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The Full CIRCLE

£5

The journal of The Association of Scottish Hardwood Sawmillers

SOLAR KILNS IN SCOTLAND - THE SUN RISES

THE ASHS SOLAR KILN
Written by Ulrich Loening

THE CRAGGACH SOLAR KILN
Written by David Shepherd

SOLAR KILNS AROUND THE WORLD
Written by Ulrich Loening and Nick Marshall

ASHS

Forestry Commission
Coimisean na Coilltearachd

Scottish Furniture Makers Association

Contents

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The Full CIRCLE

The journal of The Association of Scottish Hardwood Sawmillers

PRODUCTION EDITOR & COORDINATOR
Nick Marshall

DESIGNER
Stephanie Christie

The theme of this issue of The Full Circle is Solar Kilns. Why is ASHS working on Solar Kilns? ASHS members' Unique Selling Points include being small, local and environmentally-friendly businesses. Solar Kilns are a perfect fit because they are small, flexible, cheap to build and run, produce high-quality timber and are very energy-efficient. That can't always be said for other types of kiln.

The solar kiln has been an innovative project by ASHS members. When we started work in 2017, as far as we know there were no other solar kilns in Scotland and only a handful in the rest of the UK, with most being in tropical countries and the USA. The traditional view was that Scotland is too cold, dark and wet for a solar kiln to work but this is clearly not the case as David Shepherd's article about his solar kiln near Inverness already shows.

Our work so far has included a review of scientific and technical literature about solar kilns, as well as funding, technical and other support for the construction of a prototype solar kiln at Angus and Mack's yard and finally getting word out with a workshop and technical booklet. We hope to continue this work with monitoring the prototype kiln and making improvements, as well as spreading the word through more workshops and more booklets. There is no doubt that the Scottish Solar Kiln's time has arrived.

This came about because of the dogged pursuit of an idea by, initially, Ulrich Loening, informed by a mixture of idealism and scientific understanding and information, encouraged by the experience of others, particularly Jim Birkmeier, a forester and sawmiller from Wisconsin, USA. Once it had been discussed at a meeting, Malcolm Mack took it up with characteristic determination and practicality, and, working alongside Ulrich and with some funding from ASHS, made it a reality. David Shepherd's kiln is a similar story of one or two determined leaders and a group to help them.

ASHS members are innovators, and I hope that The Full Circle will carry more stories about projects and innovations, as well as the hard-working businesses that bring in the bread and butter and contribute so much to the Scottish economy.

All the best, Nick
ASHS COORDINATOR

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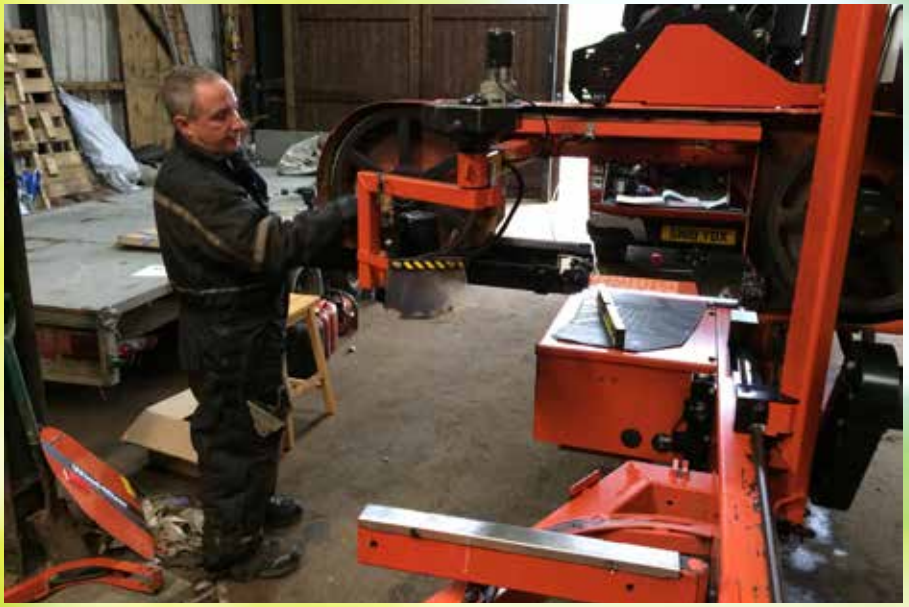
ASSOCIATION OF SCOTTISH HARDWOOD SAWMILLERS
ASHS

ASHS NEWS

Events

We held two events since the last Full Circle was published. The first was a multi-stranded event in October comprising a morning training session on alignment of a mobile sawmill. Keith Threadgall ran this detailed technical session based on his Woodmizer LT40. As this was based at Treeshape, Sandy Crook gave a demonstration of his Woodmizer WM1000 with a 1.7m maximum cut. The afternoon session was based at Scottish Wood just over the Forth. Gavin Munro and Derek Nelson launched FCS's new Log Grading and Valuing video and Gavin gave a session on grading and valuing logs in the timber yard.



In January, we held a Solar Kiln workshop. The kiln is now complete and loaded with a stack of planks to dry. Participants saw the workings of the kiln and heard about the many considerations that had to be addressed in its design and construction.

Booklets

Woodmizer were very generous in allowing us to use their LT40 maintenance manual as the basis for a booklet covering the main aspects of sawmill alignment.

We also produced a booklet on Grading and Valuing Hardwood Logs, distilled from Gavin Munro's many years of experience doing just that, to go alongside the FCS video.

Finally, we produced a booklet on the design and construction of the prototype solar kiln at Angus and Mack's yard near Dalkeith. We hope that this will be the first in a series on the solar kiln, as we learn more about how it performs in the Scottish climate.

Solar Kiln Project

Construction of the solar kiln has now been completed, bringing that phase of the project to completion. It will now undergo testing with a stack of planks kindly cut for ASHS by Keith Threadgall. Depending on the results of this testing, there may be some modifications before the design is finalised, and we produce guidance on construction. Thanks are due to Ulrich Loening, Malcolm Mack, the staff of Angus & Mack and Steve Mclean for their efforts in setting up the kiln.

- Complete except for heat collector cover (Ulrich Loening)

- Completed with doors (Malcolm Mack)

With David Shepherd's solar kiln now operating, we are aware that more people plan to construct their own solar kilns and we'll gather as much information as we can and report on these different designs as well as the ASHS prototype in future.

Membership

ASHS currently has 40 Full Members, 59 Associates and 3 retired although there have been several leavers and new members in that time.

Website

We have improved the sales part of our website, so that customers can order multiple publications in one transaction, using Paypal to process payments. Sales of all ASHS publications continue at a steady pace, reflecting the demand for quality sawmilling information.

Forestry Commission Scotland

Soon after you read this, Forestry Commission Scotland will cease to exist and become Scottish Forestry, within the Environment & Forestry Directorate of the Scottish Government rather than part of the UK Forestry Commission. Forest Enterprise Scotland will become Forestry and Land Scotland within the same Directorate.

FCS support has been crucial in the establishment and development of ASHS for more than 20 years and we should thank far-sighted staff members for that continued support. FCS currently supports ASHS in various ways including a grant to help our costs (including the production of this Journal), and with advice and contacts with political decision-makers. FCS commissioned the Timber Grading video in 2018 and helped to bring in grants for Secondary Processing under SRDP. Forest Enterprise Scotland has gone to great lengths to make logs available in smaller quantities through their Niche Marketing Initiative.

