



2020 – what a year it is turning out to be...

In this second edition for 2020 of our Spotlight newsletter, we bring you a special message from our General Manager, Phil Kemp. Phil mentions that this was to be a big anniversary year for SAACKE in the UK, but unfortunately the party has been put on hold... To continue reading, please go to page 2.



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Hot tips

Are you prepared for Brexit (end of the transition period on 31st December)? Do you have the necessary spares available for your plant if you experience a breakdown on 1st January? We have taken steps to minimise interruption in the supply chain process. However, with some SAACKE components coming from the EU, we would like to highlight the following:

- To minimise the risk, it may be a good idea to order your key spare parts now
- It may also be sensible to stock more emergency parts on site than you would normally
- We are working to keep any price rises to a minimum as we monitor the financial impact of Brexit, but ordering now could delay the impact of this.

We strongly recommend that you carry out an audit of your supplies. It is also vital that you know what your critical spares are. Do you know? If you require any help, please contact us via ukspares@saacke.com or on +44 (0) 23 92 333907.

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Message from our General Manager

Here is a special message from Phil Kemp, General Manager, SAACKE Combustion Services Ltd as we approach the end of 2020:

Welcome everyone to the latest edition of our Spotlight newsletter. This year will unfortunately be remembered for Covid-19, rather than any achievements in business or our private life. The 'Take care and stay safe' message will be with us for a long time yet. This was to be our big anniversary year with a SAACKE presence in the UK for 60 years and also 10 years of SAACKE Combustion Services Ltd. Unfortunately, the party has been put on hold whilst we endeavour to overcome the challenges this pandemic has posed for us all.

We endeavour to highlight various topics in these newsletters. Some may not be directly relevant to your business, but can be of general interest including as to how other industries are working. In this edition we cover Waste-to-Energy, the future of combustion and alternative fuels, including where we are on hydrogen.

You are hopefully aware of our mission statement "We believe that energy generation from fossil fuel combustion can be as efficient and clean as from sun, wind and water". With our vast knowledge of combustion and excellent back-up support, we can advise on plant efficiency and offer solutions to optimise your plant performance which is particularly key at this time when revenue streams may have suffered due to the pandemic. Along with this, comes our customer service support. Continuing the maintenance schedules of all plant is so important to ensure efficiency, safety and compliance with the relevant legal requirements. If you are not one of our many service contract customers, then please contact us and we can supply a bespoke service contract to suit the needs of your business. Let's all prepare for the future.

I hope you enjoy the read. Take care and stay safe.



Update on our risk assessment and training services

Over the last few months, our Training Officer, Martin Seller has been able to carry out on site Boiler-House Technical Risk

Assessments and BG01 training again, in accordance with the latest rules of course. The Boiler-house Technical Risk Assessment is mandatory under the Management of Health and Safety at Work Regulations - MHSWR Regulation 3. We recommend reviewing these assessments every 2 years.

Training your staff to operate machinery in the workplace is mandatory as stated in the Provision and Use of Work Equipment Regulations - PUWER Regulation 9 Training. The BG01 training course is aimed at steam and hot water boiler operators. It is a one day site-based course, designed to fit in with the equipment in operation and show all of the best methods of safe and efficient operation. Some prior knowledge of boiler operation is required as this is not an introductory course. We recommend retraining all staff every 2 years to maintain knowledge and skills levels and to make everyone aware of industry changes and guidance note / regulation changes.

For further information on Boiler-house Technical Risk Assessments or your training requirements, please contact Martin via **+44 (0) 23 92 333833** or m.seller@saacke.com

Have you attended one of our popular Masterclasses yet?



Our Masterclasses are live online sessions lasting around 1 hour. We have been running sessions using this format since 2018, but it has definitely been a format very well-suited to 2020 with all the restrictions we have been facing due to the pandemic. We have now had over 700 participants, with many people attending regularly.

We have offered a varied Masterclass programme so far this year covering the topics of Best Available Techniques for Industrial Emissions Directive compliance, An overview of Waste-to-Energy and Hydrogen as a fuel for combustion. We are also running a session on Energy Losses in December. To attend, all you need to do is register in advance and click the link provided at the specified time. There is no charge for the sessions.

We are currently planning a new programme for 2021. More information will be sent out via email in due course. If you don't receive our emails and would like to (to ensure you don't miss out on future events), please email Susie Bell via s.bell@saacke.com

Spotlight on Waste-to-Energy

Ever since the beginning of urban society, we have generated waste. Most of it ends up as 'Municipal Solid Waste' (MSW), be it food waste, packaging or old rags. For years, this waste was piled up in dedicated municipal waste dumps polluting the ground and atmosphere for years to come. Eventually something had to give.



