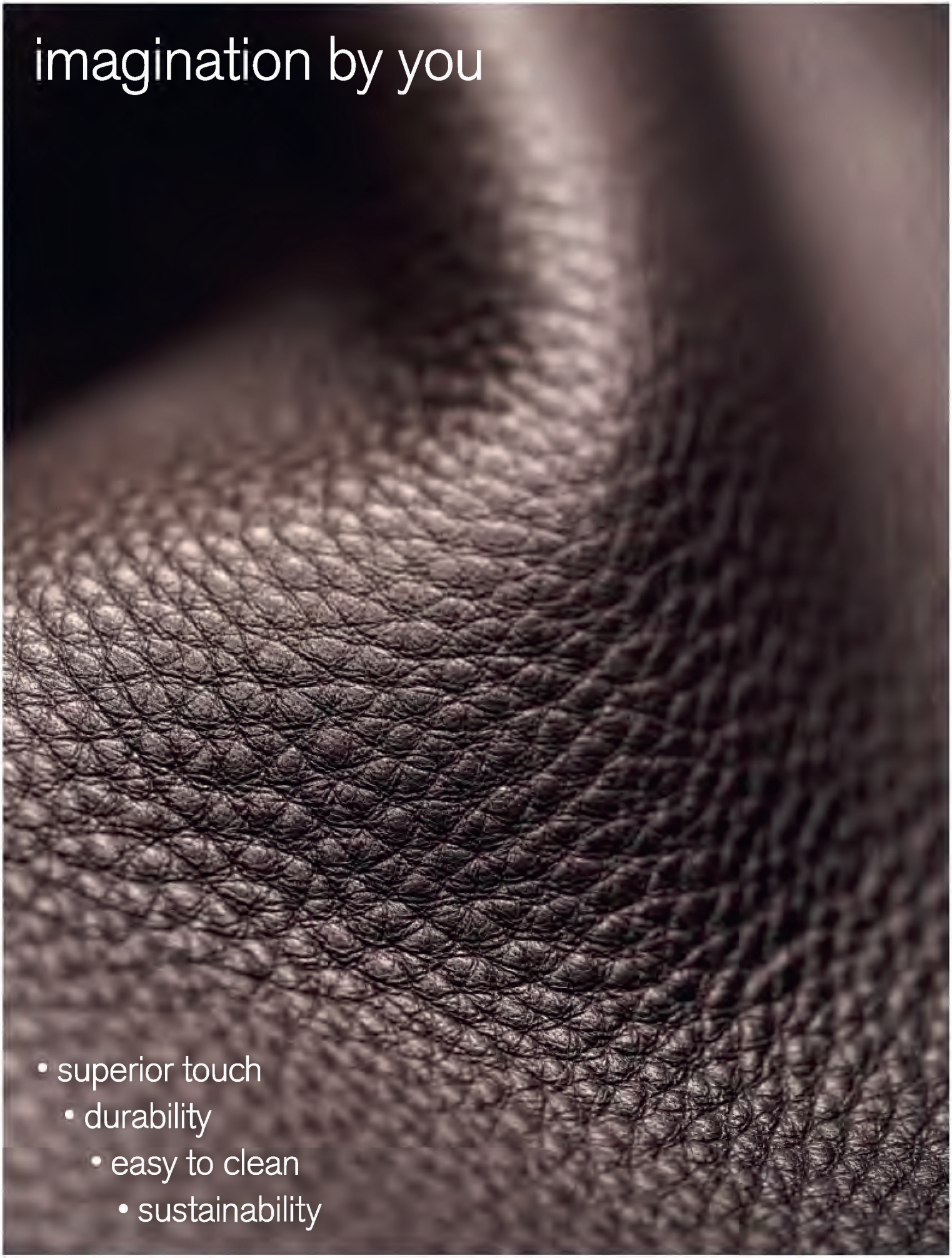
WORLD'S LARGEST PLUG-IN COLOR HYBRID FERRY

SHIPPAXINFO



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SHIPPAXINFO

A FERRY EMBODYING NORWEGIAN MARITIME INNOVATIVE SPIRIT

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The brand-new COLOR HYBRID is the latest example of Norway's steadfast drive towards a low-to-zero-emission transportation system of the future. For years, the Norwegians have been at the forefront of making ferry shipping sustainable. Back in 2000, they pioneered the use of LNG as an alternative fuel for fjord ferries. But since LNG is a fossil fuel, it can only be a transitional solution. In their continuing push towards sustainability, the country was also the first to introduce full-electric ferries, using greener hydroelectric current to charge the batteries that power the ships. In addition, the Norwegians are also contemplating using non-fossil fuels like biodiesel, biogas, and hydrogen to propel the next-generation of ferries.

Gradually, full-electric ferries are being introduced to all short-distance domestic services. On longer routes, a hybrid solution is implemented, as in the case of COLOR HYBRID that serves the 37-nautical-mile Sandefjord-Strömstad route, which is still too long a distance for full-electric operations.

In 2011, Color Line embarked on an LNG-powered newbuilding project for this route, because LNG was still deemed as one of the most environmentally friendly solutions. The project was put on hold and when restarted in 2016, battery technology had developed to such an advanced stage that, to future-proof this project, Color Line changed course, walked down the zero-emission path (at least for part of the crossing), and decided to build the world's largest plug-in hybrid ferry.

Prior to this project, none of Color Line's ships was built in Norway. COLOR HYBRID is the result of close cooperation of the Norwegian maritime cluster, where about 70% of the suppliers for this project originated – from naval architects all the way to navigation equipment suppliers.

As Norway is not a member of the EU, ferries operating on the Sandefjord-Strömstad crossing can sell duty-free merchandise on board. Not surprisingly, the duty-free shops on this route are the main sources of revenue for their operators, effectively subsidizing the ticket sales incomes.

Although the shopping element is important and prevails on its lowermost passenger deck, COLOR HYBRID is not just a floating supermarket. Taking into account what the passengers really want and expect, Color Line and Cecilia Kinnison, the ship's interior architect, have wonderfully succeeded in creating a well-thought-out general arrangement for the passenger decks. This includes plenty of outside deck space and excellent views of the Oslofjord over the ship's bow from the tranquil reclining lounge.

COLOR HYBRID is a new benchmark for reducing the environmental footprint. The ship merits an in-depth appraisal in this special supplement.

Philippe Holthof

We congratulate Color Line with the **winner of the Ship of the Year award 2019**

Color Hybrid

In 2016, Sandefjord Municipality carried out a process for the allocation of sailing times.
The evaluation criteria were mainly related to emissions. Color Line took the challenge and Sandefjord Municipality can now congratulate the shipping company with Color Hybrid that will sail with 0 in emission as soon as the ship approaches densely populated area

SANDEFJORD KOMMUNE

COLOR HYBRID - BEGIN OF A NEW EPOCH

In August 2019, Color Line's new shuttle ferry COLOR HYBRID entered service between Sandefjord and Strömstad, incorporating for the first time in a large ro-pax battery electric and diesel hybrid technology. The innovative ship is yet another triumph for the advanced Norwegian maritime cluster and sets a new standard for short-sea ferries in the Nordic region and beyond.