The future is uncertain, with continuing cuts to Government services and Brexit among other things. We know, however, that we have delivered great results from the support the we've had from Government. The hardwood sawmilling industry in Scotland pretty well disappeared in the 1980s and we've led the way in the creation of a new small-scale sawmilling sector employing hundreds of people and stimulating the development of small furniture-making and building businesses across Scotland.

The Scottish Forestry Strategy

The New Scottish Forestry Strategy has been published, and we were pleased to see mention of the importance of small-scale sawmilling and homegrown hardwoods and quality softwoods although we're keen to see them being given even more emphasis in future.

The ASHS submission to the Strategy consultation was as follows:

"Thank you for the opportunity to make a submission on the draft Scottish Forestry Strategy.

ASHS is the trade organisation representing homegrown hardwood (and premium softwood) sawmills in Scotland. Our current membership is 35 Full Members and 59 Associates. We provide training and technical publications as well as a sector Journal for our members. We encourage networking and joint working through meetings and email forums, and we help with marketing and general promotion of homegrown hardwoods through our website, emails and presence at a range of events.

We are disappointed that the strategy lacks a clear prioritisation of the various ambitions. Coupled with the emphasis on securing "wood fibre" supplies into the future, this suggests prioritisation of the general softwood sector above all else, and we would be concerned if this was at the expense of our small, but rapidly growing, sector.

We are concerned that this strategy appears to continue the artificial distinction between "productive conifer forests" and "amenity woodlands". Given the uncertain times we live in, we feel that all forestry should be based on quality, diversity and flexibility, to the maximum extent possible under the limitations of any site. We would like to see far more emphasis given to productive broadleaves and premium conifers (often called "minor species") - such an approach to forestry will deliver far more rural employment, reduced carbon emissions, and environmental and social benefits than the more uniform industrial approach implied by an emphasis on maximising fibre production.

We are heartened that the strategy does mention hardwoods and small rural businesses, and we support its Vision and Aims. We know that our sector has a huge potential for expansion through an increased number of small-scale sawmills and timber processors. We hope to see small sawmills in almost every town and village in Scotland, producing sawn timber for local needs and more distant markets. These sawmills would provide a base for other local businesses in construction, furniture making, or other small-scale manufacturing industries, as is starting to happen in the Borders, Fife and Inverness. The recent Forest Policy Group report shows just what contribution the small, local woodland industry sector makes to the rural economy and employment and hints at its potential impact in the future.

We believe that diversity of land ownership could be a key to unlocking the potential of Scotland's forests to produce far more high-quality timber and environmental benefits, as well as making it easier for small businesses to obtain secure locations for their sawmills and wood processing and manufacturing businesses. We welcome the commitment to improving workforce skills and we hope that this extends to improving the silvicultural skills of forest managers and training the sawmillers and woodworkers of the future.

We look forward to ASHS and its members contributing to the delivery of this strategy and creating a stronger and more diverse forestry and timber sector in the future."

Written by,

Nick Marshall
ASHS Coordinator

Local. Ethical. Sustainable.

SWW NEWS

The Scottish Working Woods label continues to expand with a reinvigorated Board of Directors and four new licensees – three furniture-makers and a basketmaker from our newest member organisation, Scottish Basketmakers' Circle. Check the website for more information.

We intend to expand the number of member organisations to include a wider range of small businesses using local wood or woodland products, as well as more licensees, and to bring licensees together to discuss ways to improve the administration and public awareness of the label. The speed at which SWW works is limited because everything is currently being done by volunteers working on a shoestring, but the time is right for the Scotttish Working Woods label to make a big impact on the market for timber and woodland products in Scotland.

If you're interested in becoming a licensee, find out more on the website (www.scottishworkingwoods.org.uk) and/or email info@scottishworkingwoods.org.uk.

- Lise Bech

- Ingrained Culture

- Rob Elliot

- The Baldy Carpenter

- Completed with doors (Malcolm Mack)

SOLAR TIMBER DRYING KILN

Friday afternoon the 18th January saw the completion of the Solar kiln, with the loading of its first batch of timber. It had been over 2 years in planning, funding and building. Now at last we have the first full size prototype to test out its performance over the next year or more.

My interest started with solar house heating systems back from the 1960's I purchased a Canadian book, Solar Houses for Cold Climates (1980) by Dean Carriere, which had many of the innovative ideas of the time, among them to make warm air rather than the more usual hot water. That avoids freezing and damage in winter. But blowing lots of warm air into the house is more difficult than pumping warm water, and the latter carries more heat. I joined the Scottish Solar Energy Group and was much influenced by the sadly missed Kerr McGregor. He gave many solar teach-ins at Napier College which I attended eagerly. Then I built a large solar panel on the attached stables of our house and blew the heated air into the kitchen. Even in the Winter solstice we got about an hour of heating! In summer the air reached over 80 or 90 degrees C. With a heat exchanger we made hot water, and the outflow of air from this, still warm, was blown through a plywood box filled with stickered 25mm oak planks to dry. This turned out the best dried oak I have ever seen. It was down to 10-12% moisture, and so free of stress that a fine saw cut did not open or close at all behind the re-saw blade.

Long before that, Bob Plumtre, at a forestry meeting in London, had alerted me to the possibility that solar dried timber remains free of internal stresses, because of the alternate warming and cooling every day/night. This was borne out by years of subsequent experience. I had never liked kiln dried timber from a conventional dehumidifier - this works by maintaining the relative humidity of warmed timber just below that point at which it is in equilibrium with the timber at that stage. In this way it dries steadily but not too fast, and it is hoped that warping and stresses are minimised. But all that demands careful control and knowledge. If solar drying can produce better timber more easily, it would seem the best option.

The next attempt to build a solar system specifically to dry timber, was at my sawmill, Lothian Trees and Timber. Several square metres of the shed roof was replaced with a corrugated black plastic, covered with translucent fibreglass sheet. Air blown in the gap was directed down into the space "kiln" below. It didn't work, for many reasons: the black surface did not give up its heat fast enough into the air; neither the fibreglass nor the black base was sufficient insulation; therefore the humidity of the air never became low enough.

With some lessons learnt, when we converted our stables into our present house, I allowed the whole loft to be the solar heat collector, by replacing the slates and sarking with quadruple polycarbonate sheet. The warm loft air was blown, initially with a fairly powerful mains fan, into the space below to a stack of freshly sawn 26mm sycamore, stacked on its sides to avoid the stain caused by stickers. That was in early February; by late May, the timber was at 12-14% moisture and we took the risk of using it at that stage, edging and planing it on site. This was the fastest by any method I have ever known for wet freshly sawn hardwood timber to be dried sufficiently for use. Even the wide floor boards of 300mm, have since then shrunk by less than 5mm and there is no warping.

