlantic Richfield Company (ARCO, now BP) and Humble Oil and Refining Company (now ExxonMobil) announce a discovery well at Prudhoe Bay. Well confirmed in June.

1969
February 7: Atlantic Pipe Line, Humble Pipe Line, and BP Oil Corporation elect to proceed with design and construction of their Trans-Alaska Pipeline System or TAPS. They will later be joined by Amerada Hess Corporation, Home Pipe Line Company, Mobil Pipe Line Company, Phillips Petroleum Company and Union Oil Company of California (Unocal).

1970
The Alyeska Pipeline Service Company is formed, named with an Aleut word meaning "mainland" or "the object towards which the action of the sea is directed," and charged with design, construction, operation and maintenance of the TAPS. Lawsuits to block pipeline construction begin a long project delay.

1973
The Trans Alaska Pipeline Authorization Act becomes law.

1974
Issuance of Federal right-of-way grants and state right-of-way leases. The Federal Grant contains a provision "...regarding recruitment, testing, training, placement, employment, and job counseling of Alaska Natives…" designed to secure full participation by Alaska Natives in the burgeoning oil and gas industry. The agreement helps dissolve opposition to pipeline routes across Native lands.

1975
Pipeline project 50 percent complete.

1977
May 31: Final pipeline weld near Pump Station 3.
June 20: First oil flows from Pump Station 1 at Prudhoe Bay.
July 28: First oil reaches Valdez Marine Terminal at 11:02 p.m.
August 1: *ARCO Juneau* departs Valdez with first cargo of North Slope oil.

1979
June 13: *ARCO Heritage*, 1,000th tanker to load.

1980
January 22: 1 billionth barrel arrives at Valdez.
December 29: *Thompson Pass*, 2,000th tanker to load.

1981
November 10: 2 billionth barrel arrives at Valdez.

1985
January 11: *Overseas Boston*, 5,000th tanker to load.
March 11: 4 billionth barrel arrives at Valdez.

1989
March 24: *Exxon Valdez* runs aground, spilling 260,000 bbl of oil in Prince William Sound.
June: Alyeska establishes the Ship Escort Response Vessel System (SERVS) for oil spill prevention and response in Prince William Sound. Today, the company spends over $60 million annually on prevention and response. 300 staff are dedicated to that effort. SERVS equipment is stationed throughout the Sound.

1988
January 14: Highest daily throughput - 2,145,297 bbl.
February 16: 6 billionth barrel arrives at Valdez.
May 2: *Chevron Mississippi*, 8,000th tanker to load.

