

STEAMSHIP

FRESHSPRING

TRUST

MAGAZINE



No.26 Spring 2021

*Preserving the past to inspire knowledge for the future*

The Steamship Freshspring Trust is a registered charity, No.1151907.

**Objects of the Charity:**

To advance the education of the public through the preservation and operation of a historic steamship, and the promotion of maritime studies particularly amongst young people for the public benefit.

**Registered Office:** Little Cleave, Lower Cleave, Northam, Devon, EX39 2RH

**Patrons:** The Earl Attlee TD; Rear Admiral Nigel Guild CB CEng FREng;  
Captain Kevin Slade CMMar FNI.

**Trust Management**

**Chairman:** John Puddy \* john.puddy@ssfreshspring.co.uk  
**Vice Chairman:** Simon Tattersall \* simon.tattersall@ssfreshspring.co.uk  
**Secretary:** Stephen Attenborough \* stephen.attenborough@ssfreshspring.co.uk  
**Treasurer:** Simon Tattersall \* simon.tattersall@ssfreshspring.co.uk  
**Membership:** Richard Ker \* membership@ssfreshspring.co.uk 01237 422 758  
**Marketing/Publicity:** vacant  
**Learning & Education:** Huw Davies \* huw.davies@ssfreshspring.co.uk  
**Conservation Manager:** Stephen Attenborough \* stephen.attenborough@ssfreshspring.co.uk

**IT, Website and Social Media Networking**

Anne Budd \* anne.budd@ssfreshspring.co.uk

**Fundraising & Forward Planning**

Annemaire Shillito \*

John Cooper \*

**Project Manager:** Charlotte Squire charlotte.squire@ssfreshspring.co.uk

**Technical Director:**

Ken Thompson CEng, CMarEng, FIMarEst

\* Trustee

Keep up to date with progress/news via the Trust's website or Facebook page.

**Website:** www.ssfreshspring.co.uk

**Facebook:** www.facebook.com/SSFreshspringTrust?fref=ts

**Membership Enquiries:** Please send an s.a.e. for a form to: Steamship Freshspring Trust, c/o Richard Ker, 4 New Street, Appledore, Devon, EX39 1QJ, or you can join online.

**Ship Visits & Volunteering on the ship:** The ship is currently closed to the public due to Coronavirus. However, members may visit by prior appointment, usually on a Wednesday or a Sunday. Please call Peter Gillett, our Local Ship Manager, on 01237 237 183 (email: peter.gillett@ssfreshspring.co.uk ) if you are interested in volunteering.

*Freshspring News is edited by Brian Gooding, and published by the Steamship Freshspring Trust, a registered charity.*

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**FRONT COVER:** Another view of SS Freshspring during her days in Bristol's Floating Harbour. Neil Baker

## From the Chair

**Happy** new year to you all. Having said that, we start 2021 with another lockdown and we still live in fear of the dreaded Covid. It seems worse this time as the winter has kept us indoors and so the release of sunny walks is denied us. However, the good news is that there is a solution in sight with vaccinations rolling out across the country. Most of our volunteers, including me, are over 70 and so we await our jabs eagerly.

I planned to report on the year past but when I thought about it, this would be a very short report indeed, with no opening of the ship, no events, no talks and very restricted ship volunteer activity. However, volunteers have continued in small numbers and safely distancing, which is quite easy on a 121ft ship. They are such a great bunch and so eager to keep going. The ship's boiler was thoroughly surveyed and it appears to be in good condition and suitable for a life of many years. This is a big step forward as removal of the boiler for repair or replacement could scupper our plans to return to operation. It is important for an operating ship to retain her original boiler as it is designed for the ship and her power requirements and is suitable for the rolling motion at sea; ours is a Scotch return tube wetback boiler. This means the hot gasses pass through the boiler twice and are surrounded by water for the whole of the passage.

The Trust has been fortunate in gaining further Lottery support to help us through 2020 and it has enabled us to move forward with the ship Viability Study, which is progressing well. This is to identify operational activities which return revenue and hopefully make the ship sustainable for the long term. Like most other ships, we will need to fund raise to top up revenue and, as we do now, gain support from our loyal Members. I am particularly pleased that other charities with heritage ships are being so supportive in sharing information with us to support the study. It is also good to see that operating ships do appear to be viable, albeit with the addition of active fund raising, which bodes well for us. We hope to have the results of the study by March and will share it with members when we do. I am pleased to say that it is likely that maritime heritage charities are coming together and plan to create a forum to offer mutual support.

We have been busy with the range of activities in the delivery phase of two Lottery Heritage Fund grants, which we are very grateful to have received. Without Lottery players, so much of heritage just could not survive, so keep buying the tickets and when you hit the jackpot, please remember *SS Freshspring* needs you. A mere £2.5 million would hardly be noticed from a jackpot win! As a result of this Lottery support, we are able to recruit a Community Learning Officer and a Public Engagement Officer. Both part time posts to support our school and education work and to promote the ship and provide valued experiences when people visit. This also includes the delivery of Virtual Reality experiences on board. We have also been able to overhaul our website which I hope you will find informative and interesting. We are now working on a members area.

We have now got rather used to Zoom and Teams as mediums for meetings and

they seem to work quite well for a whole range of purposes. Recently, our son had a Zoom birthday party and being a seafarer with friends in many countries, it was very much an international affair. It went on very successfully for many hours and was a most enjoyable experience. I must admit, I can't wait to meet people in person as the virtual meetings from home miss so much of the general chit chat that is natural in a group setting. One thing though, we get some interesting backdrops.

Covid continues to blight our lives and is likely to do so for quite a while yet. Having said that we have had more people wanting to volunteer on *SS Freshspring* than ever. This poses some challenges on work days to keep safe. Most people come and go during the day creating crossovers to keep on board numbers contained. We also have a very robust volunteer management system on the ship.

A late notable event in 2020 was that we were invited to partner BMT in presenting a paper entitled "STEM for all on *SS Freshspring*". The presentation was delivered by Dr Hashim Yuqab and myself at the Maritime Heritage Conference held virtually by The Royal Institute of Naval Architects. For your interest, I have included the paper in this magazine as it details the work we are doing with our partners to create ground breaking Virtual Reality experiences. Personally, in the paper and presentation, I was keen to highlight how engineers come to the fore in times of crisis and I have achieved this over three centuries starting with one of our greatest engineers, Isambard Brunel. The paper illustrates in detail partnership projects current and planned with BMT and The University of The West of England. We are extremely grateful that BMT invited us to co-present this paper as it demonstrates the commitment of the company and the energy that is going in to support our joint projects. We are also grateful for the support of Martin Kemp TV for the Directing of filming and the Management of the project.

We have added a few new activities to our repertoire during Covid-19, one of which is supporting our local foodbank. This is run by one of our early members and volunteers, Duncan Withall, who operates the bank with military efficiency. Several *Freshspring* members work at the bank from time to time and I enjoy doing the collections and deliveries in our van. This, of course, promotes the Trust and, most importantly is a highly valuable community service.



As always, you, our members, continue to be supportive of the Trust in many ways. I hope you all stay safe and when the time comes, you will come and visit your ship.

**John**

## Treasurer's & Trust Report

### Finances

**There** is a phrase which seems particularly appropriate at the moment – 'everything changes but nothing changes'!

The blight of Covid continues, but we now have a vaccination programme leading to the real hope that – sometime this year – lockdown and social distancing will be relaxed, places of learning will re-open and those businesses that have not already closed for good will start the long process of recovery. In the meantime we carry on coping!