- Finished front detail (Malcolm Mack)

- Finished front (Malcolm Mack)

- Cutting vent holes (Nick Marshall)

These and similar experiments, like replacing the mains electric fan with small DC fans driven by 20-40W PV panels, gave the impetus for me to encourage ASHS to embark on the venture to make a prototype full size kiln. I had the vision of a sawmill business being able to purchase a solar kiln, delivered by truck ready for use, placed on a flat surface facing South, filled with timber by fork lift into its side opening, and then left alone. No installation of any services, no maintenance, no fuel costs, no skills needed. Side opening made things simpler because small air leaks don't matter, nor does opening the kiln to have a look, because air is blown right through whenever the sun shines, so a bit extra loss of warm air doesn't matter.

We are now close to achieving that vision. But we had some interesting lessons to learn on the way. The first and most important, was in the design of the solar heat absorber. This must present a large enough surface to the air, to transfer the heat. USA experience had shown that black insect mesh was ideal for this, several layers absorb most of the sun's light, becoming a nearly perfect black absorber, because the heat radiated by the lower layers is caught again by the upper layers. My small prototype using this system worked well. But then we pondered - does one go for maximum temperature or maximum air flow? My initial roof trials had achieved very high temperatures by passing the air through the long distance of the roof, about 9 meters, but at the cost of needing a powerful fan, mains driven. Quite probably, timber drying needs only slightly warmed air, (contrary to usual opinion). flowing fast. Malcolm Mack and I discussed which to go for, and he designed a system for the present prototype by which the air passes back and forth through the heat absorbing insect mesh sucked in by 10 fans taking 1.4 amps each at 12 volt from two 100W solar panels.

The next lesson was with those fans. I had got used to fitting PV driven fans for my home, there are several of them, blowing air into the loft and out of it into the house. No problems. But when I came to wire up the 10 kiln fans, on one of our rare sunny days, I blew three of them. Although the max open circuit voltage of the panels is only 21V, and the power take by the fans lowers this, it is not until most of them are wired in that the voltage drops to a safe 10 or 12V. We still need to learn how the power taken affects that voltage. The voltage recorder I fitted shows that in the light cloud of most of these January days, the panels give 4V and the fans don't turn. Then as it get brighter, and the sun comes out, the voltage rises to 10V. So far it has not got any higher; we'll see what happens during spring and summer.

I had suggested we fit a battery and charge that as well, using a charge controller which limits volts to about 14V and stops the battery being over-charged. We thought that the fans could then continue to run into the night. But charge controllers are just that, and next morning the panels will charge the battery first and turn the fans only when the charging is nearly complete. So what you gain in air flow at night, you more than lose next day, when you really need the flow because the sun is out. So, it's best to keep it simple, no controllers, no battery and no switches of any sort. I am logging the voltage as a measure of when the sun shines, and to warn us in case it goes much above 12V. And recording relative humidity and temperature inside the kiln. The relative humidity should always be below that of the outside air, because the air is warmer, even if only slightly. Therefore it will always dry the timber. There is no danger of over-drying too fast, as easily happens in a dehumidifying kiln, since we necessarily have a pause every night. If there was too much sun one day, the timber will recover at night.

The sycamore we loaded on 18th January, had been sawn from older logs some weeks before; it was therefore partially air dried, and went in at about 18% moisture. In general, however, we expect to be able to load fresh timber direct into the kiln, without any prior air drying, as I had done for my home floor. So it could even be that solar drying is a great deal faster than the usual practice of air plus kiln drying. We'll see. It is also possible to add an extra load of fresh timber to the partially dried, without affecting the latter; this cannot be done in a conventional kiln.

Now we have a year or more to monitor, gather experience, and learn whether the solar system gives what I had hoped.

In the end, we all have to live by the sun!

Written by,
Dr Ulrich Loening
Formerly Lothian Trees and Timber

- Craggach Woods Oak (David Shepherd)

CRAGGACH WOODS SOLAR KILN

Background

At Craggach Woods we are developing a business model based on the owners/occupiers of the 40ha fertile lowland site growing and harvesting native hardwoods. Adding value by milling, drying and selling the timber should lead to one full time job equivalent once everything is fully operational.

We have been converting the site from typical 1950's conifer plantation over the last 25 years so production of hardwood sawlogs will not occur for another 35 years for Birch, Sycamore and Gean. Oak should reach 65cm. diameter at breast height in 75 years.

Several conifer clearfells have paid for the site and re-stocking with broadleaves has been covered by SRDP grants. Currently we have a small supply of mature Elm and Sycamore for harvesting plus about 8ha. of Larch and Douglas Fir (DF) to keep us milling. We are now covering costs with the sale of hardwood thinnings as fuelwood and a small output of milled Elm, Sycamore, Birch, DF and Larch.

We had been accumulating air-dried sawn hardwood and it became clear that we needed to kiln dry it to make the produce attractive to end users. The impetus to develop a kiln gathered momentum when Alasdair Munro, a furniture-making friend, who has gathered a large supply of air-dried timber, also wanted to dry his timber down below 10% mc. This brought us together to design and build a kiln.

- Sawmill at Craggach (David Shepherd)

Kiln requirements

Our limited current output, including Alasdair's annual needs, meant that a small kiln was required. The available site has no electricity supply so solar power was decided upon as the optimal energy source.

Design

Our design is a modification of a kiln pioneered by the Virginia Technical College USA (VT). The VT kiln is essentially a shed with a large south facing window angulated to conform with the longitude of the site. In the VT kiln, timber is stickered and stacked in the shed and moisture from the solar heated timber is let out through manually operated vents. Drying is accelerated by driving air through the stacks with electric fans switched on and off manually.

We aspired to develop an automated system for our kiln to operate the fans via a thermostat and operate the vents electronically dependent on the % humidity in the kiln.

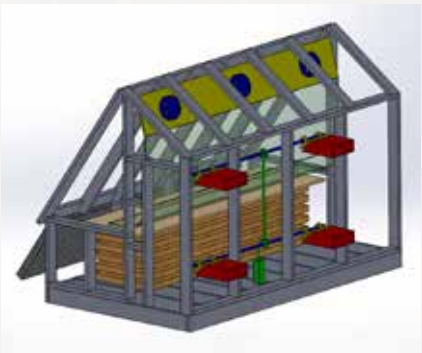
The illustrations outline the design of our structure whose dimensions are 4 metres wide and 2.2 metres deep. It stands off the ground on four concrete piers. The structural timbers are DF and the cladding Larch - both home produced. The 25mm.

polycarbonate window is made from standard materials and fixings angulated at 55 degrees (our longitude).

The walls, floor and ceiling are heavily insulated with 100mm Celotex and the inside finished with plywood. Two high and two low vents are fitted into the back wall. The roof is plywood sarking covered with roofing felt and topped off with overlapping Larch boards. The frame is covered with building membrane and clad in Larch - designed to ensure an uninterrupted flow of air behind the boards. The kiln is loaded via a door in the side and holds approximately 2m3 of timber in a stickered stack about 3.6m wide by 1m high and 1m deep.

Electrical System

As work progressed the challenge of dealing with the design and execution of the electronics loomed over us.

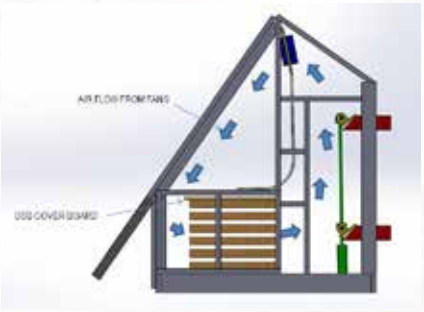


- Kiln Arrangement A (George Dickson)

By great good fortune we were introduced to Bill Bryan, a retired electronics engineer with wide experience in research and development in the electronics industry. Bill offered to design and install an electronic system to meet our requirements.