1990
July 31: *Exxon New Orleans*, 10,000 tanker to load.

1994
March 5: 10 billionth barrel arrives at Valdez.
May 13: *ARCO Texas*, 13,000th tanker to load.

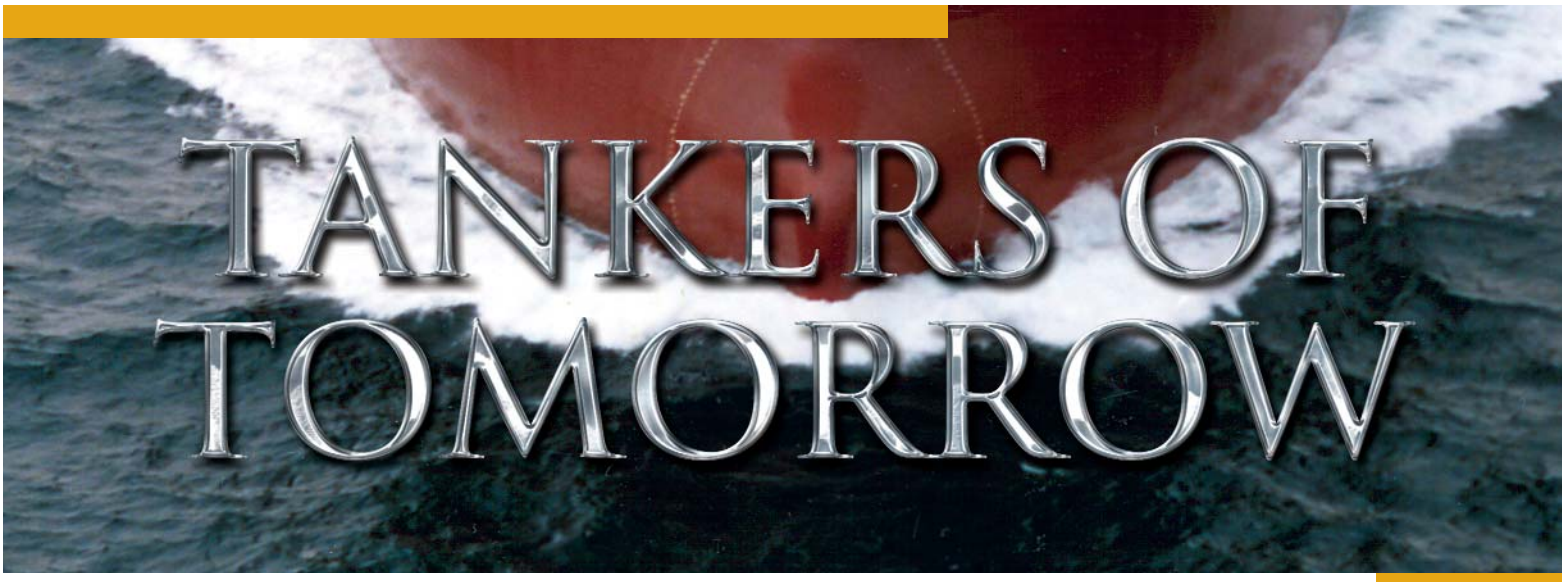
1999
June 26: *ARCO Spirit*, 16,000th tanker to load.
A man is arrested for plotting to blow up the pipeline.
A risk assessment conducted by oil shippers, Alyeska, RCAC and the Coast Guard finds that tanker safety has significantly improved since 1989.

1995
A new Alaska Native Utilization Agreement, renewed in 2001, stipulates scholarships, recruiting, job placement, mentoring, counseling and cross-cultural awareness training among remedies for Native under-employment on the TAPS.

2001
Alyeska contains spill and clamps gushing leak after the pipeline is punctured by bullets, and spews 285,600 gallons of oil about 75 miles north of Fairbanks.
In response to September 11 terrorist attacks, Alyeska heightens security.

The first of five new double-hulled Millennium Class tankers, the *Polar Endeavor*, sails into the Port of Valdez where she loads her first cargo of Alaska North Slope crude.

2000
April 27: 13 billionth barrel arrives at Valdez.



TANKERS OF TOMORROW

STENA'S GREEN DIVIDEND

Designed to depart from tradition, Stena's MAX family of tankers takes economy of scale in a new direction: sideways.

The *Stena Victory* defies conventional wisdom. The first Stena V-MAX tanker built is a 315,000-dwt crude carrier on three-year time charter to Sun Oil Company. It has the length of a VLCC (320m), but the breadth of a ULCC (70m) and the draft of a suezmax (19m scantling draft). It is part of a five-ship family designed on this 'wide body' concept of making breadth, not depth or length, the primary dimension for increasing cargo volume.

The MAX family features twin skegs with two propellers, a twin rudder, and vast breadth that nearly doubles the cargo volume per unit draft as compared to conventional vessels. It takes the concept of redundancy to new levels, doubling even the navigation system. Stena claims that the superior handling of its twin-skeg system, the shallow draft for the cargo volume, plus the environmental protection of redundant design, will make the V-MAX the tanker of the future.

Critics contend the MAX design is a curiosity suited only to very specific applications. Indeed, the first two MAX orders – a V-MAX oceangoing tanker calling at a terminal upriver in the United States, and two C-MAX product carriers intended for Caribbean trades – have been for routes combining some very special needs: high-volume carriage and environmental protection in critical shallow draft waters. But Stena claims its analyses show the design to be as competitive for traditional trading as for the draft-restricted routes that need higher volume movement. Ulf Ryder, President of Stena Bulk, further believes the concept could become the archetype of a new class of tanker.

"No oil company pays extra for environmental, safety or 'green' effects," he says. "They only care about the per-barrel transportation cost. So we looked for a way of reducing that. The wide body concept can add value to the customer's business by doubling cargo capacity as it relates to draft."

In terms of building cost increasing draft is the cheapest alternative and increasing length the most costly. But either choice is easier than dealing with the lines problems, like a reduced water stream to the propeller, brought on by increasing width.