*Freshspring* has actually weathered the storm better than I think any of us really believed possible a few months ago. As of the 25th January, we came to the end of the Lottery Covid Emergency grant – having spent the £17,200 grant as planned – and on the same day our completion report was submitted, backed up by the detailed cost database scrupulously compiled by Mike Blackman.

At the time of my last report, the fate of our application to the Lottery for a Recovery grant was unknown. We had applied for £66,000 to cover our overhead costs from November to March 2021, costs associated with moving towards re-opening the ship by Easter and – most importantly – funding for the Viability study which will inform us what options we have for the future of the ship. To our delight, we were offered a grant for the full amount – the Viability study was commissioned the same day! A lot of work went into preparing for the grant, particularly by Annemarie Shillito – our very experienced fund raising Trustee.

In the last week of January there have been indications through the Lottery of an acceptance that we will quite possibly not be able to re-open at Easter, so there are now moves afoot to extend this latest grant period beyond March and also to re-purpose some of the funding to take account of that.

Because we have been able to cover Charlotte's salary through the Emergency and Recovery grants through to the end of March, we have agreed with The Pilgrim Trust that the grant they offered us in March 2020 will now be re-timed to cover Charlotte's salary from 1st April until early 2022 – and this in turn allows me to predict that – barring disasters – we will be able to cover our overheads until early 2022!

### Forward Planning

Over the last few months a lot of work has been done to maintain the ship and to ensure that the elements funded by the Emergency and Recovery grants do not overrun each grant's end date. The level of activity has highlighted, yet again, how very dependent *Freshspring* is on too few people actually doing the work.

At a Trustee meeting in March 2020, we agreed that this issue must be addressed but Covid survival took precedence. However, we can no longer ignore the need to bring in more people who can share the workload and, as a part of that, allow some Trustees to step back a bit to plan and govern. 2021 should therefore see some changes to accomplish this and I hope to report more on progress in future magazines.

**Simon Tattersall**

# Project Manager's Report

Successful funding applications have driven the Trust's activity over the last few months, as we ensure delivery of all funded elements of our projects.

Kickstart completed at the end of December, delivering a Digital Marketing Review, the aim of which is to increase our social media presence. We now have to continue the momentum that the Kickstart project created, posting regularly and consistently on social media while measuring the impact of our communications. Malcolm Allen has kindly agreed to be responsible for "Flashback Thursday" where articles of interest from the past are posted on our Facebook page. Why not take a look?

The Heritage Emergency Fund Completion Report was submitted at the end of January. Thanks must once again go to Mike Blackman for his meticulous cost coding and attention to detail. This project enabled the Trust to buy Virtual Reality (VR) equipment and undertake a website update, transferring to the Wordpress platform. We've also been able to buy ship maintenance materials and support essential overheads. As part of this project we're developing a Membership Area on the website, so watch this space.

Work continues on board, although the recent lockdown has quite rightly reduced the number of volunteers on the ship at one time. Pete puts together a rota to ensure that all those who want to volunteer are able to do so. The ship's galley is being prepared and painted, ready for new equipment thanks to Awards4All. Work on the boiler continues under Malcolm's watchful eye, with the boiler survey mapping out some of the future works.

Over 300 copies of *The Wish Fish*, which was entirely funded by The National Lottery Heritage Fund, and is the Trust's first venture into children's books, have been sent out to libraries across the South West and are proving to be very popular. I hope you enjoyed your copy. Our Trust Volunteer Val Barrs distributed the lion's share of these and was also responsible for posting out packs of *Freshspring* Christmas Cards,

so thank you, Val, and thank you to all our supporters who bought the beautifully designed cards.

We continue to focus on raising the profile of the Trust in local media. I've thoroughly enjoyed writing articles for the South West Maritime History Society (SWMHS) and *Devon Life* (right).

I took part in a really useful virtual training event "How to write great copy" in early December. The take home messages for me were about bringing your product to life and understanding who your audience is.

I also "attended" a Heritage Compass Q&A before submitting a successful

application for this two year training programme. Heritage Compass is a collaboration between The National Lottery Heritage Fund and Cause4, with the training programme aiming to help 150 heritage organisations to increase their sustainability. Amongst other things, the Trust will learn more about re-invigorating our income generation strategy and also our audience development plan. Organisations are being grouped in cohorts depending on their stated objectives, so I look forward to learning from others as well as from the programme itself.

**Charlotte Squire**



# STEM for All on the SS Freshspring: VR Tour

H K Yaqub, BMT, UK, M Kemp, SS Freshspring Trust, UK, J Puddy, SS Freshspring Trust, UK and L Star, BMT, UK

## SUMMARY

Over the past year the world has changed dramatically. With greater restrictions on accessibility, the need to provide innovative and distributable remote experiences is now more prominent than ever. BMT has partnered with the SS Freshspring Trust to create multi-generational STEM experiences. "Preserving the past to inspire knowledge for the future". The SS Freshspring Trust have a vision to become a STEM hub by utilising cutting-edge technology. BMT have extensive experience in developing VR applications in the Maritime Domain. With skills shortfalls in many engineering disciplines, there is a need to inspire future generations into careers in STEM. Equally, many adults have a passion for technology and have valuable skills to offer to STEM projects. This paper uses the historic vessel *SS Freshspring*, a 1940s RFA Fresh Water Carrier currently being restored in North Devon, as the basis for exploring a range of initiatives and activities aimed at making engineering and technology interesting and accessible to all. The specific focus is on the development of an interactive 3D virtual tour, aiming to provide access to a wide audience by targeting a range of modalities including smartphones, internet browsers, and most consumer VR headsets.

This document is formatted in the convention required for all conference papers

## NOMENCLATURE

AR Augmented Reality  
HMD Head-Mounted Display  
VR Virtual Reality

## 1. INTRODUCTION

With the current COVID-19 countermeasures leading to greater accessibility restrictions, the need to provide innovative and distributable remote experiences is now more prominent than ever. The delivery of Science, Technology, Engineering and Mathematics (STEM) and heritage educational experiences often take place in the classroom, onboard the ship or at organised events. With all options facing new rules and restrictions, the

traditional delivery of STEM is at risk and revised routes for engagement must be considered.

The SS Freshspring Trust provide educational tours onboard their steamship based in Bideford, Devon. The intention is for the heritage vessel to become a hub of novel and engaging STEM activities. The necessity for facilitating remote solutions for STEM and heritage education has led the Trust to rethink their engagement offering and how it can be delivered.

Since the Second World War, the world has not faced such a profound need to achieve and deliver innovative development. During this challenging

time, allied ships were being sunk faster than the rate they could be produced. As a response to this, the industrialist Henry Kaiser introduced new techniques such as modularisation and welding which significantly shortened the production time, therefore revolutionising the shipbuilding industry. [1] These new methods became the foundations for modern shipbuilding which are still in use today.

Throughout the pandemic, the media has shared stories of innovative engineering which has given an insight into how STEM can be utilised to solve real-life problems and make a difference. The unprecedented circumstances have led to new partnerships being formed [2], significantly shortened design periods [3] and engineers openly sharing designs for manufacturing inexpensive medical equipment [4]. This current situation, although troubling, provides a unique opportunity for UK engineering to become a world leader. For example, a very successful collaborative project by University College London, Mercedes and Ventura has created a continuous positive airway pressure (CPAP) breathing aid. This has been delivered to hospitals all over the country with the first prototype deployable within only 100 hours [5].

As a purposeful and determined response to the pandemic, the SS Freshspring Trust have partnered with BMT and the University of the West of England (UWE) to translate the traditional activities into digital solutions which can be delivered remotely. The team are working to create a VR application which will not only allow 'remote tourists' to take a guided tour of the ship, but also participate in

virtual activities. To ensure the Trust's inclusive ethos is maintained, the application is being developed to target a range of economical, lightweight and portable modalities to make it more accessible to all.