We asked Bill to come up with a system to do the following:

- Fans to move at least 3000 cubic feet per minute (cfm) through the stack.
- Adjustable thermostat to switch fans on and off.
- An actuator to open and close the vents.
- A way of setting a chosen % humidity at which the vents are automatically opened/closed.
- An override so that if the kiln reaches 40 degrees centigrade the vents open - to prevent over heating.



- Kiln arrangement B (George Dickson)

The electrical system design was based on three principal considerations; 1) maximum power demand; 2) intensity, (insolation), and duration of sunlight; 3) measurement and control requirements.

A 12volts DC circuit configuration was chosen for the wide availability of components from which to build a system. Maximum electrical power demand occurs when all fans are running, the ventilation actuator is operating and the charge controller plus humidistat which draws a small current at all times. The fans take the lion's share of the power so they largely determined the electrical load for the system.

With a requirement of 3000 cfm as the starting point three 14" Mishimoto 1300 cfm fans were selected to provide a fairly even airflow along the stack, with some spare capacity in hand. With all three fans running they draw approximately 23 amps translating into an electrical load of 280 watts. Of course, they run intermittently, determined by the level of insolation and thermostat setting. The ventilation control employs a Gimson Robotics linear actuator to drive two sets of vents located at the back of the kiln.

With the kiln being located off-grid, the power supply of choice was solar photovoltaic (PV). Although the levels of sunlight and duration are big variables a back of the envelope calculation, informed by a combination of experience and previous records for the area, determined that two 280 watt solar panels should be sufficient for the job.

For this type of PV powered system a conventional circuit design was chosen in which a deep cycle battery sits between the PV electrical supply and the loads with a controller mediating in the middle. The battery is necessary to provide uninterrupted power as both supply and demand are intermittent in nature.

The operating specifications, which are outlined above, enable the temperature and humidity to be controlled, either manually or automatically. Various measurement and control embodiments were considered but in the end a relatively low tech electromechanical solution was selected in the interests of reliability and ease of operation.

In the case of temperature the control set-point is determined by a thermostatic switch mounted on a flying lead, so that temperatures at different points in the kiln can be selected, which is handy when experimenting with different drying regimes. Vent opening is controlled via an electronic humidistat with its sensor mounted at a central position on the rear of the kiln or by a high temperature limit switch should the temperature rise above 40 degrees C.

Two switches, which are mounted on the side of the enclosure containing all of the electrical/electronic components, give the user the means to individually operate temperature and humidity under either automatic or manual control. A recent enhancement now allows for each of the fans to be switched on/off individually.

Fans and baffle

The three fans were secured to a plywood frame hinged from the mid point of the roof This directs the air flow down the window towards the front of the stack. To ensure this air flow is through the stack, OSB boards cover the stack and a length of carpet extending the full width of the kiln is hung from the fan frame and swings forward on to the OSB boards. The effect is that air circulates round and round the kiln through the stack.Kiln Arrangement B (see p11) indicates the air flow in the kiln. When the % humidity reaches the set level the vents open and remain so until the humidity falls and they shut. The process continues.

Operation

During the first week of April 2018 we filled the completed kiln with air dried timber (about 13-18 % MC). The thermostat was set to start the fans at 20 degrees C. and the humidistat set to open the vents at 60% saturation. The next day the long hot summer commenced and the kiln quickly reached 40 degrees C.

We feared that the high temperature might lead to splits, shakes and cupping but, with the possible exception of some very knotty oak, this did not occur. The MC fell a few % the first week. The humidistat was then set to 50% then 40% a week later.

To our surprise and delight at the end of week three the % MC of most of this mixed species hardwood load, which comprised mainly 50mm. thick boards, was 7- 8 %. The exception was the 50mm. oak that took a further week to reach 8- 9 %. This pattern continued throughout the hot summer and even in September, when normal weather returned, a load dried in 3/4 weeks. So far, we have only dried timber of 13-18 % mc. We are now waiting to see how a load started in mid-November performs over winter.

We are keen to understand the dynamics of the kiln so that we can attempt to improve its efficiency. We used a temp/humidity logger kept in the kiln over summer which gives a read out of temp/humidity/dew point every15 minutes. We now have a logger outside the kiln and hope that comparison of the inside/outside readouts will inform possible future modifications.

Written by,
David Shepherd with
Alasdair Munro & Bill Bryan
With drawings by George Dickson

SOLAR KILNS AROUND THE WORLD

ONE of the most critical uses of dried and seasoned quality hardwood is for the musical instrument industry. Yet violin makers would never choose kiln dried maple (sycamore) for their violins. Stradivarius had a balcony at the top of his house, for his stock of wood, drying in the sun. It may be a fetish, but such is the violin makers' choice.

Kilning wood has also become a bit of a fetish; perhaps it became necessary with the advent of central heating, especially in Scotland with its cooler and moister climate. Antique furniture was made long before kilning, and sometimes suffers if brought suddenly into a modern heated house.

Perhaps the best approach now is to dry timber with an advance on Strad's balcony, namely a suitable solar heated container. And correspondingly, the centrally heated house would be better replaced with an autonomous solar heated home.

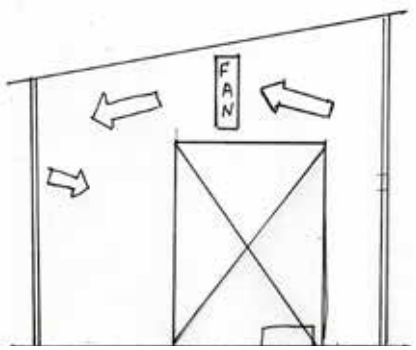
With a background of doing both these things, we proposed a design for a wholly self-powered kiln for hardwood timbers, which offered many advantages. And the possible disadvantage of being less predictable in the Scottish climate. To compare with other solar kiln ideas from around the world, we have reviewed the literature and report on this as follows.

One may question whether the Scottish climate is suitable for solar- energy projects. One pioneer, the late Dr Kerr MacGregor made the argument that given the poor general climate, the heating season is much longer, and therefore solar heat investment becomes more worthwhile. Such an argument can equally be applied to drying timber, since air-dried wood is moister than in many other climes. It is at least worthwhile to try out methods of using solar heat for drying wood.

Conventional drying of timber has been done in kilns in which the air is circulated through the timber and moisture removed by vents or by a dehumidifier, careful controls being applied in both cases. Solar kilns, as published in the papers we describe below, have mostly followed this same design; the attempt is made to copy the conventional kiln with a solar equivalent. For example, Wengert and Oliviera (1980) described the general principles of solar kiln design and compared 31 designs from around the world, giving drawings and performance data. In all of them the heated air was re-circulated.

For example, one of the simplest is merely a greenhouse, with the stacked timber and a fan to circulate the air, shown in Fig 1.