Advancements in technology have made it possible for us to burn waste to produce energy. It could be argued that the process is itself adding to a polluted world, but the emissions from a Waste-to-Energy (WtE) plant are controlled so pollution is far less harmful than leaving the waste to rot.

The concept uses the same technology that has been around for a century or more to produce power for ships' propulsion and electricity in power stations. High pressure superheated steam is produced to drive a steam turbine connected to a generator. Some of the steam can also be used for process heating. The only difference is that in the beginning we used coal or heavy oil as fuel, both contributing to pollution over the years.

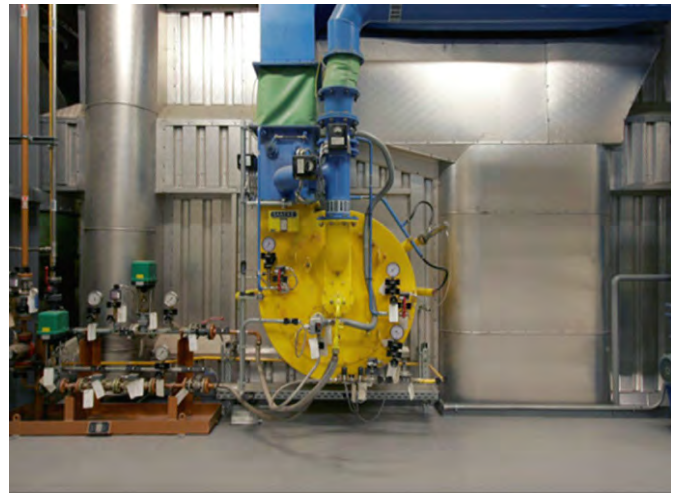
MSW has a calorific value (CV) just the same as any fuel. The CV is low but when the waste is in such abundance, the CV is more than enough. Just like any solid fuel such as wood or coal, the burning process involves heating up the waste until it emits combustible gases. The main proportion of the gas given off is Carbon Monoxide. This burns in a big fire ball just above the hot bed of burning MSW. The heat from the burning gas ignites the MSW as it is introduced to the furnace making it self-sustaining.

However, we need to get the condition in the furnace right before we can start to burn MSW. The furnace must be heated to above 850°C before MSW can be introduced. This is done using fired burners. The burners can burn a variety of fuels but the most commonly used fuel is Light Fuel Oil (LFO). The burners are also needed as support burners for the MSW if the CV of the MSW reduces and

the furnace temperature starts to fall as a result. In this case, the burners would start up during furnace operation to maintain a minimum furnace temperature of 850°C as defined in the Waste Incineration Directive.



SAACKE has a lot of experience in supplying burners for WtE plants. We have a variety of burners that can be used and the selection of the correct burner is part of the process of designing a new plant. Most burners used are oil burners using an atomising medium such as compressed air in a 'Y' jet nozzle which is a proven reliable concept. The most common burner for this type of operation is the SAACKE SSB swirl burner which due to the high swirling combustion air, encourages homogenous mixing of the burner flame with the surrounding flue gas in the furnace.



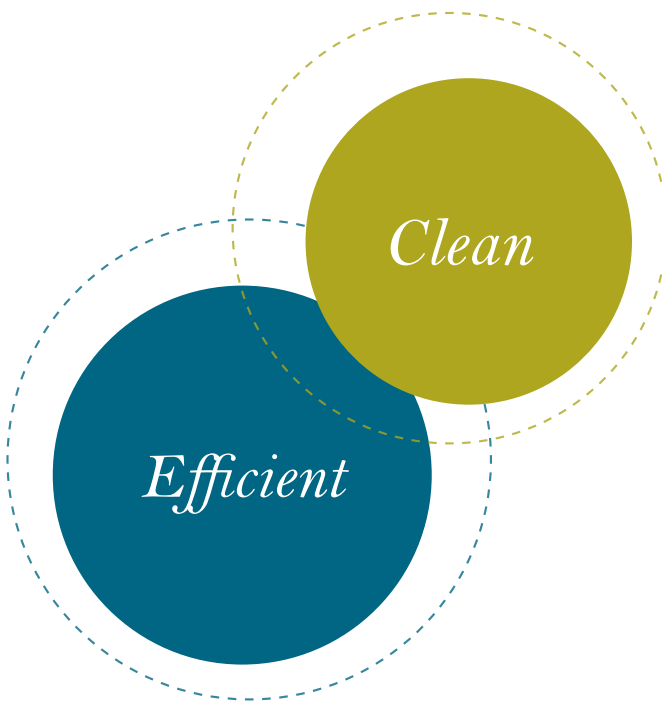
All SAACKE WtE plant burners come with robust and reliable auxiliary equipment such as flame scanners, igniters and oil metering skid. The SAACKE burners also have their own PLC based control system that can interface with any modern PLC, DCS or SCADA system. The Burner Management System is a proven reliable system robust enough to operate in the harsh environment of a WtE plant.