The long-term aim of the project is to provide a sandbox environment consisting of an interactive guided tour of the *SS Freshspring* which uses novel media presentation. These include interactive activities, immersive viewing experiences and freedom of exploration of the ship including areas which are not easy for visitors to access otherwise. The team's goal is to provide an experience in accordance with their mission statement: 'STEM for all' providing content to engage and inspire users of all abilities and ages.

## 2 THE TEAM

### 2.1 Project Formation

The SS Freshspring Trust was formed in 2013 to save the steamship from being scrapped. The Trust fostered a collaborative relationship with UWE in 2015 to provide UWE students with the opportunity to carry out design work on the conversion of the ship to carry passengers. In 2016 the Trust gained a £155,000 grant from the National Heritage Memorial Fund which enabled the ship to be docked for repair and moved to her home base of Bideford. As the partnership with UWE developed, it led to the creation of a STEM primary school project. The STEM project has been successfully operating in North Devon Schools for five years and has led to the development of a children's website. This work is ongoing within the

partnership with a rollout planned in the new year.

The Trust has now set up a new partnership with UWE and BMT for the creation of a suite of VR activities based on the *SS Freshspring*. This has been driven by the desire to continue delivery of activities and tours in a safe way that ensures positive ongoing engagement with heritage. As high-quality consumer VR becomes more affordable and widely available, the innovative project will provide high value educational experiences to many and inspire young people to become engineers of the future.

The idea for a virtual tour originated from the Trust identifying the need to provide a means for visitors with limited mobility to participate in a tour of the *SS Freshspring*. The partnership team agreed that an immersive VR-based application could be achieved by capturing high quality 360-degree footage on board the *SS Freshspring* using specialist equipment on a well-managed limited budget. The project complements BMT's ambition to offer 'STEM at Home' activities with the aim to provide accessible extra-curricular challenges for students to participate in remotely. BMT's capability for developing distributable activities combined with the Trust's experience in building novel multi-modal engineering activities provides the perfect opportunity to curate a virtual guided tour which can be experienced in an engaging and immersive way.

## 2.2 Team Experience

### 2.2(a) BMT

BMT provides independent technical expertise and consultancy, offering design solutions, asset management,

programme delivery and technology services to customers in the defence, security, transport, energy and infrastructure markets. BMT run a STEM outreach programme to engage and inspire future talent and have extensive experience in developing engaging and novel activities. BMT's STEM offering features hands-on activities such as building foam boats, a 'Stability Ship' to demonstrate the impact of cargo loading on stability and a modular 3D-printed engine room which demonstrates the engineering principles of a ship's propulsion system.

BMT have developed a collection of VR and AR applications which allow the user to be immersed in novel environments such as space and at sea. In response to the pandemic, BMT have been looking at ways of delivering existing STEM events and sessions remotely including developing a suite of AR-based 'STEM at Home' activities such as a mobile-based version of the propulsion system activity as seen in Figure 1.



Figure 1: BMT's 'STEM at Home' AR application. Users are required to correctly connect the engine components to the corresponding ship systems.

### 2.2(b) *SS Freshspring*

The Steamship Freshspring Trust is a not-for-profit organisation based in North Devon, whose aim is to return *SS Freshspring* to full operation, preserving the past and inspiring knowledge for the future. [6] The Trust has considerable maritime experience, both in renovation of a heritage vessel and managing projects.

The Trust offers a STEM Engineering Box Project, seen in Figure 2, [7] for local schools which is targeted at key stage two. The activity consists of six linked lesson plans which are delivered in sequence to demonstrate basic engineering principles. The lessons allow students to investigate and create a range of mechanisms which are used in most engines. On completion, pupils can visit the steamship and demonstrate their learning by identifying the same mechanisms on the steam engine. Other activities include ropemaking, creation of an interactive children's website, educational ship tours, flag lessons and an introduction to technical drawings.



Figure 2: Lesson packs and final assembly of the STEM Engineering Box Project.

## 3. THE VIRTUAL TOUR

### 3.1 Footage and Content

The virtual tour enables remote visitors the freedom to explore the *SS Freshspring* in detail by allowing them to navigate between various viewpoints. The current tour has been constructed using 360-degree images and videos captured throughout the vessel. Interactive elements (hotspots) are overlaid points of interest which allow users to view additional information or navigate to another viewpoint. The camera used (Insta 360 One X [8]) facilitates rapid capture and processing of 360-degree footage, therefore enabling fast iteration of an initial prototype and minimising up-front production costs.

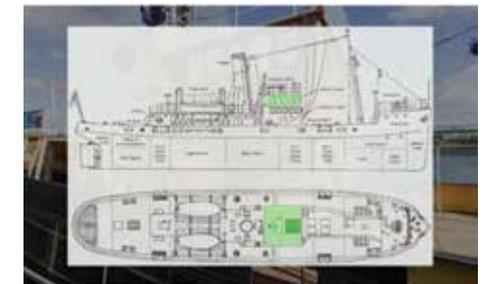


Figure 3: *SS Freshspring* interactive map which can be used to navigate to different viewpoints.

Utilising 360-degree footage for the tour, allows an effective prototype to be made while keeping the hardware requirements to a minimum. This approach ensures the tour is developed in accordance with the mission statement 'STEM for all'.

The viewpoints for the 360-degree footage capture were pre-planned to ensure the user is given sufficient

manoeuvrability within each area of the ship. The general arrangement of the SS *Freshspring* can be seen in Figure 3. Additional 360-degree video clips were captured depicting actors undertaking various activities which will feature in the tour (see Figure 6). The virtual tour grants the user access to ship features which are often out of bounds to visitors such as the boiler room, the water tanks and the propellers.

### 3.2 Functionality

The method in which the tour is implemented allows for multiple methods of interaction which include mouse-and-keyboard, touch, gaze-based interaction and VR controllers. This ensures the same package can be accessed through multiple means, allowing participation from a wider audience. Locomotion through the ship is undertaken in the style of "Google Street View" which uses the same principle of transitioning between two 360-degree images. Users can use an interactive map to navigate to different viewpoints as soon in Figure 3.

The targeted platform is the Oculus Quest 2 [9], which is a standalone VR headset which can operate without being connected to a computer. VR headsets like the Quest 2 allow users freedom of movement within an arbitrary physical space and offer comparable performance to its PC-based counterparts at a significantly lower cost. With greater affordability, it is easy to provide an immersive educational tour experience to institutions such as schools, retirement homes and community centres.

The application is being implemented for a number of modalities which include VR, web and mobile platforms. The method of interaction will differ for each modality (i.e. VR controller, mouse-click, screen tap and timed gaze selection). The application has been designed to only require basic one-click interactions, ensuring ease of deployment to different platforms.

Supplementary material is supplied in the form of ambient audio clips and hotspots within the tour denoting points of interest which allow the user to examine it in greater detail (see Figure 5). For instance, when they navigate to the wheelhouse, they are able to interact with points of interest placed in the scene (see Figure 4). Another feature of the tour includes the ability to visualise and compare SS *Freshspring's* three-cylinder triple expansion engine with a modern internal combustion engine to identify the key differences between the two. Other comparisons are currently being implemented.



Figure 4: Screenshot of VR Tour showing interactive hotspot and navigation button (Wheelhouse).