TEXT: **BRUCE PETER** · PHOTOS: **GEORGE GIANNAKIS**

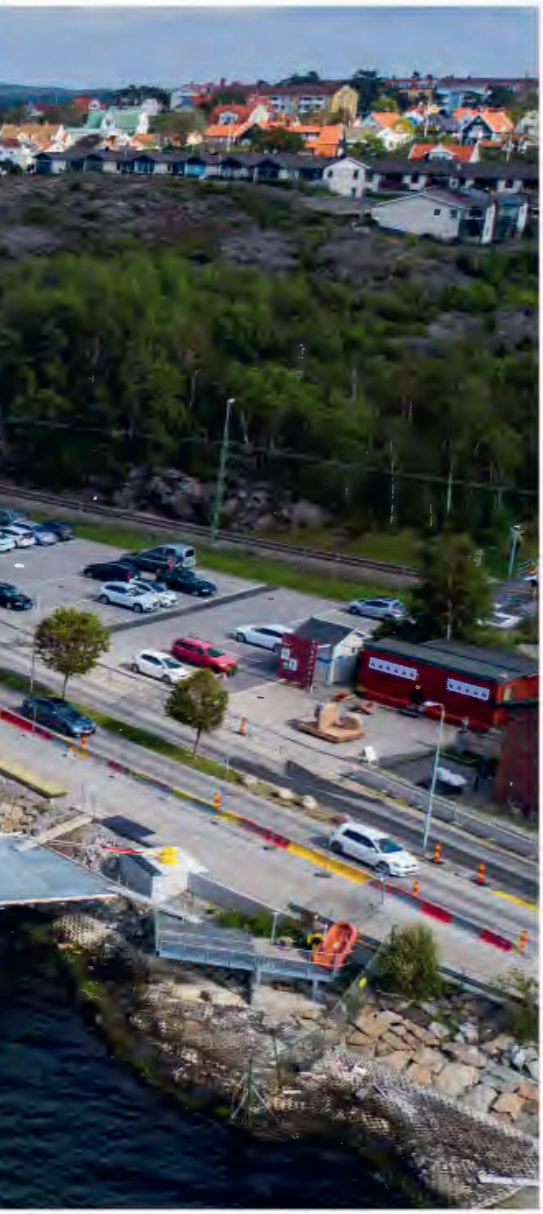
COLOR HYBRID at the terminal in Sandefjord.

COLOR HYBRID at the berth in Strömstad.

The COLOR HYBRID is the world's largest plug-in hybrid ferry and may justifiably be considered as epoch-defining in terms of its combination of a very large capacity a an exceptionally low environmental impact. The 27,164gt, 160m long vessel accommodates 2,000 passengers and 500 cars and features the first large-scale installation of a novel hybrid propulsion concept. This uses a combination of diesel-mechanical, diesel-electric and purely electric systems and, due to the reduced energy wastage of the mechanical element, is more economical than a conventional diesel-electric solution. It combines higher efficiency and better performance at high loads and excellent fuel consumption at low loads. Recharged by plugging in to a shore-based power supply at Sandefjord, or by the ship's own generators, the system promises to minimize the emission of harmful greenhouse gases and nitrogen and sulphur compounds into the atmosphere. The use of a high-voltage shore connection with the battery hybrid system will enable the ferry to produce zero-emissions when sailing in and out of Sandefjord and while berthed there and in Strömstad.

Color Line first began to plan the eventual COLOR HYBRID in 2011 but as the economic conditions were unpropitious, they put the project to one side and only returned to it in 2016 by which time battery technology had advanced considerably. Initially, Fosen Yard in Rissa proposed a design and halfway through the bidding process joined forces with Ulstein Verft in Ulsteinvik which bid successfully for the build contract, beating eight other shipyards to win it. Ulstein then outsourced the design work to Fosen.

The structural, hydrodynamic and technical design of the COLOR HYBRID was carried out entirely by Fosen Yard with the detailed construction drawings and arrangements of systems produced by Ulstein Design and Engineering. Subsequently, the two shipyards' design departments were merged to become FUDE (Fosen Ulstein Design & Engineering) and it was thereafter employed by Fosen Yard to carry out further work as necessary. The lead naval architect was Per Edvin Tande, who has over thirty years of experience in ferry design at Fosen while, at Ulstein, the project manager



was Roar Riise and Color Line's project director was Robin Tomren. A memorandum of agreement to build the vessel was signed in January 2017, with the order confirmed the following month. The hull structure was built by the CRIST shipyard in Gdynia, Poland and outfitted by Ulstein Verft of Ulsteinvik. Construction began that summer and the steelwork was completed in October of the following year at which point the vessel was towed to Ulsteinvik for outfitting.

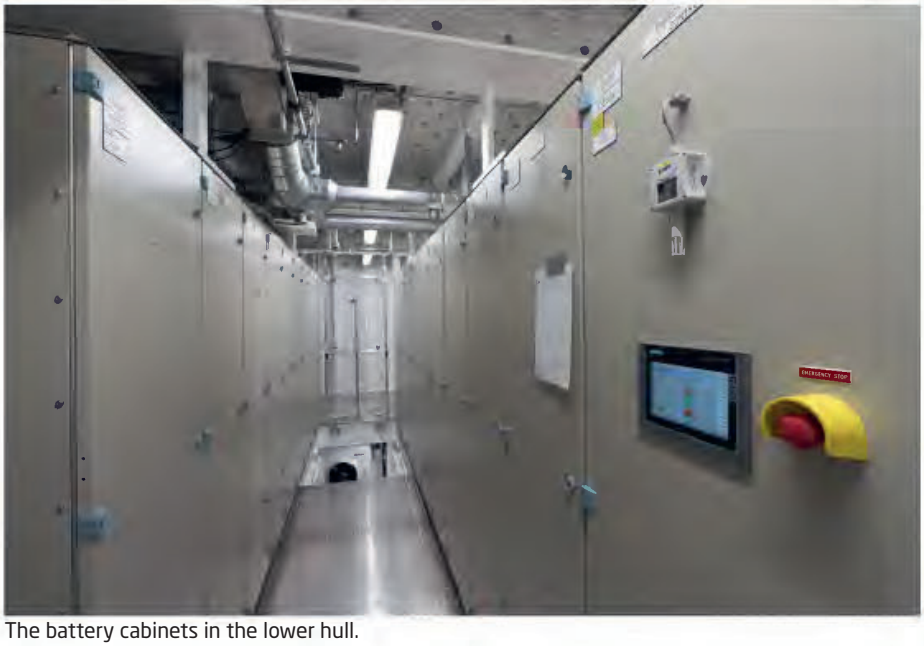
The COLOR HYBRID's Siemens batteries were made by Siemens in a new factory in Trondheim which was opened in January 2019 by the Norwegian Prime Minister Erna Solberg, who is also the COLOR HYBRID's godmother. The project was among the factory's first customers and, indeed, Siemens has now clustered all of its marine-related activities in Norway, having other plants and design offices in Oslo and Bergen. The vessel's battery package provides approximately 5MW per hour, and can operate between charges for up to one hour at speeds of up to 12 knots. Siemens also supplied all automation and manoeuvring control systems, making their contribution very substantial indeed.

The engine plant consists of two 6-cylinder plus two 8-cylinder Rolls-Royce Bergen B33:45L in-line diesels, which generate 600kW per cylinder and offer reduced fuel consumption and emissions. With a 330mm bore and a 450mm stroke, the speed levels range between 500rpm and 750rpm for propulsion and to charge the batteries. A DC grid enables the utilisation of a broader spectrum for electrical generation. The power plant also features a waste-heat-recovery system, which collects up to 5MW per hour – an amount similar to the battery capacity. Stabilisers, gears, propellers, Van der Velden rudders and three tunnel thrusters were supplied by Brunvoll of Molde and Volda – meaning that a great deal of the vessel's 'high value' technical content was made by specialist firms on the Norwegian West Coast. Indeed, for the Norwegian maritime cluster, advanced ships such as the COLOR HYBRID are superb advertisements for their technology and know-how.

New old technology

Although state-of-the-art in terms of the sophistication of the installed systems and representing a world first on a large ro-pax short-sea ferry, the combined use of conventional marine engines and batteries in ships is far from new. Indeed, battery-powered submarines were first built in the 1880s with the first hybrid steam-electric example being completed in 1900 and diesel and electric ones becoming standard from around the time of the First World War, the reason being to avoid the engine's beat producing sonar signals and giving away the location to the enemy.