For more information on SAACKE burners, please contact Eddie Harris, Sales Office Manager via **+44 (0) 23 92 333823** or **e.harris@saacke.com**

Does combustion have a future?

What does the future for combustion technology look like in times of climate change?

At SAACKE we have been dealing with these and similar questions since way before the current climate debate. For us, everything revolves around industrial combustion processes, so it is only natural that the current climate crisis should call our business into question. But our business is the conversion of energy, which does not automatically refer to fossil fuels. We can do considerably more.



Fossil fuels are still being burned because they are readily available and almost all industrial processes are designed to do so. According to sources such as the World Energy Outlook of the International Energy Agency (IEA), the share of renewable energy sources in the total market will increase by 2040 (that's as far as the outlook goes), but the actual consumption of fossil fuels will increase rather than decrease, because the global demand for energy will grow, and grow faster than renewable energies can cover. In detail, the World Energy Outlook forecasts a significant increase in the demand for natural gas. The demand for fuel oil will also increase, but to a lesser extent. And even coal will continue to be burned, but with a consistent rate of consumption. Renewable energies such as wind power or photovoltaics are clean and definitely worthy to be promoted, but they also have disadvantages: they are weather-dependent, for example. No energy is produced without wind or sunlight and storage facilities are currently only available to a limited extent.

The statement that renewable energies alone will not be sufficient in the longer term applies to electricity production, but it applies even more so to transport and heat production. Here, fossil fuels have a competitive advantage as they are simply cheaper. Moreover, a lot of processes cannot be converted to new fuels without high investment costs for modifications or modernisation. Political incentives are necessary here, because the main interest of industry is profit, not saving the global climate. The only real reason for industry to accept a profit reduction in favour of emissions would be tough legislation. Although such regulations are currently being discussed and are in some cases already implemented (keyword CO₂ trading), they will not suffice to reverse the trend. Even if the incentives are stepped up and a rethink actually becomes financially attractive, combustion technology will still remain relevant. More will be invested in energy efficiency and the focus will shift to little-used, climate-neutral fuels such as hydrogen.

Climate discussion aside – what other effects would increased efficiency and fuel changes have? Even if we cannot do without fossil fuels: their availability is finite, according to numerous studies. We may not live to see the end of availability. But our children and grandchildren will – and that is why it is worth taking care of what is still there to prolong these periods of time. Moreover, crude oil, for example, serves as the basis for a whole range of products other than fuels. The refining of oil produces various useful by-products which are further processed and serve as the raw material for the production of many everyday products. So far there are no alternatives, making oil extremely valuable and far too good to be burned. This is one of the reasons why SAACKE is also focusing on the development of alternatives to the burning of fossil fuels and already has technologies available today that make the addition of fossil fuels unnecessary.



Above: Natural gas flame, TEMINOX GL burner

With renewable energies not forecast to be able to cover the predicted increased demand for energy worldwide, currently there is no way out of combustion, especially not with our area of expertise, the high-temperature processes ($> 500^{\circ}\text{C}$).

What is the solution if combustion cannot be avoided?

We have to find ways of meeting the growing energy demand and still significantly reducing emissions. Efficiency is one of the most important influencing parameters. Another parameter is 'fuel switching', which means replacing climate-damaging fuels with alternative fuels. As an example, almost all production processes generate residual materials and these products should be increasingly used to generate energy, resulting in two direct emission saving potentials. On the one hand, no fossil fuels are used to generate this energy. On the other hand, these residues, which would otherwise be discharged unused into the atmosphere, are actually used for a positive purpose and are less harmful to the environment afterwards.

Is SAACKE ready for the fuel switch?