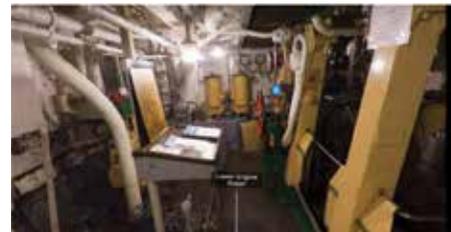


Figure 5: Screenshot of VR Tour showing interactive hotspot and navigation button (Lower Engine Room).



Figure 6: Supplementary 360 video demonstrating engine operation.

### 3.3 Narrative

While users are able to freely explore the ship, a guided tour is being developed to create a carefully curated experience suitable for all ages and abilities. During the virtual tour users will visit many of the ship's compartments, learn about *Freshspring's* history (and others in its class) and experience something of what living and working on board the ship would have been like for the crew.

The narrative will take the viewer on a journey from the quayside in Bideford, back in time to the late 1940s to join *Freshspring* on a voyage to the Mediterranean where she has been tasked to resupply Royal Navy ships with purified water in Malta. Events during the voyage are drawn from real-life records, not only of the *Freshspring*, but also from her sister ships in the Fresh class which operated throughout the war. This will allow the story to expand and include the war years as well.

The experience starts on deck as the ship is about to cast off. During the voyage, the viewer can visit different areas of the ship and meet members of the ship's crew, played by actors, who will carry the story forward. During the developing story, the perspective of the user can break out into different film or VR assets as seen in Figure 6. A scenario may consist of an engineer in the engine room reminiscing on how life on board was very different when the ship was coal fired. There would then be a following sequence with stokers shovelling coal filmed on board a working steam ship. Events on the voyage add further flavour to the virtual journey until finally the ship arrives in Malta and the *Freshspring* begins her vital work as one of the Royal Navy's fresh-water carriers.

## 4. FUTURE ENDEAVOURS

### 4.1 Fully Realised VR

As more funding is secured, the project will expand to include more 3D interactions such as fully navigable 3D versions of compartments such as the bridge and engine room. This will also allow for the development of immersive activities which can be associated

with different parts of the ship where users can participate in hands-on learning tasks. The benefit of a full 3D reconstruction of the vessel is that it will provide a more immersive experience and make navigation around the vessel feel more organic as opposed to the “Google Street View” solution currently being used for navigating between static viewpoints. The tour will also benefit from the inclusion of a realistic physics and animation system which will offer a naturalistic feel to the tour and activities.

This tour will act as the basis for a more activity-laden sandbox which is tailored to different skillsets, education levels and interests. With fully 3D assets, more interactive elements can be implemented including an engine which users can manipulate and operate. Additional challenges can be added during the simulation, for instance, a flood in the engine room or heavy seas that require a change of speed and direction. Additional assets can be introduced which may help the crew to decide how best to solve a problem, for example, a short video featuring a chief engineer who could retell a real-world experience providing guidance to the activity.

#### 4.2 A Mixed-Reality Steamship

The development of assets for a fully 3D walkthrough can also be utilised for more ambitious mixed reality projects. Mixed reality refers to the use of AR and virtual assets in a real-world setting which uses tangible interfaces. For example, steam and water flow can be visualised directly through the pipes and machinery in the engine room. This visualisation changes

according to which valves have been opened or closed. When members of the public are able to visit the *SS Freshspring* in the future, it will be important to provide new and exciting digital activities which fully utilise the ship itself. The virtual tour will still play a very important part, catering for members of the public with limited mobility who may not be able to explore all parts of the ship.

#### 4.3 STEM Outreach Partnerships

Once the virtual tour is complete and available to use, the project team aspire to facilitate remote STEM engagement via multi-generational routes to ensure the ‘STEM for All’ mission statement is achieved. By promoting via various social media channels and partnership websites, engaging with groups such as universities, schools, organisations and special interest groups, the team hope to actively engage with all generations and abilities by spreading awareness and creating new partnerships.

### 5. CONCLUSIONS

When the project began, the virtual tour was designed for users with limited mobility in mind. Since Covid-19, the project has evolved into a tour to provide users all over the world with remote access to the *SS Freshspring*. The unexpected circumstances of the pandemic have provided a unique opportunity to showcase the *SS Freshspring* globally as an asset to maritime heritage and its significant potential for STEM outreach.

‘STEM for all’ is a major aim of this project. People of all ages will have the opportunity to engage and learn about innovative technology; how it relates to heritage, how it can be utilised to create learning tools, how it is part of the future and how easy it is to access and use. Using platforms and tools that combine new and old technology for STEM delivery will also encourage different generations to experience the environments and activities together. Younger generations can learn about the principles and foundations of modern technology which itself can also be demonstrated in a simple way to older generations. STEM should be exciting and challenging for people of all ages and abilities. The potential of a distributed activity which can be viewed on a VR headset, browser or phone, will allow a greater potential for the general public to engage positively and benefit from STEM subjects. The project team hopes this will inspire and encourage users to participate in more challenging projects and provide them with a greater understanding of engineering and improved confidence in their own ability to undertake STEM tasks.

The aim of this project is to create an immersive and interactive guided tour of the *SS Freshspring* and its journey through history while providing an engaging sandbox of STEM activities for all ages and abilities. The project provides great potential to inspire STEM learning and facilitates the opportunity for users to consider possible career opportunities in engineering.

When pandemic-based restrictions to the *SS Freshspring* are lifted, the Trust hope to run on board tours again. The VR project will provide a foundation for recreating the tour to include mixed reality activities and experiences on board the vessel itself.

### 6. ACKNOWLEDGEMENTS

BMT STEM Ambassadors for their enthusiasm and commitment to providing young people with engaging opportunities to inspire their future choices.

Heritage Emergency Fund for facilitating the purchase of the specialist equipment required to make the virtual tour possible.

National Lottery Heritage Fund for supporting the Trust in both their educational work and conservation of the vessel.

Nautilus International for their support to this project.

SS Freshspring Trust Volunteers for their on-going and invaluable support. Without their dedication and hard work, the ship would not have survived.

UWE for fostering a partnership which has led to the growth of both the Trust’s STEM and conservation work.

Worshipful Company of Shipwrights for their support to this project.

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## 8. AUTHORS' BIOGRAPHY

Dr Hashim Yaqub holds the current position of Visualisation Developer at BMT. He specialises in developing VR and AR applications as well as working various research projects ranging from their application in training to engineering design. Hashim has seven years of experience in his field and is responsible as a technical lead for the VR tour.

Martin Kemp holds the current position of Creative Media Director for the SS Freshspring Trust. He is responsible for designing, producing and directing the

Steamship Freshspring Trust's 360 video and Virtual Reality projects. His previous experience includes more than 30 years' experience as a factual documentary director for UK and US television channels including BBC, Channel 4, National Geographic and Discovery. Specialising in history, science and current affairs on film locations around the world. Previous projects include 3 months filming on board the Royal Navy's icebreaker, HMS *Endurance*, in Antarctica. Extensive experience in using CGI for documentary. Martin's academic background is in physical sciences.

John Puddy holds the current position of Trust Chair of The Steamship Freshspring Trust. He is responsible for Managing the Governance of the Trust and overseeing projects. His previous experience includes Ship Management and operations, past Director of Amber Foundation, working with young, disadvantaged groups, past Director of Greenpower a STEM related school project and Founder of the Steamship Freshspring Trust.

Laura Star holds the current position of Graduate Consultant within Naval Architecture at BMT and is a BMT STEM lead. She sits within the Outfit and Arrangement team and is responsible for supporting design solutions to specialist ship design challenges. Her previous experience includes weights management for Ship and Submarine designs.