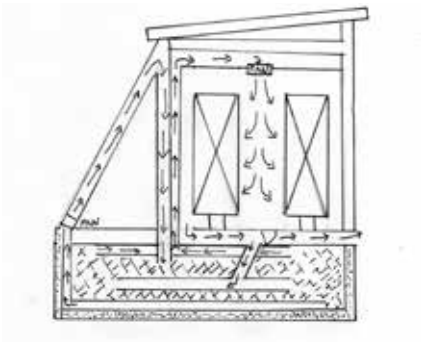
Among the more complex designs were those that incorporated heat storage, to heat the timber at night, shown in Fig 2.



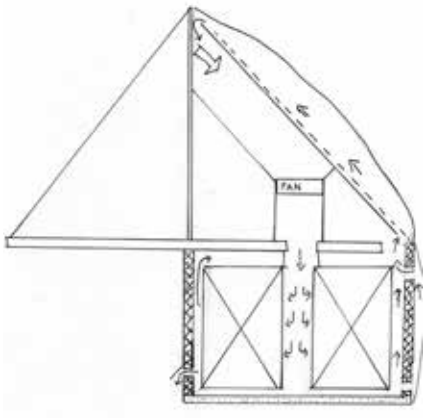
- Fig 1. Greenhouse type solar kiln; Tannanarive, Madagascar; timber capacity 4.4 cu m (Wengert and Oliviera, undated)

Plumptre (1979) was one of the earlier innovators in solar kilns, mainly for the tropics. One of us (UEL) met him at about that time, when he explained how the daily heating and cooling of the timber seemed to relieve the stresses that would normally occur. This effect is described further in his paper, and a general design for solar kilns has been published through TRADA (Plumptre and Jayanetti, 1996)

One of the most successful commercial solar kilns, and indeed successful sustainable forestry practices, is that of "Full Vigor Forestry", an enterprise in Wisconsin, USA started and owned by Jim Birkemeier who visited us in the mid 1990's. His solar kilns work throughout the year, and re-circulate the warm air, But one has to note that air-dried wood in that climate usually reaches down to 14% moisture; the kilns bring this down to 8-10%. Wisconsin is at 43degN, roughly the same as Nice in France, far South of Edinburgh at 55degN. Fig 4 shows the kiln layout from his book (Birkmeier, 2017)



-Fig 2: Solar kiln with stone heat storage; Arkansas, USA; timber capacity 3.5 cu m (Wengert and Oliveira, 1980)



- Fig 3. Recirculating solar kiln; Wisconsin, USA; timber capacity not specified (Birkmeier, 2017)

As mentioned, all these kilns as indicated above, apply the air flow systems of conventional kilns. One may then ask, are there any other options, given that solar power is free and flows anyway, whether used or not. It might be possible to suggest forms of once-through flow, without re-circulation, which would have been very wasteful otherwise.

Among the successful innovations was that of Vore et al (1999) from the University of Arkansas USA. They improved air flow by rounding off the corners of the kiln, so that it became egg shaped internally. They also increased air flow, and powered the fan with PV cells only. Thus, at night, the air flow ceased as well as cooled. Air flow during the day was about 45 m/min (0.75m/s). The dried surface of the timber re-absorbed moisture during the night.

This relieved stresses before next day's drying. Red oak lumber dried from over 30% moisture (the upper limit of measurement) to less than 9% in 29 days. The relative humidity, described in detailed graphs, was at all times some 30% lower within the kiln that outside. They conclude that the daily cooling yet continuous lower

humidity accounts for the lack of stress, cracking and checking. They point out that if the cooling did not occur, which enables diffusion to take place from the interior to the outside of the wood, the solar kiln system would take longer to dry the wood. These results are important in leading to the design of the ASHS solar kiln.

Detailed assessment of a recent solar kiln trial in Australia is given by Haque and Langrish (2005) Their kiln is a more conventional greenhouse design, the collector being a black box which holds the timber. It took 2-3 months to dry timber from 43-62% down to 12-22%. In the winter, extra heat was added.

A recent review by Luna et al (2009) appraised the design of solar kilns on the basis of 8 principles or "laws", to give some measure of the evolution and progress of design. They describe several arrangements of kilns, such as whether the heat collector is external or internal to the kiln, and with or without a heat store. They discuss the need for fins or large surface to exchange heat from the absorber to the circulating air, and the recent appearance of porous absorbers for this. These recommended newish features are valuable, but they did not take account of the freedom of design provided by solar power. Their designs are conventional re-cycling of the heated air, with some complexity introduced by the heat store.

Bennamoun (2013), described the integration of photovoltaics into solar drying, mainly concentrating on hybrid PV/Thermal systems, which can increase the total efficiency of heating to 70%. They do not suggest using the PV cells purely to drive the fans, as Vore had done.

The question of the best way to design a solar heat absorber was tackled by those interested in house heating. In the USA, metal or fibreglass insect mesh has been found to be extremely effective. Air heat exchange through the black mesh is very effective, such that there is no difference between a metallic and a plastic mesh. The thermal conductivity of the material does not matter, because the heat exchange area is so high.

This website: http://www.builditsolar.com/Experimental/PopCanVsScreen/PopCanVsScreen.htm
gives a thorough comparison between a black tube collector in the form of welded pop cans, and a three-layer insect screen, with photos and detailed appraisals, summarised thus:"DIY Solar Air Heating Collectors: Pop Can vs Screen Absorbers

DIY solar air heating collectors are one of the better solar projects. They are easy to build, cheap to build, and offer a very quick payback on the cost of the materials to build them. They also offer a huge saving over equivalent commercially made collectors.

Two of the more popular designs are the pop can collector and screen absorber collector. The pop can collector uses columns of ordinary aluminium soda pop cans with the ends cut out. The sun shines on the black painted pop cans heating them, and air flowing through the inside of the can columns picks up the heat and delivers it to the room. The screen collector uses 2 or 3 layers of ordinary black window insect screen as the absorber. The sun shines on the screen and heats it, and the air flowing through the screen picks up the heat and delivers it to the room."

The screen performs at least as well as the metal tubes. Other sites try out different numbers of layers of screen. A typical screen has an open area of 60%, so three layers of screen would have an open area of 0.63 = 0.22 and five layers would be 0.65 = 0.08. Thus, a five-layer screen would absorb more than 90% of the light, and the heat would be exchanged with the air.

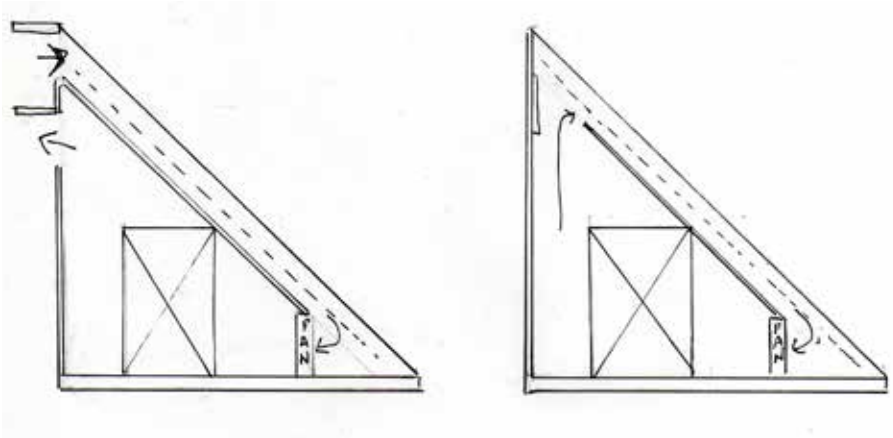


Fig 4. Lean-to greenhouse type solar kiln; USA;

This principle was used in the Appalachian State University dryer (Scanlin, undated)
This used a lean-to greenhouse type construction to house the timber and the sloping front to collect heat, using 6 layers of dark grey aluminium insect screen. The fan to circulate and vent was driven by a PV cell. Timber was dried from 38% down to 7% in less than 3 months of winter; during the summer from 38% to 8% in about 6 weeks. A section through their kiln is shown in Fig 4.