The MAX concept brings a new dimension into the equations of ship economics by going twin-skeg. "We figured out a way to carry two million barrels in a one-million-barrel-draft tanker," says Ryder. "You get a VLCC cargo into the draft of a suezmax only by widening the ship. You can only widen a single-skeg ship so far. So we made it twin-skeg and twin-screw in order to get the proper water stream to the propellers. Since we were going for two propellers we made two engine rooms, and then two bunker tanks and separate navigation systems and so on. This full redundancy allows us to sail in areas of extreme environmental sensitivity."

ChevronTexaco obviously agreed with the idea. The first two C-MAX product carriers – smallest members of the MAX family – have been built in Gdynia, Poland on the back of a long-term time charter with the oil major's subsidiary, Barbados-based Texaco Eastern Caribbean Ltd. (TECL).

"We approached (what was then) Texaco by asking if economy of scale was a relevant concern for them," he continues. "When they said 'of course,' we answered by showing them how to make three ships into one. The 10,000-dwt C-MAX replaces two 6,500-dwt products carriers and one 3,500-dwt LPG vessel with a 6.1-m design draft on full cargo!"

The beamy C-MAX, 24 m wide on a length of 120 m features 17 fully segregated cargo tanks and two 640 m^3 LPG tanks on deck (the LPG carrier could be replaced because it was only being employed at about 40 percent capacity). The boxy stern, designed for maximum cargo space, features twin skegs with azimuth thrusters which, in conjunction with the bow thruster, give the ship unique handling characteristics for a cargo vessel.

"Caribbean routes can take you into rivers and quays twice a day, so maneuverability is very important," says Ryder. "You use tugs everywhere. But you won't with a C-MAX. By replacing just one vessel with our design Texaco should save some $3 million per year, and some $8 million per year overall. It all comes out of our philosophy of trying to add value through innovative solutions," he says.

In the end, says Ryder, the C-MAX cost about eight percent more to build than a conventional ship of similar size but will bring in 25 percent more revenue. The same is true of the V-MAX, he says. "The V-MAX goes straight up a river without lightering and can save 30-40 percent on freight rates. This will be a standard tanker design in five years," he predicts. "The concept would work for dry cargo, too."

Ryder stresses that the ships' environmental benefits are not 'luxury' add-ons, but the byproduct of a viable solution to the problem of raising a ship's economy of scale. "If we don't add value we have no reason to exist," he says. "So the ships do not demonstrate a 'green' effect, but a business effect. It's all economy of scale where, you could say, we got the redundancy and enhanced environmental protection for free. We are not here to save the world," he adds. "We are in business to do business. And it turns out that safety is very good business."

Ulaf Ryder,
President, Stena Bulk

THE GREENING OF ALASKA

In July 2001, the *Polar Endeavour* brought to Alaskan waters a new shade of green crude carrier, designed specifically to deal with the technical, environmental and social demands on tankers in service to the Trans-Alaska Pipeline System (TAPS).

Polar Endeavour was the groundbreaker of a five-ship series building for Polar Tankers, a wholly-owned subsidiary of ConocoPhillips Marine, at Northrop Grumman Ship Systems Avondale Operations, New Orleans. The first two ships in that series, *Polar Endeavour* and *Polar Resolution*, are now carrying North Slope oil from Valdez, Alaska to refineries along Puget Sound, Washington.

It is the start of a near-total renewal of the TAPS crude carrier fleet. As of January 2002, the 25 tankers participating in the TAPS trade had an average age of 21.5 years. Polar says new design has a life expectancy of 30 years in typical TAPS trade sea states – a strong statement, considering that the TAPS trade is, for three-quarters of the year, one of the world's most grueling regular commercial routes. Some of its worst conditions are in the Gulf of Alaska.

About 300 nautical miles across, the Gulf of Alaska stretches from 55 degrees to 60 degrees north."The Gulf of Alaska is an area into which major storms usually move before they die and in which rapidly intensifying storms occasionally develop," says David Goldstein, Warning Coordination Meteorologist at the Anchorage Forecast Office of the US National Weather Service. "Long fetches or areas of open sea can create rolling seas of over two meters that last for days," he says. "Strong frontal systems moving into the area from the southwest or south are occasionally preceded by hurricane force winds that produce fairly short-period, confused seas of nine meters or more.

"I have seen reports of 45-foot seas in the Gulf of Alaska, from National Weather Service buoys," adds Goldstein, "and I've personally heard about seas of over 50 feet."