# Working from home during Lockdown

Mike Greener

## Boiler Room Fresh Air Fan

Once again we find ourselves in lockdown with restrictions on what we can and cannot do on the ship during this time. As we can only spend very limited time on the ship, with priority for critical repairs, I decided to take a little bit of work home to keep myself occupied and complete work that would eventually need to be tackled.

Prior to Christmas I had been working on getting the old flaking paint removed from the port side Engine Room access door and entrance way along with ducting for the fresh air ventilation fan, ready for repainting. The condition of the painted surfaces was very poor, with the many layers of paint being either cracked or peeling away and corrosion starting to take hold. The ducting was particularly poor and had taken the most effort to dismantle and strip back to bare metal.

This ducting system pulls air from a vent on the upper boat deck and blows it down into the area in front of the boilers giving the stokers a steady supply of fresh air and helps reduce the temperature when the boilers were being brought up to steam. This ventilation system starts at the boat deck, comes down the engine room access way and through the bulkhead that separates the Engine and Boiler room access ways and drops into the Boiler Room.

In the Boiler Room access way, on a high level mount, there is located a motor-driven fan. It is this which pulls in the fresh air for the system and which was in a very sorry state. The multiple layers of paint



were peeling away and the underlying casting was quite corroded. Fortunately before the lockdown came into place, the motor and fan had been disconnected from the ducting and the cabling, so lent itself to being temporarily removed from the ship to be worked on.

Once the motor was up on the bench in my garage, I could see the extent of the work that was required and it looked like it was going to be a bit of a challenge. This was not going to be a quick refurbishment; all the attachments and fixings were either significantly corroded or covered in thick paint and where the paint had flaked away on the castings, heavy rust was apparent. The fan, while once having a galvanised coating, had corroded significantly and the fan fixing nut and boss were heavily rusted... what had I let myself in for!

A slow and methodical process of taking each item apart did bear fruit. If a part wouldn't move, a 24 hour soak in WD40 always did the trick and slowly over a week the motor was completely pulled apart, where I was finally able to work on each component part in isolation. Cleaning the bearings proved to be a significant challenge, as the ancient grease had gone to the consistency of cheddar cheese. However, once they were removed from the rotor, they were soaked, cleaned and re-greased. It was comforting then to find that they spun freely with minimal wear after this work, a real surprise as the motor must have worked extremely hard when the ship was based in Malta. The stator plate and brushes were in remarkably good condition with little wear

apparent; this was probably due to them being replaced on the refit which occurred before *Freshspring* was laid up.

After many hours of chipping paint, wire brushing and burnishing the castings, finally the motor and fan were back to bare metal and in a ready state for a coat of paint... but what colour!!

Over the years the motor like the rest of the ship had been painted in many



different colours. The original paint with which it left the factory, was a dark green. This was followed by a mustard yellow, then silver, next grey and finally white. I took a decision to paint it green; this was the colour in which it would have left the factory and more importantly I had a can of smooth Hammerite that was very close to the original green colour in the garage. As a short term fix, the fan and backing plate were given four coats of silver metal paint to replicate the original zinc plate and to protect from further corrosion.



On the side of the motor was a large brass identification and specification plate, which due to the motor's age and the environment it was located, was unreadable. However, with a vigorous light rubbing using a soft cloth and car polish, the information it contained came to life. It transpired the motor was manufactured by Verity's of Birmingham, to an Admiralty spec, in 1942, some four years before *Freshspring* was laid down. Whether this age gap was down to the motor being held in stock at Lytham St Anne's shipyard or it was re-purposed from elsewhere we will never probably know.

Verity's was a well established, large company, based in Plumes works in Aston, Birmingham, founded in 1825. The company manufactured electric motors, many for the Admiralty. They also produced desk fans and lights, employing over 800 workers during the war. There was also a suggestion that the company supplied advanced submarine electric motors towards the end of the war which were especially quiet so as to evade detection. Sadly the company was wound up in 1965.

## New members

We welcome the following new members of the Trust:

Stephen Brown

*Down, Northern Ireland*

Daniel Hutchinson

*Prenton, Cheshire*

David Anderson

*Northam, Devon*

John Boxall

*Frome, Somerset*

Peter Vickery

*Bideford, Devon*

# Daniel Adamson – the ‘Danny’

Cathriona Bourke

The influence of the maritime heritage sector depends on the sector working together, sharing experience, information and expertise. For many years, the relationship between the SS *Freshspring* and the SS *Daniel Adamson* (the ‘Danny’) has been fairly exemplary in this regard.

From the ‘Danny’ sharing advice on initial steps towards resourcing restoration of a historic vessel, to the *Freshspring* crew physically coming up to support our engineering team at a time of need, to continued sharing of knowledge and experience across a number of areas, most recently the field of virtual reality, new to both vessels, we have always valued learning from one another.

The ‘Danny’s’ restoration journey began in 2004, when her owner – the Manchester Ship Canal Company – agreed a deal with a scrap merchant, a deal which effectively consigned her to the breaker’s yard. Word reached individuals who would go on to form the Daniel Adamson Preservation Society, and the struggle to save the ‘Danny’ began.

The ‘Danny’ had started out as the *Ralph Brocklebank* in 1903, commissioned by the Shropshire Union Railways & Canal Company and built on Merseyside as a twin screw tugboat towing river barges from Ellesmere Port into the Port of Liverpool. From the beginning, she was designed to be a dual function vessel, and to carry passengers as a tender as well as tow cargo vessels.



The ‘Danny’ tied up on the Weaver in recent times.

When Ellesmere Port was sold to the Manchester Ship Canal (MSC), the ‘Danny’ was sold with it, and started service in the MSC fleet. Now towing great cargo vessels into Manchester Docks, she was also used increasingly both for private hires, and for taking visitors and potential trade partners on inspection tours of the engineering wonders of the ship canal. King Fuad of Egypt, King Feisal of Iraq, the Sultan of Zanzibar and numerous trade delegations from all over the world had been guests on board before the ‘Danny’ became the official director’s launch for the MSC in 1936. This was when she was re-named the *Daniel Adamson*, after the first director of the Manchester Ship Canal Company. It was also when she was outfitted with Art Deco saloons and a promenade deck, aiming to replicate the elegance of ocean going liners on the Manchester Ship Canal.

When the ‘Danny’ had completed her last duty in 1984, she was tied up, initially in Runcorn, and then at Ellesmere Port Boat Museum. However, she was never acquisitioned into the museum’s collection, so they couldn’t fund raise for her upkeep, nor did the MSC Company have funds for maintenance. The ‘Danny’ fell into disrepair, fell prey to arson and vandalism and finally was consigned to the scrapyards in 2004.

However, the fledgling Daniel Adamson Preservation Society persuaded the MSC Company to cancel the scrapping of this historic vessel. Instead, Dan Cross handed over £1 to the Manchester Ship Canal Company, and they agreed to hand over the vessel to DAPS on condition that they got her out of Ellesmere Port, and got her restored for posterity. For Dan Cross, the passenger licence, which still had time to be renewed under grandfather rights, was key to her survival.

With free towing into Liverpool and free



The ‘Danny’ towing river barges into Liverpool in 1907.



A passenger outing in the 1920s.

sharing of a dry dock from Svizer Marine (Dan's Company), inspection and securing of the hull carried out thanks to a loan from some of the new members, and a succession of favours, including a free berth from Peel Ports, free workshop spaces from United Utilities and 100,000 hours of volunteer labour, the 'Danny' succeeded in 2015 in getting £3.8 million Lottery Heritage Funding to restore the vessel and return her to operation over a five year programme.