The air can be recycled (right) or vented (left). In the former case, used initially for fresh timber, air passes over the heated screen repeatedly, as it does in most of the other designs discussed here. This gives maximum heating. In the latter, vented set-up, the timber is dried fastest, without damage because it stops at night.

A large number of other solar kiln designs are given here:
http://www.builditsolar.com/Projects/WoodDrying/woodkiln.htm

The phenomenon that solar timber is dried free of stress was explicitly described by Langrish (1992) for Nothofagus and again for Eucalyptus (Langrish, 2013). The abstract for the later paper best describes the effects:

"This work compares a conventional continuous drying schedule with a solar cyclic drying schedule for the seasoning of an Australian hardwood timber, Eucalyptus grandis, focusing on the simulated stresses and strains developed during drying as a measure of timber quality. The cyclic drying schedule has been found to give lower instantaneous strains, due to the effect of mechanosorptive strains in relieving stresses both in the initial stages of drying and over the entire drying period. The gentler initial drying conditions during cyclic drying are also beneficial compared to the harsher and unmodulated nature of conventional drying schedules. Without the modulation of the external drying conditions in intermittent or cyclic drying, the mechanosorptive strains are unable to relax or mitigate the stresses that are caused naturally by timber drying. There is some support for these conclusions by comparison with industrial experience and previous laboratory practice for intermittent and cyclic drying."

These findings agree with our experience with solar drying of oak in Scotland, which produced boards that showed no distortion on re-sawing.

All the solar kilns described were at lower latitudes than Scotland. However, autonomous houses (passivhaus) have been built in Scotland, and one can expect a solar-powered timber kiln to be effective. In any case the relative humidity in a solar kiln will always be much lower than outside, and the increased moisture concentration gradient will hasten the drying process, without causing mechanical problems. The assessment by Hughes and Oates (2011) demonstrates how solar drying is appropriate in the UK. They made detailed analyses of air temperature, flow, and humidity, and modified the design of the kiln accordingly.

Our conclusion is that solar kilning of wood has much to offer, in that a suitably designed kiln can dry the timber quickly enough, especially as the pre-kiln air drying which is usually needed to produce high quality timber can be avoided, so that the total time needed is short and the quality is reliably high. A totally autonomous solar kiln driven by PV cells, is thus an attractive economic possibility.

Who knows, that in a few decades time, the modern followers of Stradivarius may opt for solar matured timber for their instruments!

Written by,
Ulrich Loening & Nick Marshall
From a Review carried out for ASHS with FCS funding | Drawings by Nick Marshall

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THE IRON AGE LOGBOAT PROJECT

This project started with a 90 year old Douglas fir log grown by the Forestry commission on the shore of Loch Ness (see article in Full Circle 8). The Iron Age logboat project was devised by the School of Ancient Crafts Charity and funded by the Heritage Lottery Fund. The aim of the project is to make a replica Iron Age log boat using a technique known as Experimental Archaeology.

This means that only authentic materials, and tools can be used to make the object, in this case 2000 year old technology. You maybe wondering what about the instructions? How do you know where to start? There are no written records from the Iron Age of how to make a log boat, so it was a combination of studying the archaeological remains and using human intuition.

This logboat project is based on the remains of the Loch Arthur log boat on display in the National Museum of Scotland. Close examination of this object gave us a lot of clues about the construction methods used.

The first stage of working on the boat, was to decide which side would be the top, and which the bottom. Once decided it meant that the log had to be turned, by hand. Turning a 8 tonne log, with 6 volunteers, and a set of wooden rollers and levers, was a daunting task. But surprisingly a bit of high school physics came in useful and the log was turned 180°.

Work could now properly begin with the hull and sides of the boat. This involved stripping off the bark, using the Iron Age toolkit of axes, adzes, wedges and chisels and hammers. Although simple in design, they haven't been improved over the ages, all of these tools are still used in carpentry today.

It has taken 6 months to get this far with the project. A hot summer brought its problems, and the ends of the log had to be sealed to prevent the wood cracking. Now we are in a cold winter, and working conditions are not too bad – it's cold but at least dry.

However the end is in sight for the Iron Age Log Boat project, as Project Manager Dr Romain Viguier explains "There are four crucial stages left in the project The first is to use bow drills to create a series of 10cm deep holes in the base of the hull. Then the boat will be returned 180°. Then we will hollow out the hull. The final task is then to make a transom for the rear of the boat."

When asked why are you drilling holes in the hull, surely that will let water in? Romain explained" These seems strange to drill holes on the hull, but they do exist on many examples of Iron Age log boats. There are two theories to explain why you would drill holes. The first is that the 10cm deep holes help you ensure that the floor board is dugout at an even depth thoughout. The second is that when the bungs are removed from the holes this will allow you to deliberately sink the boat. This could be a useful tactic to prolong the life of the boat, if it is sunk in shallow cold peaty water like in Loch Tay, decomposition would be minimal during the winter months when the waterways would be frozen anyway. We will never know for sure, but that is the joy of prehistoric engineering".

The Iron Age Logboat team consists of 42 volunteers who work on this project at the Granton Hub, Edinburgh. They aim to complete the project and launch the boat in 2019.

Written by,
Melissa Viguier
School of Ancient Crafts
www.schoolofancientcrafts.org

PROBLEMS BUYING LOGS

You could say the picture for home grown hardwood logs in Scotland is not a pretty one. The majority of our best hardwoods (over 80%) are bought up by European and English merchants and sawmills as low value round wood. These logs are then taken out of Scotland with all the value-added benefits associated with their processing and eventual sale being carried out elsewhere.

Ironically a proportion of this processed timber finds its way back into the Scottish market at many times its original value. ASHS is however, gradually, and sustainably, changing this picture.

Oak is our greatest challenge. The best Oak in Scotland generally comes to market in big lumps... parcel sizes of usually several hundred tonnes. Now that's a scary amount of dosh required should you wish to put in a bid for one of these. And because this Oak for us tends to be for use in our own mills (rather than selling on), it can be a long time before some of those logs realise an income.

So cash-flow is the main restriction. Time for the return on investment is another. Then there are the more practical considerations such as storage space, and log degrade over time. To counter these challenges, being part of a membership organisation like ASHS can pay dividends.

Collaborative buying

ASHS has been going now for nearly 20 years. Over that time members have got to know each other well, and there has developed a solid feeling of mutual support, trust and friendship throughout. I, for one, thoroughly enjoy the atmosphere of fun and goodwill when a number of us get together for meetings, training events, or whatever.