It is only in much more recent time that battery power has come to be applied on short-sea merchant ships as engineers and naval architects have grappled with the problem of reducing the amount of pollution such vessels emit, especially when navigating through coastal waters. Since the millennium, Norway has been at the vanguard of new developments. In 2012, the Norwegian Ministry of Transport launched a competition for a new generation of 'green' ferry, the prototype of which would be used on the Sognefjord; the resultant battery-powered AMPERE, built by Fjellstrand, entered service in 2015 – but on a crossing of only six kilometres in length and taking just 20 minutes to complete. Another more recent highly innovative Norwegian fjord vessel, Fjord1's carbon fibre-built, battery-powered sightseeing catamaran, the FUTURE OF THE FJORDS entered service last year on the Gudvangen-Flåm route. (Mention must also be made of the recent – and much publicised – Hurtigruten expedition cruise ship ROALD AMUNDSEN which can operate under battery power when ▶



The battery cabinets in the lower hull.

The view ahead from the projecting wings of the Utsikten bar and lounge.

> *The Norwegian ferry innovation story is a paradigmatic example of widespread cooperation between the various actors in a small nation to produce outstanding yet eminently practical results.*

cruising through ecologically sensitive regions.)

By comparison, the route between Sandefjord and Strömstad is an international ferry crossing with a duration of two-and-a-half hours and is therefore more obviously comparable with routes such as Gothenburg to Frederikshavn, Grisslehamn to Eckerö and Kapellskär to Mariehamn where similar hybrid technology might in future prove efficacious. No doubt, Fosen and Ulstein are hoping that having produced their prototype in the COLOR HYBRID, other operators will wish to purchase similar vessels for their own services.

The wider story of Norway's world-leading status in the development of innovative, greener ferries clearly demonstrates the requirement for intelligent and constructive legislation and funding to support technological developments and financial support to mitigate commercial risk. Indeed, the Norwegian ferry innovation story is a paradigmatic example of widespread cooperation between the various actors in a small nation to produce outstanding yet eminently practical results .

Sandefjord-Strömstad: from the margins to the mainstream

The Norwegian international ferry market has changed considerably in the past quarter century. Back in the mid-1990s, few would have predicted that the Sandefjord-Strömstad route would today be hosting the world's most advanced short-sea ferry – let alone a newbuilding of any kind. In those days, it was the routes from Norway to Denmark and the UK which dominated but while the latter have vanished altogether as a result of competition from budget airlines, the Norway-Sweden link has gone from strength to strength. This situation is particularly remarkable when one considers that for many years, it was at best marginal as a business proposition. First begun in 1964 with the little Norwegian-owned SPERVIK I, it was closed after just four years when new customs regulations were introduced, deterring motorists. It was not until 1984 that a new and even briefer attempt was made to link Strömstad and Langesund, this time by a Swedish entrepreneur using the SVENO MARINA (formerly Brittany Ferries' PENN AR BED) but this lasted less than a year. Shortly after, however, the advent of Scandi Line in 1986 was a key moment. It began by using the BOHUS

The sun deck, aft of the Color Shop at the stern.

(ex-EMSLAND) but within two years this was replaced by the ro-pax BOHUS II (originally the East German freight ferry STUBBENKAMMER). In 1990, Scandi Line was acquired by the Norwegian conglomerate, Vard A/S, which also was the owner of the Larvik Line ferry service linking Larvik with Frederikshavn in Denmark. Backed by sufficient capital and with an effective business plan, it aimed to attract leisure travellers for shopping and relaxation, exploiting the high cost of alcoholic drinks ashore in both Norway and Sweden at that time, as well as motorists and hauliers wishing to avoid having to drive further north to cross the Oslofjord between Moss and Horten. In 1992, the charming SANDEFJORD (ex-VIKING III) was acquired and this attractive little ferry soon became a favourite with Norwegian and Swedish day-trippers alike. Such was the rate of growth that already in 1994 a bigger ferry, the BOHUS (III) (ex-PRINSESSAN DESIREE), entered service and, 24 years later, it is this remarkably successful ferry that the COLOR HYBRID is replacing – a hard act to follow indeed. That same year, both Scandi Line and Larvik Line were sold by Vard to the Norwegian businessman Olav Nils Sunde, who in 1998 merged both with another Norwegian ferry company, Color Line, which he by then also controlled. Under his ownership, Color Line has enjoyed substantial investments in fleet renewal, giving its main Norway to Denmark and Germany routes some of the most up-to-date ferry tonnage in northern Europe. By comparison, the Sandefjord to Strömstad line remained much more traditional even with the old BOHUS being supplemented in 2000 by a much larger second-hand ferry, the COLOR VIKING (ex-PEDER PAARS). From being a 'backwater' in the Nordic ferry sector, the route was rapidly becoming one of Color Line's most lucrative operations.

A night view of the funnel and 'play whale' for children on the deck.

Exterior

First impressions of the COLOR HYBRID's exterior are promising; its superstructure is sleek and curvaceous, albeit without the distinctive 'drooping' silhouette of the earlier Color Superspeeds (connecting Hirtshals with Kristiansand and Larvik, respectively), though with the same funnel shape, which has become a Color Line 'trademark' feature. There is a lot of tinted glazing and, in particular, the vessel's starboard side looks especially fine due to there being a long row of big porthole windows illuminating an arcade along the side of the lowest of the four passenger decks (whereas to port, there is the blank side of the tax-free supermarket). Fortunately, the judicious application of bands of dark grey paint conceal the lack of fenestration in the galley on the deck above.

Hull form

The hull topsides are tall relative to the other dimensions and the hull is highly optimised with fine lines at the waterline, a fairly straight stem and relatively little flare. The hull form represents a further finetuning of existing faster ro-pax designs in Fosen's own portfolio and has a block coefficient of 0.52 (LwL) and Froude number of 0.22 (at 17 knots). Both of these figures strike as being somewhat lower than are typical of other comparable ro-pax vessels, however. The aft-body has a shape resembling that of a small flat-bottomed rowing boat with a moderate wedge. The form incorporates low wash properties to prevent disturbance when passing through the Sandefjord where there are many homes and gardens down by the shoreline. All tank testing of the hull and propulsion testing was carried out at Sintef Ocean (the former Marintek) in Trondheim. On my crossings, the form proved highly efficacious as the weather was unseasonably stormy with wave heights of five metres and more – but the vessel sliced through very smoothly with little pitching motion and no rolling whatsoever.

As part of an all-encompassing strategy to spare as much weight as possible, lightweight, high-performance materials have been used throughout the hull and superstructure – for example, the insulation – of which there is a lot on a ▶

Discharging vehicles via the bow door and ramp at Sandefjord.

passenger ferry – is of a thin, high-performance type supplied in rolls by Glava of Askim, a member of the Saint-Gobain group, other subsidiaries of which also provided materials for the vessel's outfitting.

Vehicle decks and access

COLOR HYBRID has a full-height main vehicle deck with a hoistable platform deck, above which is a separate single-deck-high car deck. As the port infrastructure at both Sandefjord and Strömstad is all on one level, the upper car deck is accessed by means of fixed internal ramps on the starboard side directly linking decks 3 and 5. The vessel is, however, adaptable to two-level loading in the future. Altogether, there is space for up to 500 cars when using all three levels or 700 lanemetres for freight on the lower level. Despite the extended time needed to unload the upper levels via the main deck, port turnarounds are just one hour. Although simulations showed that 47-minute turnarounds should be possible, bottlenecks are caused by shore traffic congestion for departing cars in both Sandefjord and in Strömstad. Vehicle access equipment is of MacGregor's design and consists of a single wide stern ramp/door, located slightly off-centre to port in order to fit the linkspan at Strömstad, where the vessel berths stern-in and bow access with side-opening doors, a folding ramp and hinged watertight inner door.