We have now cruised on the River Mersey, the Manchester Ship Canal and the River Weaver, hosted school groups, weddings, Scouts, Guides, family parties, people with disabilities, folk groups, choirs and a variety of community organisations, and this year are working towards building a young people's volunteer team and developing our virtual reality resources, so that people can continue to access the vessel and to train throughout this Covid period. We have also found that 'going digital' during Covid has actually increased the reach of our group talks to a national audience.

We hope to continue to build on our valued relationship with the *Freshspring*, and are looking at ways for audiences to reach our VR offers through each other's sites, and we also hope to bring our young volunteers to visit the *Freshspring*. Through continued engagement with one another, we hope our relationship of mutual help and cooperation continues and grows even stronger.

- *Cathriona Bourke is the Learning & Participation Manager for the Daniel Adamson Preservation Society.*



The 'Danny' under way on the Weaver.

## Matt's Diary

I wrote my last diary entry in June 2020 whilst waiting to join a ship. Wales was in lockdown due to Coronavirus. To be perfectly honest, I couldn't wait to get back to sea. I couldn't do anything at home so the confinements of a ship seemed a far better and possibly safer environment, with a small number of people with less chance of Covid gaining hold.

Throughout this time, the number of ports throughout the world allowing crew changes changed on a daily basis. I was given around five dates to join a number of ships but unfortunately all fell through for various reasons. Eventually my luck changed and after two negative Covid tests, I flew to Nova Scotia, Canada to join the oil tanker *Stena Supreme* on 7th July. I joined the ship with the Captain, 2nd Officer and 2nd Engineer, all of whom I met for the first time in the hotel. Upon joining the vessel, I found that I had previously sailed with both the ship's electrician and messman, both of whom were over their contracts due to problems with sign off because of Coronavirus.



Once I had been introduced to the rest of the crew, the current 4th Engineer gave me a tour of the engine room. Whilst most of the machinery was familiar, it turned out that the cargo discharging system on this vessel was a little different to what I was accustomed to.

On my previous vessels the cargo pumps had been driven by electric motors but on this particular vessel they were driven by a steam turbine. The name for this arrangement is a Cargo Oil Pump Turbine or COPT for short. It consists of two main parts, a steam turbine and a centrifugal pump. The steam turbine is connected to the boiler steam system and it receives high pressure steam through a series of inlet nozzles. These nozzles convert the high pressure steam into high velocity jets



directing them to the turbine blades forcing them to rotate the shaft. The rotational power generated is then transmitted to the centrifugal pump through a connected shaft. Any excess steam travels through the exhaust to a vacuum condenser where it condensed back into water and then goes back to the boiler via a feed water pump.

My plan before joining this vessel was to focus on shadowing the 3rd Engineer, because as a 4th Engineer, this would be the next stage for my career. However, I quickly realised that wouldn't be the case as I ended up having plenty of problems with my own machinery that I had never experienced before. Initially this was very stressful as I struggled to find time for my daily routines as I was kept busy troubleshooting problems and repairing them. But at the end of the contract, I felt my engineering knowledge was much stronger and I had learned one good lesson – not all machinery breakdown solutions are listed in the manual!

One problem that arose that affected the ship as a whole occurred when we were about to set sail after a stay at anchor. As we were about to set sail, the main engine was prepared and I was stood by in the control room with the Chief Engineer waiting to move; however, we could hear on the radio that there was a problem with the anchor. It turned out that during our anchor stay not only had the anchor chain twisted but it had tied itself into a knot.

Eventually the deck team gave up trying to haul up the anchor and it was decided we needed to call for help. A day later a small boat came to assist us. They had a crane and were able to bring the knotted section of the anchor chain onto their deck where the decision was made to cut the knotted section out and use a Kenter shackle to reconnect the chain.



After work during our off times I got involved with a number of different activities one of which was a "boodle fight", which is a meal that dispenses with cutlery and dishes. Diners instead practice kamayan, Filipino for "eating with the hands". The food is placed on top of a long banana leaf-lined (or in our case, tin foil as banana leaves are hard to come by at sea) table and in the true military practice, diners do not sit in chairs but instead stand shoulder to shoulder in a line on both sides. Essentially, it's just a free for all eating the food with your hands.



The Boodle Fight...  
**LEFT:** Before...  
**ABOVE:** ... and after.



I also started playing basketball with the Filipinos on a Sunday. Basketball is a very popular sport in the Philippines and I was shown up almost immediately. We ended up purchasing jerseys with the ship's photo and our names on the back which were brought on board by a crew member joining the ship from the Philippines office.

During a couple of stays at anchor, we also tried our luck with fishing. We were able to catch plenty of Dorado fish but eventually had to stop as the Chief Cook ran out of room in the freezer!

After 4½ months, having sailed across the Atlantic to India then on to the UAE and Iran, we eventually navigated the Suez Canal to the Mediterranean and finally to Antifer, France where I signed off with the exact same people that I joined the ship with in Canada. Luckily there was no Covid restrictions in place in France so I was allowed to return home immediately where I began my 14 day self-isolation period. I now have leave until February 2021 when hopefully I can rejoin a ship to continue my engineering journey.



# VIC 56 Re-tubing the boiler in 2017

Colin Hatch

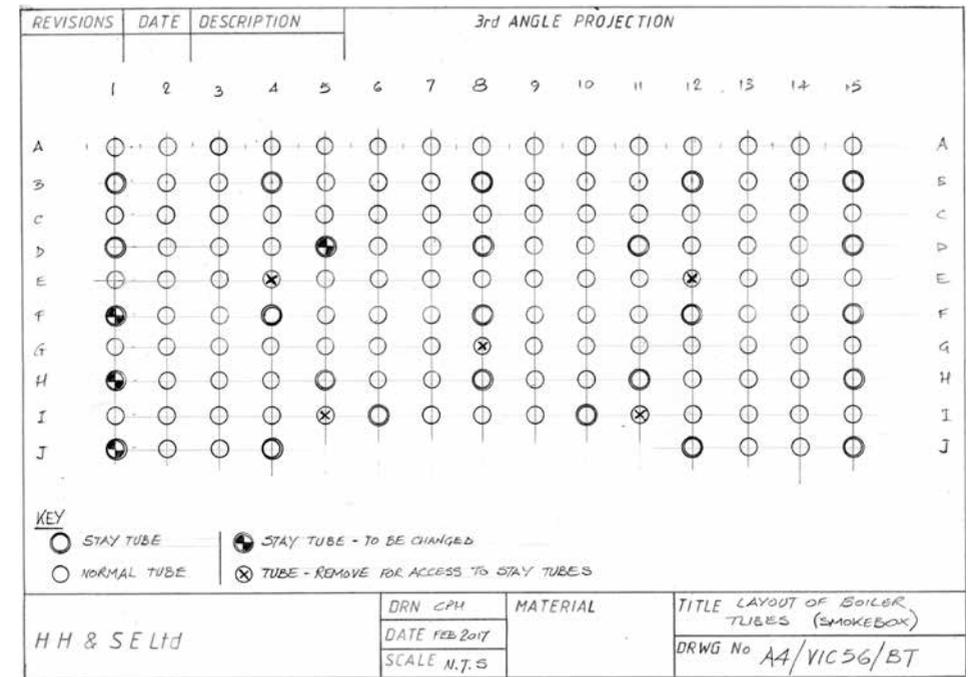


VIC 56 at Chatham with Sam Thompson on deck.

**J Henry Cleary**, the owner of VIC 56, contacted me in late 2016 to ask if Hatch Steam Engineers could assist with sorting out a problem with some corroded stay tubes which had been found as a result of the annual boiler inspection. Following on from my visit to Chatham Historic Dockyard to view the job, it was agreed that we would remove just enough of the flue tubes to enable viewing of each stay tube by use of mirror and light, although many would be accessible from the steam space in the top of the boiler.