Add subzero temperatures to that unrelenting battery and you have a recipe for damage. By the late 1980s, a number of TAPS tankers had accrued significant numbers of fatigue fractures, located largely amidships in the connections between longitudinal stiffeners, web frames and transverse bulkheads.

Working in this environment since the first days of the TAPS trade, Polar Tankers could apply a wealth of knowledge and experience to the Endeavour design project. Polar is the former marine subsidiary of the Atlantic Richfield Company (ARCO), a pioneer in the TAPS trade. In 2000, the ARCO Marine operations were sold to Phillips Petroleum as a condition for approval by the US Federal Trade Commission of the merger between ARCO and BP Amoco. With the 2002 merger of Phillips and Conoco, Polar became a subsidiary of ConocoPhillips.

By retaining most of the technical staff through these title changes, Polar kept its collective knowledge intact. Perhaps the greatest of its lessons learned was that fatigue life must be the main structural consideration in any new tanker design.

"Through the Tanker Structures Cooperative Forum, the United States Coast Guard's Critical Area Inspection Program, and our own internal structural analysis we were able to directly apply our experience to the structural design of the new ships," says Bob Levine, the Endeavour project manager. "We took care to identify those areas where problems could occur and to remedy the problems in the design stage. The structural details, particularly the brackets, reflect this effort to reduce the occurrence of stress risers."

"In developing the design for the Endeavour class vessels, we asked ourselves if we had done everything we could to build the safest tanker possible," Levine recalls. "And we realized something. We had spent years working on bridge team management and developing the skills of our seafarers. We had spent years developing our own knowledge of fatigue and ship's structures, so as to minimize structural cracking. But what we hadn't yet done was study redundancy."

Polar's technical staff researched international efforts in redundancy, visiting the shipowners and builders of the world's green tankers.

The company assembled a team of renowned consultants to realize these ideas. John J. McMullen Associates handled specifications, systems diagrams, midship sections, costing and contracting. SSPA Sweden worked on lines development, seakeeping, maneuvering, propeller design, cavitation testing, wind tunnel testing and disabled ship performance. Herbert Engineering worked on the specifications, intact stability, damage stability, cargo tank distribution and ballast tank arrangements. MCA Engineers performed finite element analysis, dynamic load analysis and structural fatigue analysis. Glosten Associates supported the model test program as a conduit between the hydrodynamicists and designers, to achieve practical design solutions.

"We worked hand-in-hand with the design teams, both as project managers and as naval architects and marine engineers. At each revolution of the design spiral, we were there to decide the next step. Though the ship was Polar's own design, the Endeavour-class vessels can really be called the result of a collaborative effort from a group of world-class designers."

The double hull puts a ten-foot space between sea and cargo. The ships contain 8,000 tons more steel than a comparably-sized tanker built for average international service. Overall steel content breaks down to about 80 percent mild and 20 percent high-tensile, the latter used primarily in high-stress areas of the upper deck. Internals are protected by advanced coatings, while the hull is sheathed in tin-free antifouling paint. The 140,000-dwt vessels are also rated at 125,000 dwt capacity, to comply with Federally mandated size limits on tankers navigating Puget Sound.

All this technical virtue comes at a price, however. Altogether, the five Endeavour-class ships cost about $200 million each – maybe three times what a similarly sophisticated suezmax could cost at current world prices. For an independent shipowner in the world market, such building costs would make for very difficult ship economics. However, in the controlled market of Alaskan oil, the shipping lines share a level playing field of strict oversight, tough regulation, and extremely high visibility. Pricing for Alaskan crude is figured on a net, back-to-the-wellhead basis, meaning transportation and pipeline costs are included. So TAPS tankers, though exceptionally expensive by world standards, are competitive within their unique market.

Prince William Sound has one of the safest transportation systems in the world, and we feel these ships compliment that program."

SURVEYING THE TANKERS OF TOMORROW

Recently, Surveyor caught up with ABS Senior Surveyor Paul Beattie and surveyors Dave Bergsland and Bill Voulgarakis attending construction of the double-hull TAPS tankers building for Polar Tankers at Northrup Grumman Ship Systems Avondale Operations. These photos show their examination of the final three vessels in the series: Polar Discovery, now at the outfitting pier; Polar Adventure, midway through hull construction; and Polar Enterprise, just now shaping up on the ways.