There is a clear answer to this question - yes! We were significantly involved in the first big step away from heavy fuel oil and towards gas, which was taken years ago for land applications. And we are also very well prepared for the turnaround beginning in the marine sector. It is currently foreseeable that the market will focus on the increased use of alternative fuels such as hydrogen or wood dust as the next step. We have been doing this for years too. SAACKE already has a wealth of experience, particularly in the use of other, alternative fuels. Here are a few examples:

- ▾ Biogas combustion
- ▾ Hydrogen combustion
- ▾ Animal fat incineration
- ▾ Low calorific gases and liquids, for example from upstream processes.

Industry 4.0

In the past, there have been groundbreaking innovations that have had a fundamental impact on the way we work. The next revolution in industrialisation is currently in full swing: The 'Internet of Things', also known as 'Industry 4.0'. We don't need to be scared of this development - we must recognise and take advantage of the opportunities. After all, the climate targets and the associated emission limits cannot be achieved without the opportunities offered by Industry 4.0 (intelligent energy generation and intelligent consumption control). Through increasingly inexpensive, networked technology, completely new possibilities for optimising efficiency are emerging, including in the field of combustion technology.

Interconnecting systems to improve the efficiency of processes and plants is becoming increasingly relevant. On the basis of our measuring and analysis technology, we will soon be able to run plants automatically at any time at the optimum operating point (optimum fuel use = minimum emissions). This will become increasingly relevant as carbon dioxide neutral fuels such as hydrogen or biogases increase in frequency and importance. They are often present in fluctuating compositions and therefore place high demands on analysis and control technology.



Using a so-called dashboard (pictured above) that transparently presents the key figures of the plant, we can already analyse plants all over the world accordingly from any location. As well as some prototype plants in industry, we are already regularly applying this principle in the marine sector. With the broader market launch of the EGCS (Exhaust Gas Cleaning System), also known as a 'Scrubber', there are systems on board that optimise exhaust gas purification, but also serve to prove compliance with emission limits.

In the medium term, this will enable us to generate benchmarks from which our customers can derive direct cost-benefit analyses and significantly simplify the decision to modernise. We are also currently developing assistance systems for commissioning and possibilities of predicting impending problems during plant operation by means of sensors and corresponding logics ('predictive maintenance') in order to initiate appropriate measures or spare parts deliveries even before a potential failure. This will also result in minimising travel by our service engineers.

Combustion has a future!

There are many perspectives and approaches to dealing with the issue of environmental protection and climate change. Simply because these are global issues, we are dealing with an enormous complexity. However, combustion has a future - we can say that with certainty.

How can we use alternative fuels to reach net-zero carbon emissions?

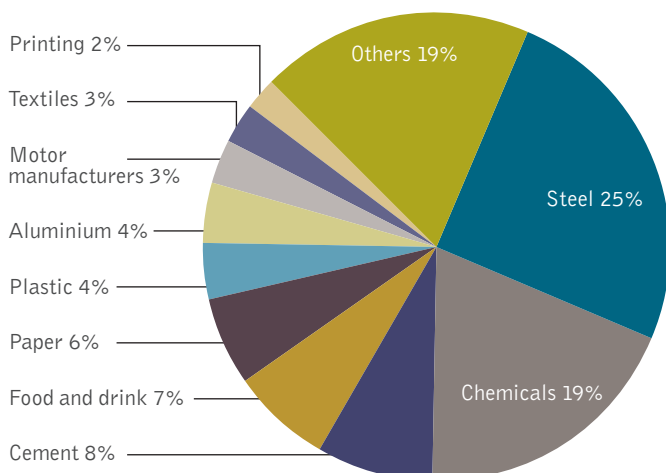
In June 2019, the UK Parliament passed new legislation requiring the government to reduce the UK's net emissions of greenhouse gases by 100%, relative to 1990 levels, by 2050.

In seeking to deliver net-zero emissions by 2050, the UK starts from a position of advantage. The Climate Change Act provides the legal framework for decarbonisation, with the independent Committee on Climate Change setting out the legally binding Carbon Budgets required to meet the government's emissions reduction target. This new legal commitment to net zero by 2050 represents a significant step change in the UK's level of ambition however!

By burning fossil fuels and destroying forests, we are releasing greenhouse gases, importantly carbon dioxide (CO₂), into the atmosphere. These heat-trapping gases are warming the planet, setting in motion changes that are taking us outside the climate bounds within which civilisation developed.

We cannot afford to let the planet get much hotter and at today's already elevated temperatures, the massive Greenland and West Antarctic ice sheets - which together contain enough water to raise sea level by 12 metres - are melting at accelerating rates. Glaciers around the world are shrinking and at risk of disappearing, including those in the mountains of Asia whose ice melt feeds the continent's major rivers during the dry season.