Passenger accommodation

Given the Sandefjord-Strömstad route's characteristics, it will be appreciated that passenger accommodation requires to combine the capacity of a shuttle with some of the facilities and atmosphere of a cruise ferry. Thus, with regard to design and layout, appropriate comparators would be recent vessels on the Helsinki-Tallinn route, such as the VIKING XPRS, STAR and MEGASTAR. Of course, Color Line's own SUPERSPEED 1 and SUPERSPEED 2 are also worth considering even if, when first built, their layouts proved to be much too constricted with insufficient free seating, particularly on busy crossings. These were designed internally by the Norwegian Finn Falkum-Hansen but when he subsequently was hired by a rival ferry operator, Color Line decided to select a different designer for its subsequent projects. Its choice ever since has been the Swedish Cecilia Kinnison of Kinnison Design, based in Svalöv in Skåne. Kinnison had first worked for Color Line as an employee of Tillberg Design, including as project manager for the interiors of its Oslo-Kiel cruise ferries COLOR FANTASY and COLOR MAGIC. The entire interior outfitting was carried out by the German international turnkey marine outfitters Rheinhold & Mahla, which has a Norwegian subsidiary in Molde.

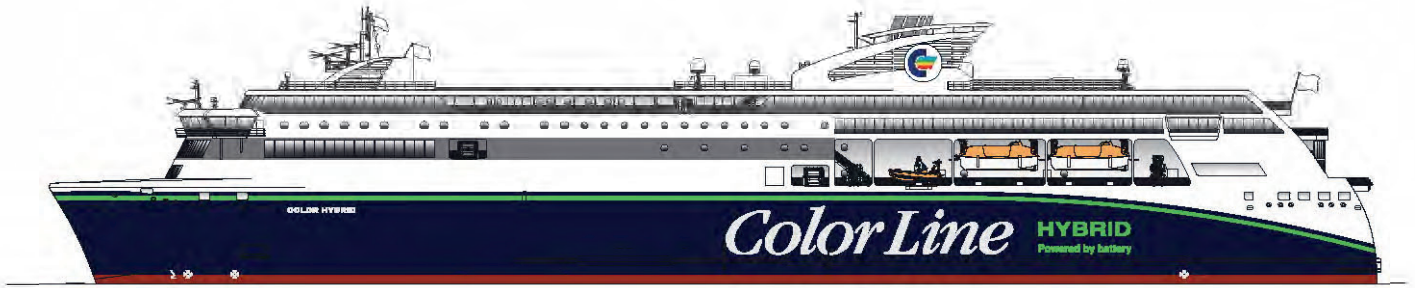
Traditionally, the market for ferries from provincial Norwegian and Swedish towns has been mainly working people from the countryside travelling for shopping and leisure purposes. The atmosphere on board these vessels was often somewhat 'folksy' – cosy and quite informal but without much attention paid to 'designerly' sophistication, as anyone remembering, for example, the PETER WESSEL and CHRISTIAN IV will attest. In line with changing social trends and growing consumer expectations, all of the ferry companies engaged in these trades have in recent time needed to enhance the style and quality of their offers to attract in addition a younger and more style-conscious clientele. The SUPERSPEED 1 and 2 represented Color Line's first major moves in a new direction for the routes from Kristiansand and Larvik – and now COLOR HYBRID brings an even greater style transformation to the Sandefjord-Strömstad line.

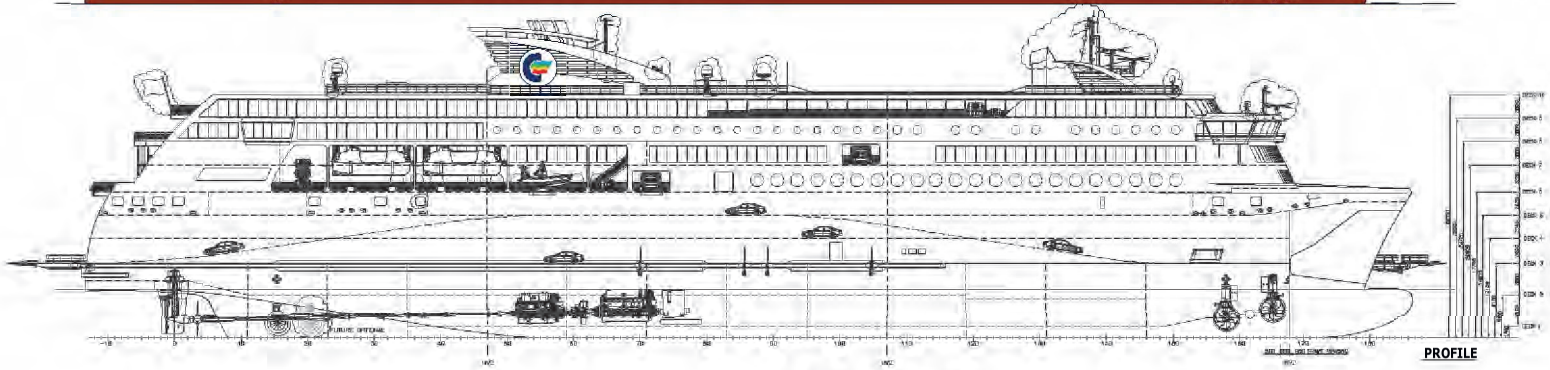
Inboard, COLOR HYBRID is undoubtedly among the finest short-sea ferries of its generation and it is evident that Color Line's technical staff, Fosen's naval architects and Kinnison have all given a great deal of careful thought to all aspects of the design and of the passenger experience. Upon embarkation, passengers arrive into a spacious and attractive reception area on Deck 6 with plenty of informal seating and a giant screen upon which information about the ship and its services are displayed. Almost the entirety of this deck is given over to retail space, the forward half containing an enormous supermarket selling mostly drinks, sweets and perfumes, adjacent to which is a smaller food and delicatessen shop with another huge shop selling clothing and toys towards the stern. The latter is similar in many ways to the à la carte dining saloons on the

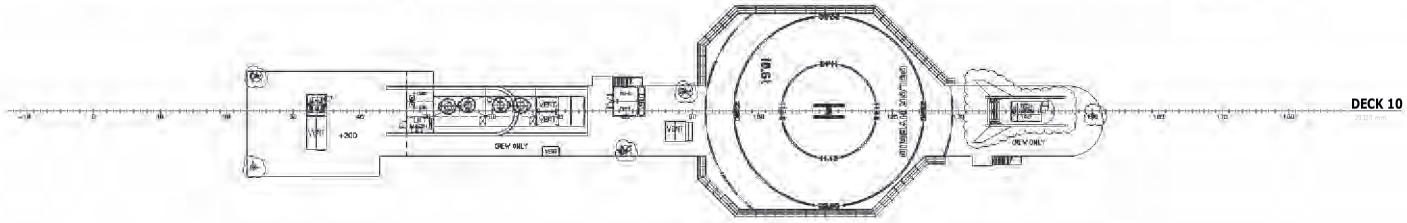
Two views of the Color Shop, looking aft (top left) and across (above) and of the entrance to the Tax-Free Market (top right).