A wealth of experience resides in the ABS Avondale team. For example, Bill Voulgarakis took the traditional maritime route to the ABS survey staff, which he joined five years ago. He had been a chief engineer 15 years at sea, licensed, he proudly says, for both diesel and steam by US and Greek authorities. After that, he worked 22 years as a ship superintendent.

Beattie and Bergsland came to surveying from shoreside. Each is that unusual combination of skills, the working engineer turned surveyor.

The entrepreneurial Dave Bergsland had his own survey company for a while, putting in seven years as a non-exclusive surveyor before joining ABS in 2002. In a previous life, he had been senior mechanical engineer with a Great Lakes shipyard.

Bill Voulgarakis, Surveyor, ABS

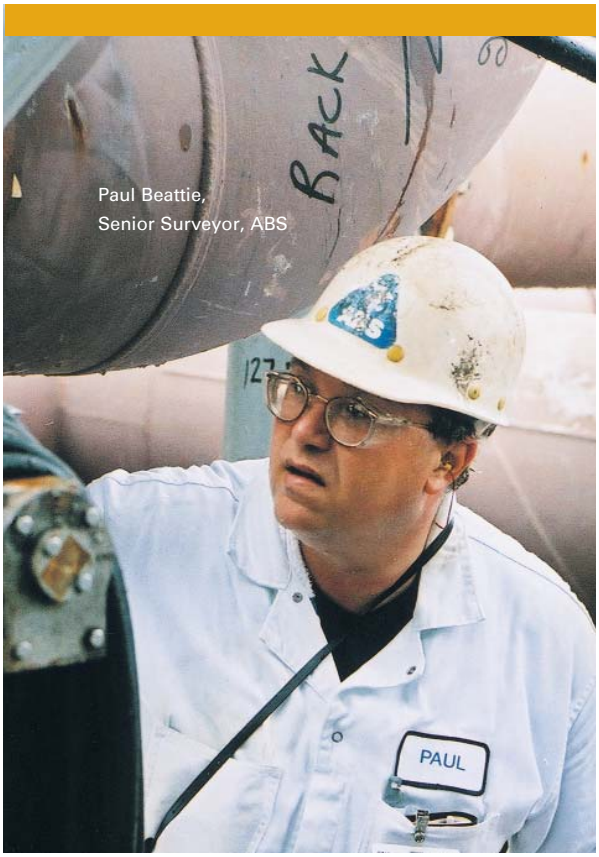
Beattie, who joined ABS as surveyor in 1990, began his career as a naval architect in the New York-based design firm CR Cushing, where he paid his dues alongside another rookie named Ken Richardson, now ABS Vice President, Engineering. A few assignments as owner's representative in Asian shipyards, however, brought Beattie a professional epiphany. "I discovered I like shipyards better than offices," he says.

Settling in as an ABS surveyor, he spent 1993 to 2001 in the shipyards of Korea and Japan, returning for a stint with ABS Cleveland before coming to New Orleans three months ago. "You name it, I'll go there," he says. Which brings him around to talking about the job's appeal. "The surveyor's job is different every day; there's always a new challenge or a practical problem to solve. You see a lot of new things, and there are always opportunities to learn something.

Dave Bergsland, Surveyor, ABS

"For example, there are a lot of interesting things about these Polar tankers," he continues. "One of the most interesting is that you can disconnect the main engines from the clutch coupling and run them as the power supply for the electric cargo pumps. First time I've seen that setup," he adds.

"The biggest step in becoming a surveyor is realizing that you aren't supposed to know everything," he says, adding that the quality most surveyors display is willingness to learn – in general, a key to professional growth. "If you admit you don't know something, you can learn it," he says. "Maybe you see a welder performing a procedure you're not familiar with, or a ship fitter doing something different than normal. Rather than attack him for it, you should start out curious. Ask what he's doing, listen when he answers, consider what he says against your experience and education, and then make your conclusion. You may indeed find that the job has to be redone. But you may learn something new."