The chart below demonstrates the challenge we face, every industrial sector / process has a part to play.



So, how can we achieve zero net carbon emissions? The term 'net carbon emissions' means that either the carbon dioxide emitted through the process is either removed before combustion or offset in some way. Currently there are 2 fuel sources seen as the possible solution to help turn the climate crisis around.

Hydrogen - a possible combustion fuel of the future

There are many projects underway across the UK looking to use hydrogen (H₂) as an alternative to natural gas, with the supply network operators seeing this as a potential means of reusing their existing gas infrastructure to transport it to industrial and residential customers, as well as in standard combustion. SAACKE is also currently working with several companies on trial firing hydrogen in various industrial process applications for viability. It's seen as such a credible solution because hydrogen in complete combustion only results in water as an emission.

Hydrogen – the basics

This is the equation for complete combustion of natural gas:



Methane 2 x Oxygen Carbon Dioxide 2 x Water
(one carbon bound to 4 x hydrogen)

The issue with natural gas is the transfer of the carbon in the equation, that carbon bound in the natural gas goes on to produce the climate killing carbon dioxide gas (CO₂). So, the obvious answer would be to try and remove the carbon from the equation in the first instance...

The equation for complete combustion of hydrogen:

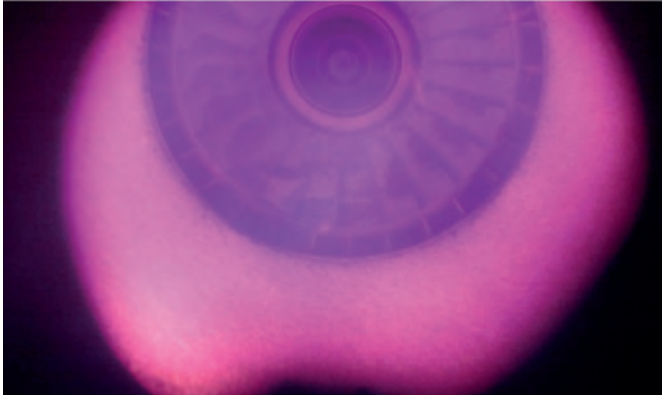


Oxygen 2 x Hydrogen 2 x Water

Sounds easy - but it isn't! There are several methods to produce hydrogen being considered currently, broadly classified as the following categories:

Green hydrogen - Hydrogen produced by electrolysis of water, with the energy for the electrolysis being via renewable means such as hydro, solar or wind. Whilst the best solution in terms of being completely emission free through its process, it is energy intensive to produce.

Grey hydrogen - Turning methane into hydrogen with high temperatures. The carbon is extracted and emitted however as a by-product.



Above: A hydrogen flame

Blue hydrogen – As grey hydrogen, but in this method the carbon is captured and deposited underground / in landfill known as CCS technology. This is less energy intensive compared to green hydrogen, but that carbon is still produced and has to go somewhere. The positive is that it isn't released into the atmosphere however.

All methods have to overcome obstacles to make this solution the viable option we all hope it can be. Producing hydrogen is just one part of the challenge, burning hydrogen is also not straightforward. Whilst carbon dioxide may not be produced, thermal NO_x production is a real challenge owing to increased furnace temperatures.

Biofuels – waste not, want not!

Biofuels widely vary in their form and origin, from liquids to gases and on to solid fuels - a broad spectrum indeed! All are based on the same basic fact that they are not a fossil fuel and instead originate from organic matter. Here is a brief summary:

Coming soon!

We are currently preparing an app that will be available to all of our Service Engineers which simply identifies any obsolete items installed on your burner / boiler plant within a matter of minutes. This is all part of our Customer Service Solutions to provide the best possible support to all our customers. Components are identified as:

- Green: Fully supportable
- Amber: Nearing the end of its lifespan
- Red: Obsolete item, danger of downtime to the plant unless upgraded

Our goal - To deliver Exceptional Service company-wide.