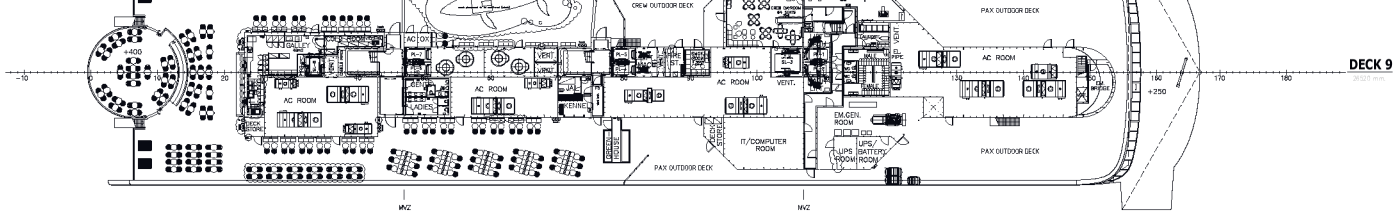
COLOR FANTASY and COLOR MAGIC, being double-height with an aft-facing atrium with grand stairways and a curved double-height window overlooking the stern. In order to encourage lingering and to enable those in doubt to ponder possible purchases, there are occasional easy-chairs scattered around in between the racks and shelves of commodities. It is probably the best-looking shop ever designed for a ferry and, in my opinion, the space is actually far too good to be a shop. As I stood gazing around, I couldn't help thinking what a lovely lounge or spa the space would make – though the fact that it is a shop tells a very great deal about our current society's priorities and, indeed, the economics of short-sea ferry operation. At the superstructure's extreme forward end, by contrast, there is a shallow but very wide reclining seat lounge with an ▶