This Cochran boiler, built in 1945, has 118 smoke tubes and 26 stay tubes. The nominal size of the tubes are 2.5in. dia. The smoke tubes have been replaced in 1956, 1967, 1978, 1988, 2000, and 2007. The stay tubes were believed to be the original ones from manufacture in 1945.

Sam Thompson (BESTT trained boilermith) and I were to carry out our first of several visits to Chatham, with all our tools and equipment. As VIC 56 was moored in the Medway, the vessel was constantly on the move, so we had to load most heavy



A plan of the tube nest drawn up to indicate which flue tubes were to be removed.

gear at high tide. When she was on the bottom, at a slight angle, a very long ladder was the only access!

As a result of inspecting all the stay tubes (including a visit from the boiler inspector), five were ear-marked as needing to be replaced. Whilst we were on the first visit, we removed one stay tube (F1 on the plan) which was cut through by climbing down the side of the tube nest. The removal of this tube enabled measurements of



Sam Thompson warming the tube ends for removal.



Sam Thompson with mirror and light inspecting stay tubes.

the threads in the tube plates to be taken, as these were not shown fully on copies of Cochran drawings available to us.

The cause of the tube pitting was believed to be that the corroded feed water pipes situated adjacent to the tube nest were allowing oxygenated water to enter the boiler water at a level near the bottom of the tube nest instead of near the boiler water level, and the stay tube corrosion was more prevalent in this area (see tubes affected on left side on the plan). Part of the repair involved replacing these two feed pipes.

During the removal of the first stay tube, while attempting to collapse the ends, it was realised that as the tubeplates are nominally 1in. thick, removing stay tubes amongst the tube nest would be very difficult and it was decided by the owner to replace all of the smoke tubes, therefore giving complete access to examine all the stay tubes adequately.

Working inside the boiler meant we had set up an air extraction fan to remove fumes; all the mudlid doors were removed from the boiler to allow air to enter at the bottom. It became very apparent to Sam and me how boiler work on a vessel is



*The holed feed pipe, and the second pipe missing.*



*Removing the flue tubes by cutting through inside the boiler.*



*The stay tubes after removal of the flues. The third tube on the right (D5) can be seen badly pitted.*



*The new tube stock, 5 stay tubes on top left.*



*The long bed lathe for screw cutting the consecutive thread with a single point tool.*



*A ring gauge for the small end.*

much harder due to working in small spaces, and having to clamber over items. We constantly had to modify our safe working practices.

Back at Swindon we could order new tube material. I made a mock up stay tube to the sizes which I thought were correct diameters each end by 9 TPI pitch. Even so, on a return visit to Chatham to check sizes and fit, I had to use a lathe in the maintenance shop through the good offices of Chris Jones to 'chase' the threads in order to get my tube to fit. The tube outside diameters ended up as 2.480ins firebox end and 2.687ins at smokebox end. Back in Swindon, I then made ring gauges so that when the threads were cut on the tubes, I had means of checking them.

In the swelled end of the stay tube I tack welded in a short length of thick walled pipe so this could be held in the chuck of the lathe for machining. Also, when fitting to the boiler, the tubes were screwed in by using a large pair of Stilsons, and a pipe!

Sam and I had several visits to Chatham, lodging at the Travelodge conveniently situated at the entrance to the Historic Dockyard.

On the face of it, at the beginning of the project, it was a relatively small job, but as with many boiler repairs, escalated into a bigger one. We also had to transport all tools and equipment, and hired in a Hydrovane air compressor, parked on the quayside to feed our air tank which was on the deck, to power the air tool for expanding all the tube ends. I remember one occasion when Sam had gone up the ladder to the compressor to get the air on and I was in the boiler room getting the air tool ready, when suddenly the air hose came off the tool, and the supply hose was thrashing around like an angry Anaconda, disturbing every bit of dust and turning the whole area into a dust storm blackout! I retreated up the ladder and onto the deck to shut off the air receiver, as my shouting to Sam was completely pointless due to the high revving compressor. On this day, and others we would return to the Travelodge, and the young lady in the reception would burst out in laughter at the two black faces coming through the doors!

The fitting of the stay tubes went ahead, again with visits to the lathe ashore to chase the threads. The worst case scenario can be when a thread is too tight and it

picks up, tearing the thread in the tubeplate – then you are in trouble. There is a short video on youtube showing the last stay tube being fitted. [https://www.youtube.com/watch?v=CR9q\\_XRAg-8](https://www.youtube.com/watch?v=CR9q_XRAg-8)

Following this all flues were fitted & expanded.

On our last visit to Chatham to complete expanding, the boiler was re-filled and pumped up with water pressure to prove the fit of the tubes. After some weeps were re-expanded, a successful conclusion was achieved.

Credit must go to Henry Cleary for keeping this vessel in working order, together with his band of merry men, one or two of whom I had the opportunity to meet. I admire his tenacity and dedication in keeping her fully operational, I believe, for something over 30 years. The vessel has now moved on to Portsmouth.

I am sure Henry could relate an interesting story with his time on VIC 56.



*View of the smokebox end showing the variation in tube hole diameters from 2.600ins upwards. The five stay tubes with their tack welded sockets are in position. Access and space at the firebox end of the boiler is limited as the bulkhead here is close to the boiler. Precious little room for two men and the air tool expander, hose, and various tooling.*



*Cochran makers' plate.*



*The ship's builder's plate.*

## A trip on an 'Up and Downer' Part 1

**John Richardson**

In 1968, I was an engineer cadet with Esso Tankers and had completed two trips on steam turbine powered ships. After a few weeks leave, I was told my next vessel was to be the *Esso Preston* (pictured below) a coastal tanker of 2,790 tons deadweight. She had been built for the bitumen trade and all her cargo tanks had been fitted with steam heating coils to prevent the bitumen from solidifying. For me, however, her most interesting feature was that she was powered by a triple expansion, steam reciprocating engine of around 1,550 horsepower. I had always thought I would be too late to serve on 'up and downers', which were almost dead and buried by this time, so when I heard of my posting I was thrilled to bits.

I joined the ship at Purfleet – and found it to be almost deserted apart from the second mate who showed me my cabin and a seaman tending the ropes. Having unpacked my gear, I wandered down aft and poked my nose into the engine room where I was greeted by my first view of the triple expansion engine, which was a real beauty and the two Scotch boilers that supplied the steam for it. The boilers were still fired up and were not far off their full pressure of 225psi, although none of the other steam plant was running and all the electrical requirements of the ship were being met by a six cylinder diesel generator – I think it may have had a Perkins engine but after all this time I can't be sure. When I had got down the ladder to the bottom plates, I was met by the 3rd Engineer, who said hello and gave me a quick guided tour.

The engineering crew of the *Esso Preston* consisted of the Chief Engineer – who was an alcoholic Geordie approaching retirement, who never once to my knowledge set foot in the engine room, a 2nd Engineer, 3rd Engineer as mentioned above and a 4th, together with one fireman/greaser on each watch. The 2nd Engineer was not in fact a proper engineer at all and had started his career at sea as a cabin steward with the mighty Cunard Line. He had a foul mouth and an even worse temper, so I can't imagine how he managed to hold down a job like that on a passenger ship. He had been on the *Preston* for so many years working in the engine room, however, first as a rating and then by virtue of long experience, as 4th and then 3rd Engineer,



that he had been granted a dispensation by the Board of Trade to sail as 2nd without actually having to take his 2nd's ticket. I am fairly certain that this dispensation would only have been valid on coastal trade vessels like the *Preston* and possibly only on the *Preston* itself as he never mentioned to me that he had ever been on any other of the Company ships. I think it rankled with him that when the old Chief retired, it would be the 3rd (who did have a proper ticket) that would take his job, rather than him.