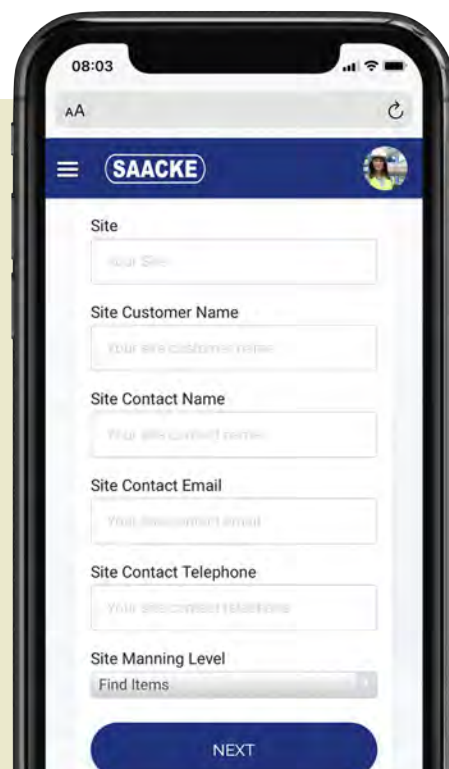
Biomass: Biomass is a solid fuel solution and another contender for net-zero emissions. Wood pellets / dust is a popular form of biomass and has carbon neutral credibility because the carbon dioxide emitted from its incineration is offset by the amount of carbon dioxide the trees would have absorbed in their lifespan.

Biogas: This is another biofuel gaining media attention for its green credentials. Waste gases from waste organic matter held in an anaerobic digestion plant are captured and used for combustion.

Biodiesel / Bio-oils: Even broader in scope of constitution are bio-oils. Many standard rated fuels now contain some bio or recycled oils already and carry classification of biofuel. There are sources such as rapeseed, palm, corn and soy.

SAACKE have worked with biofuels since the 1960's and have a wealth of knowledge, products and solutions available to meet each application's requirements. Recently in Sweden, SAACKE delivered 4 x 34MW burners for burning wood pellet dust for an energy company, resulting in a saving of approximately 25,000 t of carbon dioxide a year. The burners are supported by a service and spare parts package.

SAACKE are the combustion experts with the solutions! Please contact Tim Fellows, Regional Sales Manager, in the first instance via t.fellows@saacke.com to discuss your plant's specification and potential with regard to alternative fuels.



Welcome

We are pleased to welcome:

Calvin O'Callaghan
Service Engineer, Ireland

Aled Lewis
Service Engineer, Midlands

Paul Phillips
Service Engineer, South

Congratulations

Hannah Payne-Cook (Senior Sales Co-Ordinator, Havant) who has recently celebrated 10 years

Adrian Rowsell (Regional Sales Manager, Havant) who has recently celebrated 25 years

Rob Chapman (Senior Mechanical Designer, Havant) who has recently celebrated 35 years

Phil Kemp (General Manager, Havant) who has recently celebrated 40 years with SAACKE UK companies.

Aleksandr Attemann (Electrical and Mechanical Design Engineer, Havant) who has achieved his BTEC Level 5 (HND) in Mechanical Engineering with Distinction.

Happy Retirement

Les Carr (Electrical Designer, Havant) who retired on 31st August.

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UK team snippets

Despite shows being cancelled this year, **Andrea Leggett** (Personnel Officer, Havant), decided to carry on with her textile design work, improving her skills and creating new patterns. She decided to test out some of the new items and got them made, including a couple of face masks and a complicated but unique jacket. Sales of her face masks in particular really took off via social media and her designs are now on lots of people's faces all around the country, keeping them safe. Very impressive!



Above: Modelled by Keith Tester (Lead Stores / Spare Parts Technician, Havant)

Steve Hastings (Service Support Co-Ordinator, Havant) returned to an old hobby during lockdown and made this amazing piece of furniture from reclaimed timber. He also plans to do some upcycling, but confesses that the temptation to watch television instead as it gets colder might just be too much!



Rob Chapman (Senior Mechanical Designer, Havant) entered the 10 mile 2020 Great South Run due to take place in Portsmouth on 18th October. Sadly, it was cancelled this year due to the pandemic, but the organisers set up the Great South Run Solo challenge of 25 runs in 48 days instead. Rob ended the challenge with a 10 mile run – the same distance and on the same day as the original event! Overall, he accumulated 125.7 miles, achieving the Silver distance award. Well done!



Above: Rob at the end of a long run before the 2020 restrictions!

It was **Adrian Rowsell's** (Regional Sales Manager, Havant) 30th wedding anniversary (pearl) at the end of May and he and his wife Jackie were supposed to be celebrating in a luxury hotel in Cape Verde. Instead, due to the pandemic, their two daughters Emily and Sophie organised activities for the week as if they were in a hotel called 'Pearl Resort', including games nights, cocktail making, aqua aerobics, a gala dinner and a themed tiki night. How creative!