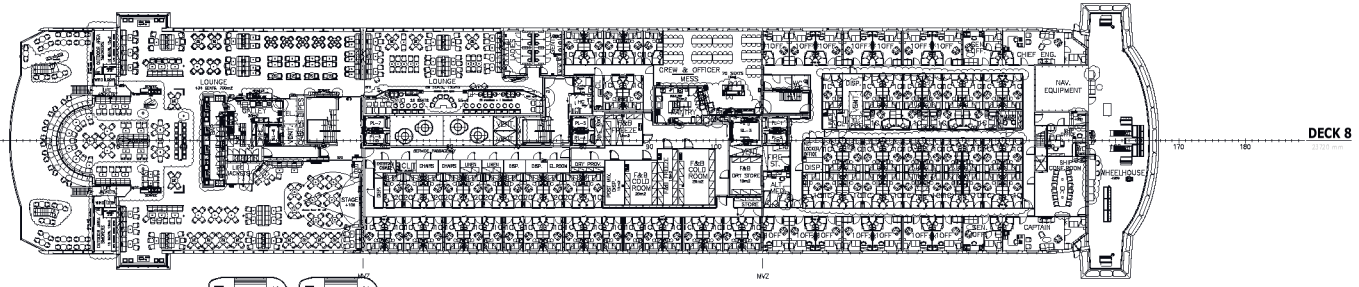
COLOR HYBRID

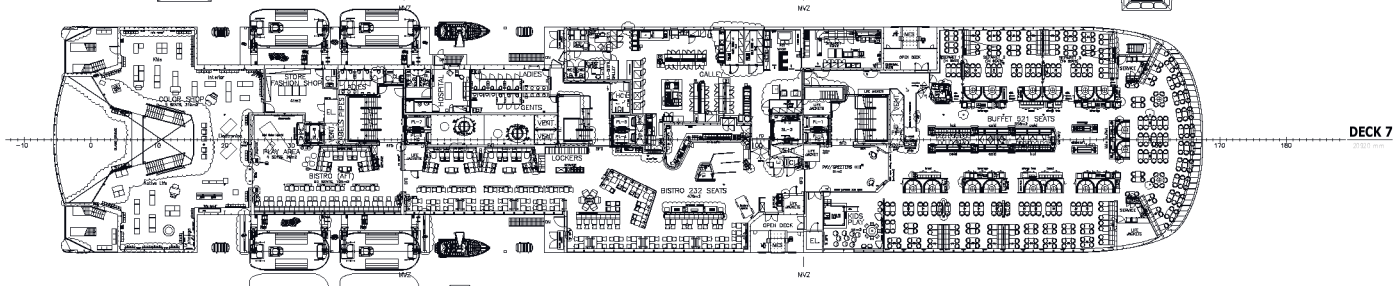


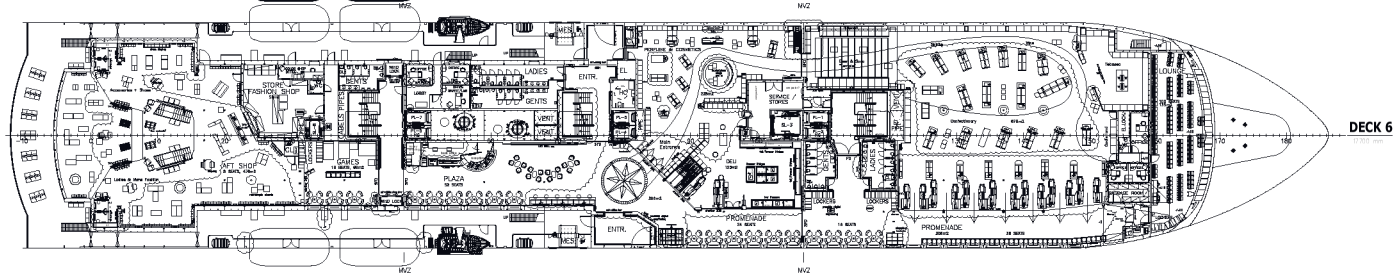


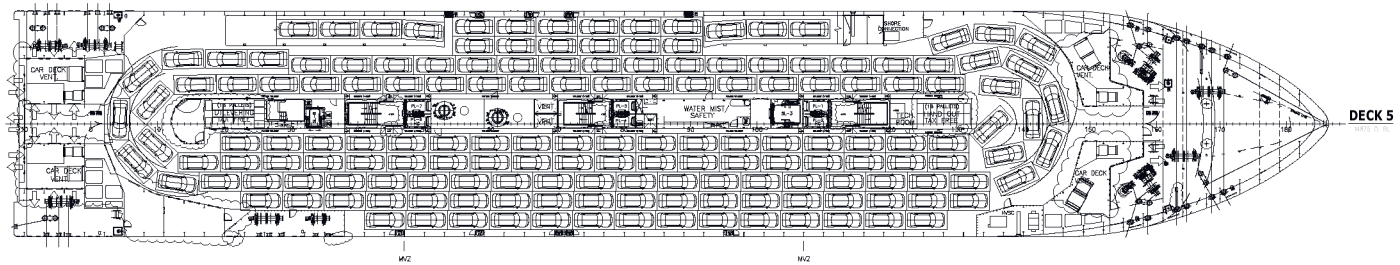


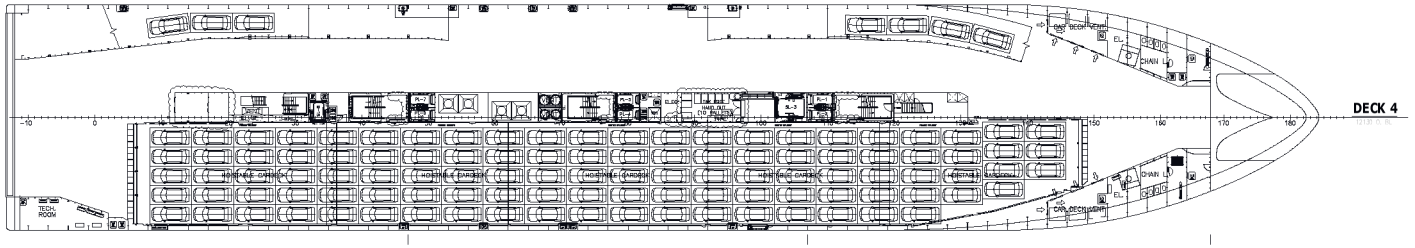


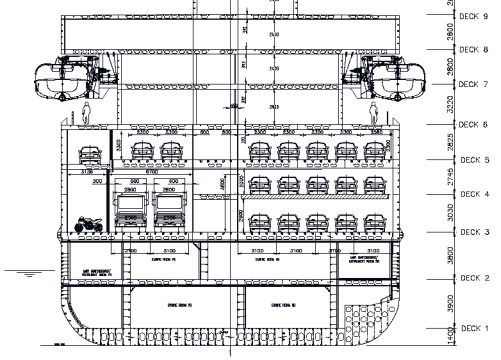












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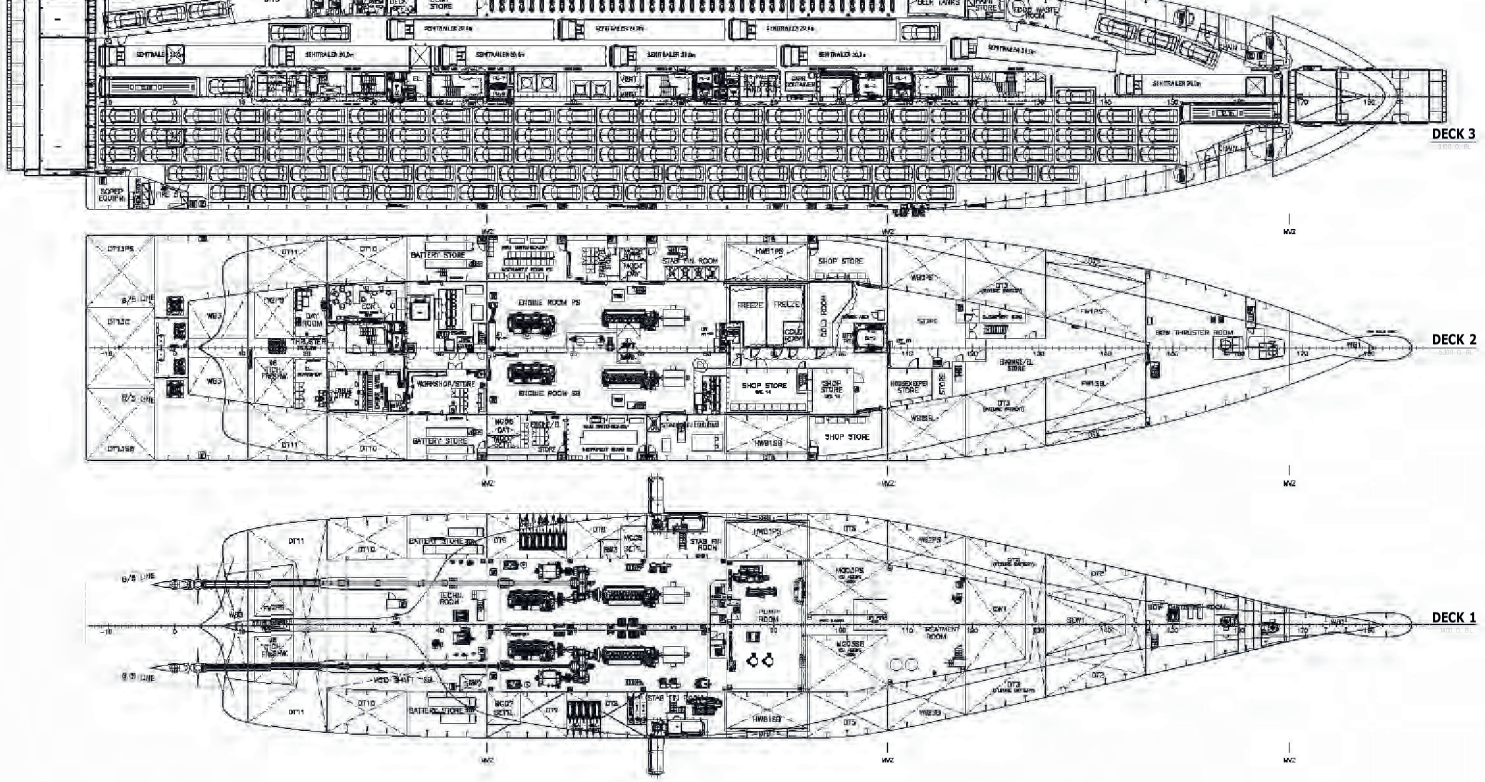


100 CREW IN:

18 pcs - OFF. CABINS
62 pcs - 1M CABINS
10 pcs - 2M CABINS

2000 PAX

MAIN DIMENSIONS

LENGTH O.A.	approx 160,00 m
LENGTH BETWEEN P.P.	approx 142,95 m
BREADTH, MOULDED	27,10 m
DEPTH TO DECK 3, MOULDED	9,10 m
DESIGN DRAFT	6,0 m
SCANTLING DRAFT	6,3 m

DNV-GL 1A, FERRY A, ECO, CLEAN, NAUT(OC), TMON, COMF(C(2)V(2)), ICE(1B), MCDK, , LCS(DC), BIS, F(MC), BATTERY(POWER), VIBR, RECYCLABLE, BWM(T)
Note: the comfort class V(2) applies to crew areas as well

YARD NO.: 311
DRAWING: H
311_101-100-01
REPLACEMENT:
DEPARTMENT: 285

Ulstein Verft AS Postbox 158, 6067 Ulsteinvik, Norway.
www.ulstein.com

Main particulars
COLOR HYBRID IMO 9824289

Classification
DNV-GL* 1A, FERRY A, CLEAN, NAUT(OC), TMON, COMF(C(2)V(2)), ICE(1B), MCDK, LCS(DC), BIS, F(MC), BATTERY(POWER), VIBR, RECYCLABLE, BWM(T)

Dimensions

Length oa	160.33m
Length pp	148.154m
Breadth ext	33.08m
Beam mld	27.10m
Draught, max	6.00m
Depth	14.875m
Gross Tonnage	27,164
Net Tonnage	8,149
Deadweight	3,258t
Max. persons (LSA)	2100

Crew Cabins

Captain and Chief Engineer	2
Senior Officers	2
Officers	14
Crew single bed	62
Crew double bed	10
TOTAL CREW CABINS	90
TOTALT BERTHS	100

Cargo Capacity
Trailer Lanes, Deck 3 ..... 760m

Cargo Handling Equipment
All delivered by MacGregor
Bow ramp and door, stern ramp and one moveable hinge deck, deck 4 starboard.

Life Saving Equipment

MES Systems Viking type VEC Plus	4
MPC32 Lifeboat 150 persons each	4
FRSQ630 Fast rescue boats	2

Palfinger davits

Machinery

Main Engines	4 x Bergen Engines B33:45L6 /8
Propellers shafted	2xCPP
Bow Thrusters	2x1,800 kW
Stern Thruster (RIM type)	1,000 kW
Maximum Speed	21.0 knots
Service Speed	17.0 knots
Fin stabilizers (SKF)	1 pair
Heat recovery system	Ulmatec
Ice Class	1B

Seating in the entrance hallway with the reception counter to the rear.

unbroken curving expanse of windows giving a panoramic view ahead over the forepeak as the Swedish or Norwegian coasts draw closer. Framed black and white prints mounted on the rear wall depicting local life in old Sandefjord were chosen and curated by the Sandefjord Historical Society. The space is secluded enough to be tranquil and there are plenty of lockers in which to stow luggage and shopping.

Passenger circulation is by means of three sets of stairs, located on the centreline forward, amidships and aft and colour-coded respectively in bright green, red and blue. In comparison with the stairs of another recently-introduced ferry I have lately reviewed, these ones are far superior, being memorably coloured and having interesting patterns and photo-murals on the walls relating to the colour themes. I was also impressed that the colour themes continue inside the lifts and in the lighting. Directional signage is also very clear and crisp. Off the hallways, the toilets are not as imaginatively designed as some I have seen on recent ferries but, nonetheless, the stainless steel washbasins look smart and, inside each cubicle, there is an image of a cartoon animal smartly dressed in fashionable clothing.


The servery in the 'Spiseriet' self-service restaurant.