After the complexities of turbine ships, the dear old *Preston* was wonderfully simple and within a few days, I had worked out all the pipe systems and could pretty much run the job on my own. The 2nd obviously thought so too, because he put me on his own watch (the 4 to 8) and unless we were on stand-by while entering or leaving harbour, I never saw him in the engine room before about 7.30 in the mornings. This didn't bother me at all, and in fact the less I saw of him at these times the better I liked it, as he too had a drink problem and was usually nursing a hangover every morning, which made him all too ready to work off some of his bad temper on me.

As to the machinery, nearly everything was steam driven – quite a bit directly from the main engine itself and apart from the lights, galley equipment and the domestic fresh water and sanitary pumps, there was hardly any other electrical plant. The two Scotch boilers had small Weir type fuel and feed pumps, while the forced draught fans were driven by a couple of high speed, enclosed crankcase steam engines (the boilers could also be fired with just natural draught if the need arose). The sea water cooling pump for the condenser, a bilge pump and the Edwards air pump for creating the condenser vacuum, were all driven from the main engine high pressure crosshead. The steering consisted of an old fashioned steam tiller, which would normally be motionless, apart from a whisp of steam leaking from the glands to tell you it was actually turned on; when it got a helm order, however, it would burst into life like some demented robot and clatter over to the required position before subsiding into quietude again. This was completely different from the electro-hydraulic steering I had been used to, where the only indication that a movement was about to take place would be a slight change in the whine from the electric motors, after which the hydraulic rams would silently move the rudder over to the new position. For our limited electrical needs there was a very small steam turbo generator to supply the load at sea and the aforementioned diesel to do the same when we were in port.

The triple expansion engine stood around 10 feet high from the floor plates to cylinder head level and was kept in a very clean condition, with all the copper and brasswork being polished at least twice a week, while the steelwork was kept bright and shining with 'Scotch-Brite'. The 2nd Engineer was largely responsible for this and was forever going round wiping the engine over with an oily rag or attacking any rust spots with emery cloth before they had a chance to spread – whatever his other faults the engine was always a picture and did him much credit. The chequer plating around the engine was also kept in gleaming condition and was mopped over every watch – at the foot of the ladder leading down from the top level, which was the usual route in and out of the engine room, legions of engineers' boots had worn away the diamond pattern, so that it was now just a sheet of bright steel plate.

The triple expansion engine was invented well back in the 19th century and is so named because although the engine may have had three cylinders, the steam is only admitted to the first of them – the high pressure or HP cylinder. After doing its work there, the exhaust is taken to a second, larger cylinder called the intermediate pressure or IP and the exhaust from this goes in similar fashion to the low pressure or LP, which is bigger still. Finally, the exhaust from the LP went to the condenser, so the steam was used (expanded) three times.

As these engines go, the one on the *Preston* was a quite modest affair; I seem to recall that the HP cylinder was 18ins diameter, the IP was 28ins and the LP around 42ins with a common piston stroke of 30ins. As you can see, even an engine this size had a pretty big LP cylinder and some of the very large triples used two LPs, to avoid the manufacturing difficulties of constructing cylinder blocks with bores of 8ft or more in diameter – although these would now have had four cylinders, they would still be triple expansion. The engines of the *Titanic*, which were amongst the largest ever built, had cylinders of 54ins, 84ins and two LPs at 97ins diameter with a common piston stroke of 75ins.

The *Titanic's* machinery was in fact an example of quadruple expansion because the exhausts from the two reciprocating engines which drove the outside screws, were led to a turbine connected to the central propeller shaft in order to extract even more energy from the steam. Although the exhaust steam pressure entering the turbine was only 9psi and was then expanded down to whatever condenser vacuum could be created, the turbine still managed to produce 16,000 horsepower, which was the same as each reciprocating engine. The two giant 'up and downers' weighed around 1,000 tons each and together with the boilers, will still be largely intact on the bottom of the Atlantic Ocean long after the rest of that great ship has turned into a pile of rust.

Unlike my previous deep sea ships, the *Preston* was engaged on coastal and near continental trade only and we were therefore in and out of port every few days. From Purfleet, I can remember that our first trip was to Antwerp, where the 3rd Engineer took me ashore. We went to a place called 'Danny's Bar' where there were a number of extremely good looking women to be seen mingling with the customers. I have to confess that I was very attracted to one of them and mentioned this to the 3rd, who burst out laughing. "I should be careful if I were you" he said, "I think you may find that woman is in fact a bloke in drag!" I found this pretty hard to believe but when 'she' sidled up to me and asked if I wanted to buy her a drink in a distinctly baritone voice, I finally saw the light (and also a trace of five o'clock shadow under her make up!) Having survived this embarrassment, we enjoyed a few beers and listened to a local group, so it finished up as a very pleasant evening.

From Antwerp, it was back to Purfleet, then to France and a trip up the river Seine, where our destination was a tiny place called Quillebouf sur Seine. Here we found a typical French bar/cafe where we sampled some of the local wine instead of beer – I was not impressed, although we also had a meal which was both tasty and cheap.

*To be continued.*

## Freshspring Steam Beer!

Continuing our successful relationship with Bideford's Clearwater Brewery, The Steamship Freshspring Trust is excited to announce a new recipe for our 'Freshspring Steam Beer'.

The new Freshspring Beer is 4.2% abv and is a golden hoppy beer with a distinct clean and crisp edge... very drinkable!

Freshspring Beer comes in 500ml bottles and is 'bottle conditioned' which means some of the natural ingredients are present in the beer. This gives a more intense flavour but the bottle needs to stand before drinking to allow it to settle and requires careful pouring.

The beer is available direct from the brewery at £2.50 per bottle including VAT and can be ordered through sales@clearwaterbrewery.co.uk or by phone on 01237 420 492.

Delivery for a minimum of 12 bottles can be made for free within a 10 mile radius. Deliveries further afield will be made by courier with a £15 charge.

Payment to be made in advance by BACS (call the brewery for bank details) or by cheque made payable to Clearwater Brewery Ltd.



Clearwater Brewery Ltd  
Unit 1 Little Court  
Manteo Way  
Bideford  
Devon  
EX39 4FG



## Leaving a legacy to the SS Freshspring Trust

The Steamship Freshspring Trust has benefitted greatly from the generosity of its members and friends who have left or given money to the Trust.

Legacies provide very necessary financial support in helping the Trust to meet its stated objectives of preserving the past and inspiring knowledge for the future

If you would like to think of giving the SS Freshspring Trust a legacy, it could not be easier: The following codicil can be completed by you, witnessed, and kept with your Will.

### CODICIL

I (full name).....

of (full address).....

.....  
declare this to be the (1st/2nd/other.....) codicil to my Will dated.....

I give, free of Inheritance Tax, the sum of

£..... (.....pounds)

to the SS Freshspring Trust of Little Cleave, Lower Cleave, Northam, Devon EX39 2RH (Registered Charity Number 1151907), absolutely for its general charitable purposes.

In all other respects I confirm my said Will.

Testator's signature:.....Date.....

Signed in the presence of:

First witness  
Signature

Second Witness  
Signature

.....  
Full name

.....  
Full name

.....  
Address

.....  
Address

.....  
Occupation

.....  
Occupation

Note: The witnesses must not be your executor, your executor's spouse or a beneficiary of your Will.

# Freshspring's Sponsors

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