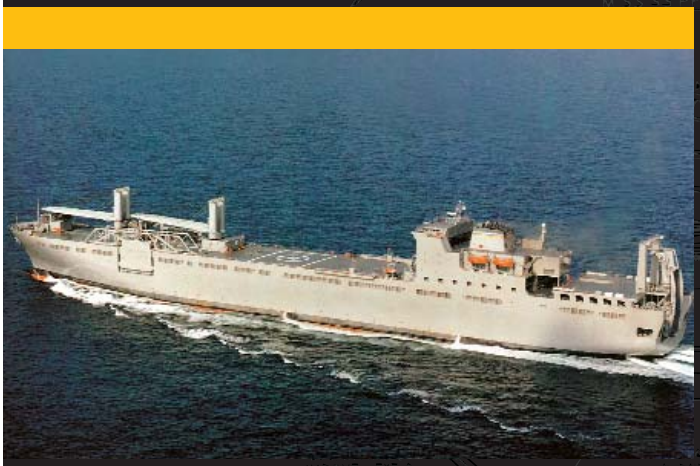


Paul Beattie, Senior Surveyor, ABS

From Barges to Battleships

Avondale Marine Ways opened shop in 1938 as a local New Orleans barge builder with an initial capitalization of $15,000. Today, bearing the military-sounding name Northrup Grumman Ship Systems Avondale Operations, it is part of the global Northrop Grumman Corporation, an aerospace and defense contractor valued at about $15 billion. Over those 64 years of operation and evolution the yard has amassed a building resume that runs from the simplest floating constructions to the most sophisticated Naval combatants.

Avondale's main shipyard fronts the Mississippi River about 12 miles upriver from New Orleans. It was founded on that spot by three New Orleans businessmen who looked at an abandoned railroad car ferry landing and saw a ready-made slipway around which they could build a boatyard. The Southern Pacific Railroad had used the landing for its car floats until 1935, when its trains began using a nearby bridge.



One of the original workshops still stands, but it is easily missed in the shadow of its massive descendants. An odd-shaped, whitewashed shed squatting amid a clutch of cottonwood trees near the old rail line, the sturdy veteran silently testifies to the power of dreams accompanied by hard work and vision.

The Avondale of today grew from a group of such sheds to three large facilities: the original main yard; a smaller yard in Tallulah, Louisiana; and a fabrication yard at Gulfport, Mississippi, specializing in the production of marine structures from advanced composite materials. In the past, Gulfport produced a series of composite minehunters for the US Navy. Today it is producing innovative radar masts and extensive composite superstructure units for the Navy's futuristic LPD-17 amphibious assault ships now underway at Avondale's main yard.

Avondale's relationship with the US military dates back to its third year in business, when it received an order from the US Army for eight oceangoing tugboats – its first major order of any kind. The World War II building boom brought contracts for Coast Guard cutters, Navy coasters, Army barges, and more tugboats, opening customer relationships that continue to this day. In the postwar decade the yard built its first large commercial ships, cargo vessels for the US Maritime Commission.

In 1959, Avondale was brought under the umbrella of the Ogden Corporation, a multinational holding company. That year it built four destroyer escorts, the first Navy combat ships. Over the next 20 years the yard delivered a wide variety of naval and commercial ships including guided missile destroyers, Coast Guard cutters, and LASH vessels. In 1985, the yard changed hands again, in an employee buyout that renamed the company Avondale Industries.

Projects during the 1980s and 1990s were, for the most part, military ships, including Naval landing craft and a polar icebreaker/research vessel for the Coast Guard. Two commercial projects during those years enlisted the yard's skills to answer very different municipal needs: a massive 192-MW floating power plant for the town of Vidalia, Louisiana, and a floating jail for New York City.

In 1999 Avondale was purchased by Litton Industries, owners since 1961 of the Ingalls Shipyard at Pascagoula, Mississippi. In 2001 Litton was bought by Northrup Grumman and the former competitors were united under one umbrella.

Of Northrup Grumman's 100,000 worldwide employees, about 34,000 are building ships in the US. The Ship Systems division, composed of the former Avondale and Ingalls shipbuild-

ing groups, employs some 17,000 individuals. Northrup Grumman's other shipyard, Newport News, remains an independent subsidiary employing the remaining 17,000. The Avondale Operation, with about 6,000 staff, is Louisiana's largest manufacturing employer.

The mix of building projects currently sharing the attention of Avondale's talented shipbuilders and designers reflect the yard's history of military and commercial shipbuilding. Nearing completion is the *Benevidez*, last of the Bob Hope class of sophisticated ro-ro vessels for the Military Sealift Command's prepositioned fleet. Getting underway is the LPD-17 series, the Navy's latest amphibious assault ships. Midway through completion is the five-ship series of double-hull crude carriers being built for Polar Tankers' Jones Act fleet. Future projects include building block subassemblies for the futuristic new cutters in the Coast Guard's Deepwater fleet renewal project.