But crucially, this level of trust and rapport allows and facilitates for the collaborative buying of logs, where a certain level of compromise and understanding of each other's businesses and priorities is paramount when dealing with something as fickle and variable as a parcel of Scottish Oak logs.

Knowledge and support.

Another benefit is access to people who know more than you – about whatever! For example, buying a large parcel of Oak is scary enough without taking into account your possible (or self perceived) lack of confidence in attributing value to a log, or to identifying some of the characteristics and features that could make a log iffy. Help isn't usually far away.

Getting the message out there

The longer we are around, and the more that people hear and read about us (in places like this excellent Full Circle publication), then the more aware the wider industry becomes of the issues, challenges and benefits of making better use of our home grown hardwoods in a local environment.

This has led to local land owners and Forestry agents who are sympathetic to the benefits of keeping things local, into making decisions that help enable the likes of us to get our bids in (as long as the prices achieved can be comparable with traditional marketing methods).

For example, we have seen the splitting of larger parcels of timber into a number of smaller lots; or the felling and bringing to market of timber in stages, rather than all at once. Or even just making sure - through the ASHS Coordinator - that the membership is aware of a pending sale.

As ASHS grows...

All the above becomes increasingly possible and more common as both ASHS and its individual members grow. In times past it was unlikely for us to be informed of the sale of a big parcel of Oak. Perhaps the sellers were not aware of us as a collective, or, they didn't take us seriously as being in a position to place a bid.

Now, however, as more of these parcels are secured by members, sellers are keen to keep us informed. Scottish Wood alone has managed to secure three large-ish Oak parcels in the last couple of years, totalling over 600 tonnes - all stuff otherwise destined for export. The last time I turned up to view a parcel for a possible bid, a timber merchant, who happened to be on site, said to me ... "Not you again.... your showing up at these sales doesn't work out well for us"!

What a great compliment for ASHS!

So things are changing... slowly. A few years ago, the figure at the top of this article (80%), used to be safely quotable as being more like 90 to 95 per cent. Not so now. And happily these figures continue to get steadily eroded.

Lets keep that going!

Written by,
Jim Birley
www.scottishwood.co.uk

alnfurniture is owned by Anna Nichols who has been working in the creative industry for 16 years. Anna first moved to Scotland in 2010 to start her own bespoke furniture business in the Scottish Borders.

alnfurniture workshop moved to Leith 18 months ago and is based at Edinburgh Open Workshop. EOW is a multi-arts hub, who champion and celebrate emerging talents and creative innovation, bringing a number of people across a wide range of disciplines and with a wide variety of skills and interests into close quarters.

How did Anna end up making furniture?

Anna's love for working with wood started when she was 17 years' old at school when she made her first piece of furniture, a rocking chair. The rocker included a steam bent back and hand turned spindles in Ash.

Although Anna was more interested in Sculpture in her final year at school, when she went to Berkshire College of Art to do her foundation year and then on to Northumbria University for her BA Hons Degree, she chose to focus on 3D Design & making. Anna then went on to specialise in furniture making/designing, one-off or batch production pieces for her final two years of University.

Professionally Anna spent 8 years as a designer/draughtsperson in the Architectural Industry designing commercial furniture/interiors and architectural steelwork/stairs before returning to the bench making furniture for a living. Anna is fully CAD proficient in 2D and 3D modelling.

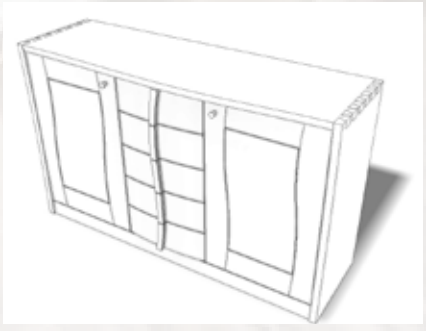
A cabinet maker and wood turner exploring the 'beauty of wood', clean lines, shape and form with an occasional hint of bold colour, her furniture/small products are made mostly from hardwood. She frequently collaborates with other artists. Designs are able to be produced incorporating metal, plastic, glass and composite materials.

To view more of her design work and experience visit www.alndesigns.co.uk

The Design:

Working from the customers brief Anna designs the piece to meet the needs of the customer within the constraints of furniture design. Anna can produce a computer aided 3D model to portray her ideas over to the customer.

For example a design for the latest project to be made at Anna's workshop, a Scottish Ash Sideboard.



The Making:

The design process doesn't stop at the drawing process. The selection of wood is a very important part of the process.
The starting point of making is sourcing hardwood from a local sawmill. Then selecting boards to match and complement each other.

The making process has to take into account that solid wood furniture moves seasonally and is affected by heat and moisture. A hot dry environment will cause wood to shrink, whilst a damp environment will cause it to swell.

In the workshop the hardwood will be processed more than once to allow for the wood moving. Modern and traditional cabinetry techniques are then used to produce the required design allowing for wood movement. These techniques will ensure that when the furniture is installed in your home the hardwood used will not react too dramatically to modern heated houses.

The Sideboard design above incorporated large dovetails at each end with a natural edge front and curved drawer fronts. Plus an alndesign feature the 'S' shaped doors and drawer handle.

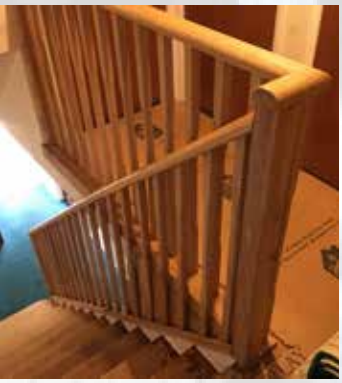




Recent projects

Anna creatively designs and makes bespoke furniture & other fine woodworks through commission.

Some of Anna's recent projects have include a vestibule in Oak, stair balustrading in Oak, Yew tree table with glass top and a 3 metre dining table in Ash with hand turned legs and a natural edge Ash sideboard.


Anna also has a small range of handcrafted wooden gifts ideal for weddings & special occasions. Some of her recent smaller projects have included collaborating with Glittering Edge, a Bladesmith at Edinburgh open workshop, to produce Japanese knives for a knife block. Plus collaboration with Craft design house, who are based in Edinburgh, to produce Trivets for Kelvingrove Art Gallery Exhibition and The Willow Tearooms, celebrating Charles Rennie Mackintosh. Then also Craft design house own product range "The Pearl Dish".




Written by

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SUSTAINABLE RENOVATION GUIDE

The Pebble Trust is a small charity, founded by ex ASHS members Penny Edwards and me, Martin Sherring, to promote the sustainability agenda in Scotland, and particularly in the Highlands & Islands. Mostly the Trust offers small grants to individuals and groups, but more recently it has entered the world of publishing, with a new book "Sustainable Renovation – Improving Homes for Energy, Health and Environment", which sets out advice on how to get the best results in upgrading Scotland's housing. Having produced the book, we're now working on a programme of presentations and other events to get across our central message – that we need to raise the bar to get the most out of domestic energy-efficiency improvements.

Over a year ago, concerned about the slow progress in making Scotland's housing fit for the 21st century, and interested to see if there was anything the Trust could do to help move things forward, Penny and I met an old friend, Chris Morgan. Chris is a director of John Gilbert Architects, former chair of the Scottish Ecological Design Association ("SEDA") and one of only four Scottish architects accredited to "Advanced" level in Sustainable Design.