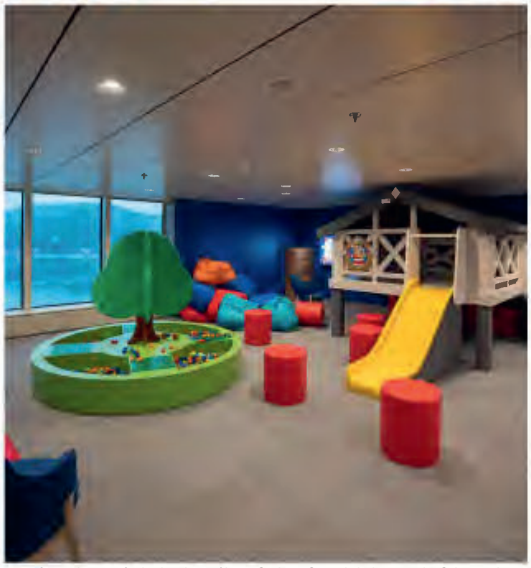
Restaurant facilities

Deck 7 is where the main catering outlets are located, both served from a single large galley located amidships on the port side. Adjacent to starboard is 'Spiseriet ved Havet', a self-service cafeteria where one can in addition order freshly-cooked hot meals which are delivered directly to passengers by the chefs via a hatch from the galley, much as with Tallink's 'Fast Lane' concept. The servery and passenger seating areas occupy two sections between three bulkheads and have been ▶

Part of the seating in the 'Spiseriet' self-service restaurant.







Images of the 'Koster' buffet restaurant showing the server (top left), the forward section of seating (top right), details of the food (above left) and the children's play area (above right).

ingeniously laid out to provide a variety of styles, each with its own atmosphere. Separating these are see-through partitions, some of which consist of large numbers of classic Norges Glass bell jars (such as one would use for conserving food), while others are beautiful wire screens with a range of patterns resembling embroidered lace. These were made by Redfort in the Netherlands and in materiality they match the white metal-framed seating used alongside (though there are also upholstered banquettes). Artefacts on display elsewhere in the space include a retro-styled turquoise electrical bike of a type called a 'Fat Woody' (!), which was handmade in California by an 'artisan' bike builder by name of Ken McNeill, surfboards specially made by Grain Surfboards in Maine and even a very special veteran car parked in one corner. It is, indeed, Norway's first ever electric example, a Waverley Electric dating from 1902 and made by the American Bicycle Company. In Spiseriet, there is certainly much to delight the eyes of a very wide diversity of users and passers-by and the light background colour scheme and attractive direct and indirect lighting create for a very pleasant and relaxing environment. Most importantly, the food is well-presented, quite traditional in style and is tasty, making Spiseriet a popular choice for families and the route's old regular clientele.

Filling the entire forward third of the deck is the very large Koster buffet restaurant, which has no fewer than 250 tables arranged in sections forming a wide U-shape around two impressively long parallel buffet counters. In terms of overall layout, the space follows the well-perfected standard formula for 'smörgåsbords' on big Scandinavian ferries – but it is in the comfort of the seating, the pleasant lighting and other details that the space stands out. Particularly notable is the great spread of windows at the bow, where diners are surrounded by the sea and archipelago scenery. The blue and off-white colour theme also reflects those of the sea and sky and a lovely touch is the occasional placement on the tops of partitions and in corners of wood-carved and painted models of sea birds. These

The Utsikten lounge and bar, showing the aft-most area of seating (top), the bar counter (above left) and the multi-functional entertainment area (above right).

were made by craftsman Tom Nilsson (known as 'The Birdman') from Lysekil in Sweden and they really are delightful, as well as providing landmarks for diners to recognise when trying to find their seats again after loading up with more food ('Your seat is just behind the guillemot, Sir!') When I saw the birds, I thought 'my little son would love these!' ▶
Better still for small children, one section of the restaurant close to the entrance features a large play area so that adults can dine while keeping an eye while they have fun.

The aft end of Deck 7 contains the upper level of the aft-facing clothes and toy shop, which is accessed from the rear of the Spiseriet seating area.

Moving up another level, the forward half of Deck 8 contains crew accommodation with 90 cabins and 100 berths, while the aft half is filled with a big and beautiful bar and lounge called 'Utsikten'. This is indeed one of the vessel's design highlights and, as with the restaurant, it is U-shaped and split into a number of smaller sections by partitions (here, these consist of arrangements of twinkling shaded lighting). The seating to starboard faces a stage and dancing area where, occasionally, live entertainment will be provided. Those to port, meanwhile, can either be used as lounge space, or at certain times of day as a rather elegant café with table service and a menu featuring deli plates and cakes. For Color Line, this is a new concept and one that already appeared to have found a niche clientele. Wall-mounted 'décor boxes' contain, among other items, ceramics made by the Swedish family-run Paradisverkstaden. In the middle of 'Utsikten', there is a long, straight bar counter facing aft towards more seating, the aftmost section of which has a circular arrangement within a curving spread of windows overlooking an area of sun deck. The best features, however, are to the sides, where blocks of superstructure have been pushed outwards, mimicking the bridge wings and giving spectacular views ahead along the ship's sides and astern, as well as through glazed panels in the floor, which enable vertiginous glimpses all the way down to the waterline and the churning wash along the hull. ▶

Sun decks

Yet another characteristic of COLOR HYBRID worthy of celebration is the very generous provision of outdoor deck space. The greater part of Deck 9 comprises a wide, wrap-around sun deck, most of which is surrounded by glazed screens but with openings on either beam. (I could not help but contrast this splendid generosity with the miserably constricted offering I recently experienced on a Sweden-Finland ferry operating on a scenic archipelago route and on which there was no access whatsoever for passengers on one side and only enough room for smokers in the few tiny corners elsewhere.)

On COLOR HYBRID, best of all, there is a big wooden sculpture of a whale for children to play in – another feature my son would simply adore. On the one hand, this may reference Sandefjord's old associations with the whaling industry (and indeed the activities of one of Color Line's local antecedents, the Jahre company). On the other, the whale is of course now a symbol of the global struggle to protect nature and so an appropriate symbol for a shipping company investing in green technology such as Color Line. It did look a fun object to play inside and I'm only sorry that on my crossing it was too wet and windswept to be usable.

A further unexpected and delightful feature of the COLOR HYBRID's sun deck is a heated greenhouse amidships on the starboard side containing a herb garden, meaning that fresh herbs grown on board can be used in some of the passenger and crew meals – and this is probably a world-first on a ferry! When it is too cold to rely on radiated heat from the sun, energy from the waste-heat recovery system is used to keep the plants at optimal growing temperature.

The sun deck has a lot of nicely designed black-coloured furniture of different kinds and even some big sun loungers. There's even a little deck bar and kiosk, facing aft, at which one can buy fast food and drinks. Yet more sun deck space aft on the tiers below, where the steelwork is formed in broad, sweeping curves, giving a real sense of being on an elegant and well-formed ship, even when outdoors. Such attention to detail reflects the tremendous pride of Norwegian shipowners and the Norwegian maritime industry even in today's mercenary times. COLOR HYBRID is among the latest and indeed finest iterations of a 'can-do' culture that invites the viewer to ponder and admire what can be achieved technologically, economically, aesthetically and environmentally through the application of effort and expertise. ■

COLOR HYBRID sailing out of the Sandefjordsfjord.

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Leading the Evolution of Secure Connectivity at Sea

COLOR HYBRID approaching the berth in Sandefjord.

BELLONA AND THE ELECTRIC MARITIME REVOLUTION

When COLOR HYBRID entered service on 16 August 2019, a milestone was reached. A real step was made towards a probably not too distant future of a fully emission-free ferry operation on the Sandefjord-Strömstad route. Bellona Foundation plays a key role in the development of this vessel and the drive towards electrification of the Norwegian ferry sector.

TEXT: MARKO STAMPEHL

The electrification of short-distance ferries is gathering pace. Norway is a pioneer in this field and others are following slowly. The battery technology has developed to such a level that the installation of battery packs for peak shaving and (plug-in) hybrid operations is now viable on larger ships, thus enabling them to reduce CO_2 emissions considerably and, as in the case of COLOR HYBRID, operate parts of the voyage purely on electric power. This is particularly important when manoeuvring in and out of a port, as it reduces local air and noise pollutions.