While it builds these future fleets the yard is also building itself, with a major capital improvement program touching all corners of the 265-acre shipyard. Recent improvements include a 388,000 sq ft covered steel fabrication facility and the paving of a large area for expansion of assembly operations.

Besides future facilities, Avondale is also building future personnel. In the on-site training facility, literally hundreds of "homegrown" welders, shipfitters, and pipefitters are educated, trained and qualified in skills ranging from basic practice to the advanced art of welding titanium pipe.

Part of its operational improvement initiative involves tapping staff creativity through an innovative incentive program in which workers who contribute time or labor-saving ideas receive a cash award, with the year's top five suggestions each earning $5,000.

But the yard's investment in the future is not confined to the shop floor. In partnership with the State of Louisiana and the University of New Orleans, Avondale organized the Maritime Technology Center of Excellence (MTCE), a high-tech research and design facility. The Center is housed in a four-story, $40-million building on the main shipyard grounds. It is homeport for the engineers and designers of LPD 17, the Coast Guard's Deepwater project and the yard's Product Development and Engineering Department.

The first floor of the building provides offices and laboratories for faculty and students from the University of New Orleans School of Naval Architecture and Marine Engineering. They are engaged in joint research projects with the shipyard. One project currently underway with these shipbuilders of the future is development of customized control software for the yard's welding and cutting robots.

Developing new software to bring enhanced operation to its robotic workforce is one step in Avondale's search for improved productivity. Future plans include acquisition of a 600-ton capacity crane, to speed production by allowing construction of large block ship subassemblies.

Viewpoint: Raising the Standards for Standard Ship Designs

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We need better standard ship designs. As an independent designer, I believe ships should be designed with the owner's requirements as first priority. If I were working for a shipyard, I would have to take a different approach. I would be charged with thinking first about what the shipyard needs – which means lowest building cost. This is a basic conflict in the modern maritime industry.

Perhaps the starting point of this conflict is the one-year guarantee period. Today, shipyards build them and forget them. If the guarantee period were extended to three or five years, the higher liability would have them thinking differently. Their incentive would still be to build as cheaply as possible, but they would be starting from a higher point. The liabilities in longer guarantee periods would separate higher- from lower-quality shipyards, and benefit the entire marine industry.

We saw what happened in the 1980s and 1990s, when business was very bad and certain shipyards tried to cut costs by reducing ship scantlings. They found class societies, including some very big ones, to go along with this. It got so far that the standard vessels they developed, although satisfying what became the minimum class requirements – which were exclusively based on static calculations – were in some cases inadequate for the long-term operating needs of the owners.

Owners know from experience where their ships need to be stronger. But if the designer tries to incorporate features the owner wants, but the standard ship does not have, the result is an expensive "extra" modification. Designing owner requirements into the ships from the concept stage, may make it slightly more expensive, but possibly within acceptable limits.

But to modify a standard design interferes with yard flow and planned efficiency, which is based on producing their standard ships in series, and brings a premium on top of the price. This discourages owners from unilaterally raising the standards of the standard ship.