Color Line has long been at the forefront of implementing solutions for reducing emissions and for zero-emission port times. For many years, it has been in partnership with Bellona in striving towards these goals.

> ***The combination of strong professional insight, solution-oriented behavior and the commitment and impatience of the environmental organization gives Bellona strength as a partner.***
>
> Helge Otto Mathisen, Executive Vice President Communication & Public Affairs, Color Line

An environmental organisation with a difference

The Bellona Foundation was co-founded by Frederic Hauge in 1986 as an environmental protection NGO. Its initial aim was to organise protests and direct actions in its fight against pollutions by the Norwegian oil and gas industry. Over the years, the foundation has devolved into an international movement in tackling all kinds of environmental issues, including those relating to the maritime industry. Facilitating the development of electric cars, fighting against the nuclear threat from the East, protesting and launching actions against nuclear waste disposals (e.g. in the Murmansk area) are among its other core activities.

Aside from its headquarters in the Grünerløkka district of Oslo, Bellona today has offices in Murmansk, St. Petersburg, Brussels, Washington, and Kiev.

In 1998, as part of a new strategy, the foundation began to develop partnerships with various key players from the industry in an effort to encourage companies and organisations to adopt environmentally friendly solutions and to establish ▶

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frontrunner projects. Instead of just organising media-effective protests or blockades, it has become actively involved in developing technologies and sustainable solutions. It now works with the industry rather than against it. Bellona however resorts to working against the industry in some extreme cases, such as those in the context of oil and gas exploration projects off the Norwegian coast.

The organisation has a team of highly skilled experts in the fields of renewable energies, shipping, and climate-friendly technologies like carbon capture and storage, to name but a few of these widely discussed topics in relation to climate change or – probably more appropriately labelled – climate crisis.

"People often ask me if this isn't a kind of 'green washing'," said Frederic Hauge, co-founder and director of Bellona Foundation, in a conversation with Shippax. "I don't think so. People can criticise the ferry and cruise industry, but my impression is that the owners and people running these companies know that they need public acceptance in the future in order to continue their operations. They all need to do something, and we don't have to discuss that anymore. But we need to discuss and implement solutions. Therefore, it is more important for us to have specialised resources rather than standing with posters and protesting all the time. This green shift will also create a challenge. And we cannot sit in our office here in Oslo and create solutions without having the input from and the dialogue with the players in the industry."

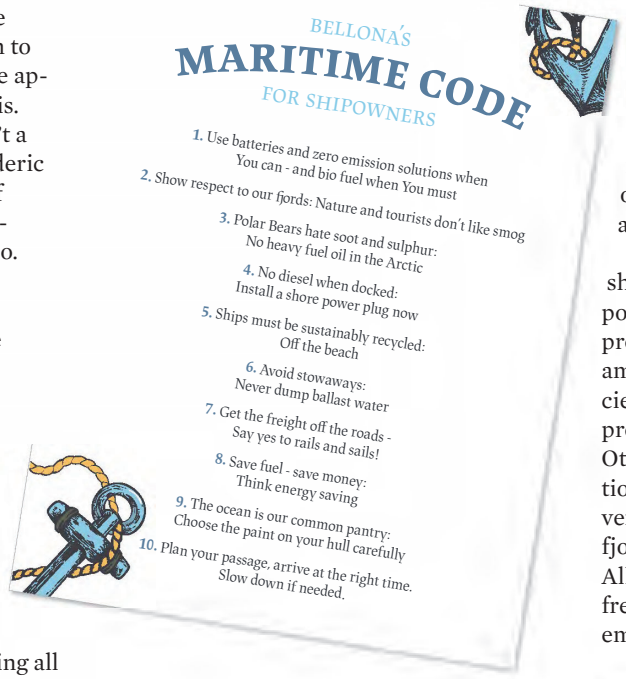
Bellona's approach is thus a mix of challenging and partnering with the industry in order to support projects initiated by experts aiming at finding viable solutions and implementing them. It regards this as an effective way to achieving results in the combat against climate change. In the process, the foundation remains active as a watchdog and challenger to its partners.

Asked why the maritime industry was so important to Bellona, Hauge, who loved the sea, said: "This is an area where we can use the power of example to create an international precedence. If we in Norway manage to grow carrots in an environmentally friendly way, I don't think this would make a great impact on a global scale. But if we manage to be an example in the maritime field, then we are setting a trend."

COLOR HYBRID in Sandefjord.


Frederic Hauge. PHOTO : DAG THORENFELDT

> ***We cannot sit in our office and create solutions without having the input from and the dialogue with the players in the industry.***
>
> Frederic Hauge, Co-founder and Director, Bellona


BELLONA'S
MARITIME CODE
FOR SHIPOWNERS

1. Use batteries and zero emission solutions when You can - and bio fuel when You must
2. Show respect to our fjords: Nature and tourists don't like smog
3. Polar Bears hate soot and sulphur: No heavy fuel oil in the Arctic
4. No diesel when docked: Install a shore power plug now
5. Ships must be sustainably recycled: Off the beach
6. Avoid stowaways: Never dump ballast water
7. Get the freight off the roads - Say yes to rails and sails!
8. Save fuel - save money: Think energy saving
9. The ocean is our common pantry: Choose the paint on your hull carefully
10. Plan your passage, arrive at the right time. Slow down if needed.

When Color Line in 2016 placed the construction order for COLOR HYBRID with Ulstein Verft, Bellona was amongst those who applauded its cooperation partner Color Line and the people in Sandefjord . "This brings us closer to the vision of emission-free shipping, and again it shows that Color Line is not just talking – they are doing something." stated Hauge in a press release on that occasion.

Hauge comes from Sandefjord. So this newbuilding project had a special meaning to him. "For me, it is incredibly old-fashioned that ships idling in Norwegian ports can legally emit lots of NOx and particles into Norwegian cities. Color Line has gone ahead and shown that there are alternatives. They have operated their [shore power] facility in Oslo for five years without any problems. Now they show that you can also sail quietly and without emissions in and out of Norwegian fjords." Hauge continued.

"It is cool to see Color Line making progress," he told Shippax. "We are grateful to have such stakeholders and partners in the industry."

Pioneering Color Line

By 2017 Color Line had already invested about NOK 200 million (EUR 20 million) in shore power connection infrastructure in the Norwegian ports it operated from and scrubber solutions on all of its new vessels.

The company began using the first shore power connection facility in the port of Oslo back in October 2011. The project was the result of a partnership among the port authority, funding agencies such as ENOVA, and environmental protection organisations such as Bellona. Other shore power connection installations followed suit in Kristiansand in November 2014, Larvik in April 2016, Sandefjord in August 2017 and Kiel in May 2019. All these facilities are operating problem free and enabling a total reduction of CO_2 emissions by 8,000 tons per year. ■

Higher hurdles for shore power in Germany

In Color Line's German port of call, Kiel a shore power connection at the Color Line berth could finally be inaugurated in May 2019. However, caused by a renewable energy surcharge ("EEG Umlage") which is added to the price of electricity to finance the switch to renewable energy, Electricity is very expensive in Germany, with the kilowatt hour costing about 18 Eurocents (which at the time of writing is more than the equivalent cost for Diesel) whereas in Norway it is just 7 Eurocents. This puts an additional economical hurdle to the breakthrough of shore power connections in Germany, while they are becoming more and more common at a fast pace in Norway.

Yet, Port of Kiel is working on the second shore power connection on the opposite side of the harbour to enable the ferries to Sweden and cruise ships at Ostseekai to use shore power while in port. Cruise and ferry operators have already signalled their interest in using the facility. Requests have been issued towards the Federal Government to lower the above surcharge for ships to make the use of shore power more attractive.

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Aesthetics: Hardtop XP • **Car Decks:** Resist 86

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