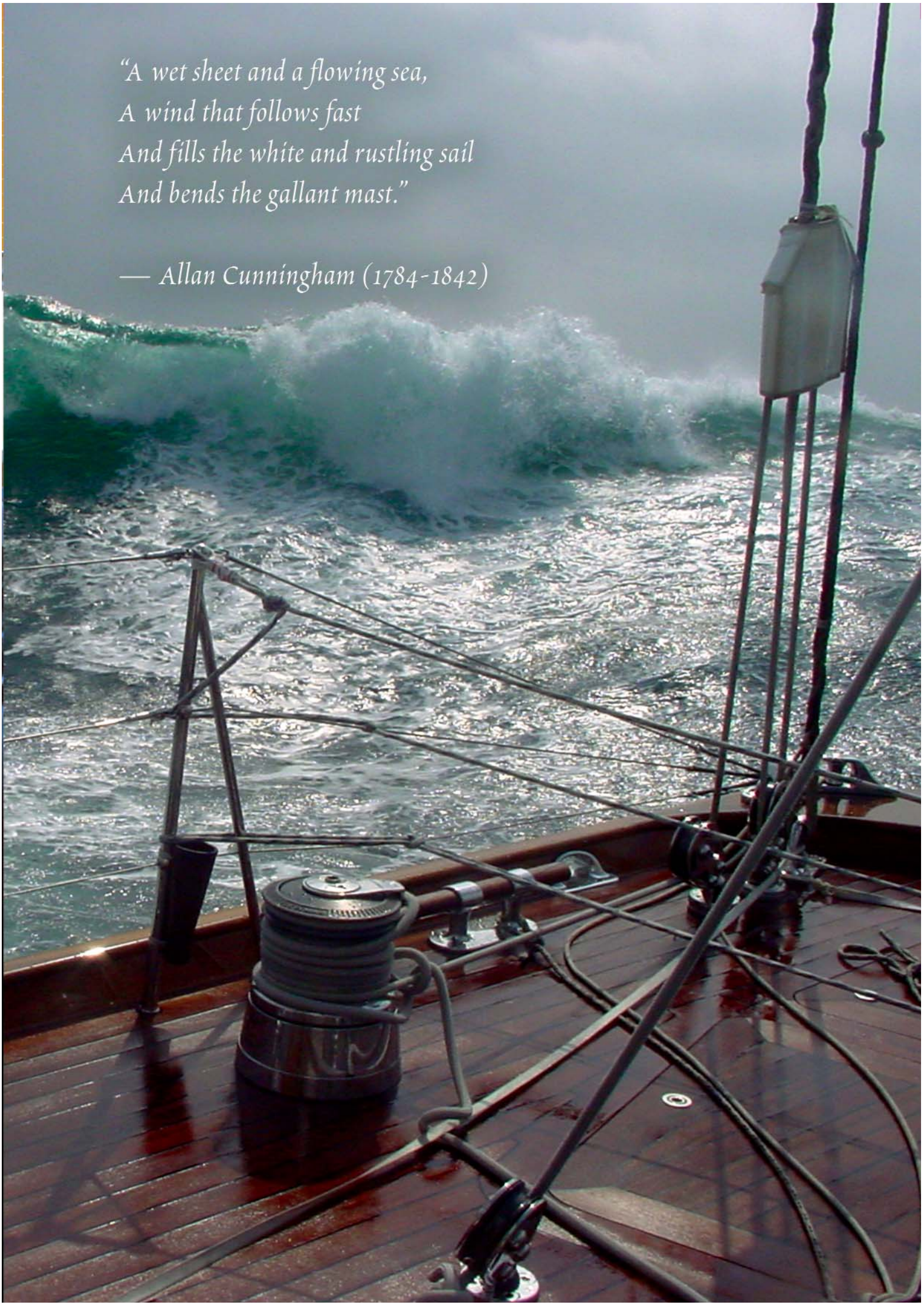
When the ABS SafeHull System came along, it was seen as adding extras to what were then standard designs, because it is based on dynamic analysis and finite element methods. Today, SafeHull has been accepted as standard. It has made an extremely positive difference to ship quality and safety.

That put the industry on the right track. We need more cooperation between owner and class to have better standard ship designs. Without the cooperation of class, it is difficult and expensive for the conscientious shipowner to build the ship he needs, when it is outside the standard shipyard offer.

We are the designer for the first environmentally-friendly, 175,000-dwt *Green Cape* bulk carrier, now building in China to ABS classification, which applies the "fit for purpose" principle by incorporating many owner's requirements as standard.

At the moment, there is movement towards mandating double hulls for bulk carriers. My opinion is that such would be a wrong move. Double hulls are not necessary for all size bulk carriers. They are an operating convenience and a structural improvement for the bigger ships, but not the smaller, which typically carry cargoes other than iron ore and coal.

If class societies can unite to set higher general minimum standards, the yards will have to respond, and we can have better standard ship designs. That said, we must be very careful about making universal requirements for bulk carriers, distinguishing what is absolutely needed from what is not. It is important that industry, not regulators, take this initiative. Otherwise, we could end up with requirements for ships that last 100 years, at costs no one can afford.


"A wet sheet and a flowing sea,
A wind that follows fast
And fills the white and rustling sail
And bends the gallant mast."
— Allan Cunningham (1784-1842)

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