Driven by the twin aspirations of reducing carbon dioxide emissions and fuel poverty, Scotland is on the verge of a huge programme of investment in the fabric of our housing. This is extremely welcome, and there is no doubt that current retrofit efforts are saving energy and improving comfort for thousands. On the other hand many renovation projects are not as effective at saving energy as they could be, as Chris has been able to demonstrate through studies of real buildings before and after renovation work. The outcome of that initial meeting with Chris was a book, adopted by SEDA as one of their series on guides to sustainable construction, setting out practical ways to get the best value from the coming acceleration in retrofit work.

As Penny commented "We gave Chris a really challenging brief – to produce a book that would appeal to everyone, from the concerned homeowner to the architect, and from the builder to the policy-wonk. We're delighted with the result and the positive reception it has had from all those people and more."

It's clear from Chris' work that the standard approach to retrofit work generally fails to reduce energy usage as much as promised. Worse, it can damage the comfort and health of occupants, and the condition, durability and in some cases the conservation value of the buildings. The guide identifies four broad areas for more effective, healthy and robust solutions.

The first important difference between our guide and others is that we aim for a balance between energy efficiency, the comfort and health of occupants, and the durability and condition of the building fabric. Broadening the focus beyond energy efficiency doesn't mean we don't value it - the opposite is true - which leads to our second difference. Our guidance is based on observations and investigations of 'real' energy consumption, measured and monitored in real buildings once completed and inhabited, rather than mathematical models. We are interested in what actually reduces energy consumption, rather than what should do according to a spreadsheet. Thirdly, almost all studies into how buildings really perform acknowledge that the way people behave in the buildings makes at least as much difference as their thermal properties. Thus, in the book we place considerable importance on engaging with people. Lastly, we acknowledge the value that the conservation or heritage sector has brought to the understanding of how to work with existing buildings. Although the focus of the sector is on listed buildings, their advice is relevant to most existing homes.

Within these four areas, our guidance differs from most advice by:

Balance

- seeking a more effective approach to energy efficiency
- taking account of the comfort and health of people who live in buildings
- avoiding problems which could lead to building fabric decay

Real buildings

- making recommendations based on real, measured performance, rather than modelled predictions
- highlighting the need for more co-ordination and inspection, and for better workmanship
- integrating considerations of moisture in buildings

People

- proposing a better engagement with people, particularly occupants

Conservation

- acknowledging the different construction principles and materials found in older buildings
- placing value on maintenance
- suggesting that consideration of the 'significance' of individual buildings should be integrated into routine retrofit assessment.

A hard copy of the guide can be purchased for £10 plus P&P from SEDA or the Pebble Trust websites, and can also be downloaded for free as a pdf from the same websites. SEDA website - www.seda.uk.net Pebble Trust website - www.thepebbletrust.org/index.asp

Written by,
Martin Sherring

KILFINAN COMMUNITY FOREST COMPANY - PART 1

Kilfinan Community Forest Company can trace its origins back to 2006 and meeting in a cold damp community hall of a group of enthusiasts who saw the potential of the National Forest Land Scheme.

After lots of hard work, the occasional setback and meetings that in hindsight should have been held in a blizzard (see note* below), the first 128 ha of forest became 'ours' in 2010. The remainder for the FCS holding (a further 434ha) was added in 2015 bringing the total to 561ha. I know but FCS sold us what they thought they owned according to their original purchase maps. The boundaries of which didn't actually match up with those held at the Registers of Scotland. Apparently this is something that is not uncommon, in fact that's probably a whole other article's worth of material in that story.....

- Inside drying room

- Yard after tidy

- Saw log stack

Since then, like just about every other small charity, KCFC has been dealing with the day to day challenges that running an asset-rich, cash-poor operation throws up. Including, mind boggling conversations with bureaucrats - mini roundabout to regulate forestry traffic anyone? And 'run ins' with those living locally who have formed opinions on forestry management whilst blissfully existing in a fact and/or experience vacuum. But thankfully all balanced by some truly heroic efforts of staff and volunteers over the years. And perhaps, more importantly, those occasional almost throw-away comments by users of the forest (both locals and visitors) stating their amazement at what has been achieved. Now, as we approach our 10th anniversary, we employ six staff (4 FTE). Just about sustainably (ie supported by revenue generating operations/projects) with nearly all income from timber harvesting being used for replanting or capital projects.

It was clear from the outset that simply being granted a substantial asset ie the land and the value of the trees on it, in and of itself would not contribute much to the local economy. The trees would be harvested and 'exported' and the land - well if you've seen a clear fell site ....what do you do other than just plant more trees. No, it was only going to work if something very different to FCS was tried. The first step was to look at how the land could generate more than £125 per ha per yr (ie the value of the Sitka that it would otherwise grow). The obvious answer was to promote some sort of development, with affordable housing and woodland crofts the two most logical choices. The crofts would be the easiest (or so we thought) as at almost all levels of government there is support for this. In the end we created three which are now successfully let. But, as has been the case throughout KCFC's history, the path to our goals has been the littered with obstacles left by those whose who are there to 'help' us.....but again that's another story. While the crofts were certainly a big win on the 'doing things differently' front they were never going to support the rest of KCFC's operations, whereas house building just might.

- The woodmiser lt20 electric

However, the biggest asset we have is timber lots of it - of largely variable quality. The standard way to realise this value is to get in an itinerant workforce once every 35 years to clear it all and send it away as a raw material for someone else to add all the value. That's why a sawmill was always part of our business plan. Now this has been done before and, sad to say, small village-size sawmills have, a bit like village pubs, a long history of being valued and appreciated, often by those who buy elsewhere - but ultimately not a history that contains much profitability. Supplying wood the for garden projects of the 500 or so households in SW Cowal wasn't going to support the operation and with access (in any quantity) only to low value Sitka spruce and hybrid larch, the £300 oak log keeping someone employed for a couple of days approach wasn't going to work either. So the approach we took was to combine our access to cheap land and cheap (albeit not great quality) timber and create one of the most valuable commodities - namely housing.

While timber frame is nothing new it almost universally uses stress-graded soft woods. With a largely manually operated sawmill and a supply of logs that was never going to give more than C16, it was clear from the outset this approach was going to face challenges. While there was no real reason why we couldn't use our own timber, the costs of processing on a small scale to a grade whereby it'd pass muster would far exceed those of simply buying it in – after all there's a reason why mass production exists. And with log cabins being difficult for planners and impossible for Building Standards a different solution was needed.

*Meeting to discuss developments of the local timber haul route normally take place in warm offices fed with tea and biscuits normally last for 2 or more hours. Except for one that involved a road inspection that meant it took place in a turning head in January while the weather closed in on us suffice it to say all business was concluded within 15mins...taking the standing meeting to the next level.

Written by,
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- Saw log stack

- This years fire wood

- Next years firwood stack

- LT20

WOODLOT LICENCES - FAMILY FORESTRY FOR SCOTLAND

Back in 2011, a small group of Dumfriesshire foresters were considering how it might be possible to get some small, unmanaged woodlands back into management. Across Scotland, there are many hectares of small woodlands some of which haven't been managed for many years or even decades. We were also aware that unlike many European countries those working in forestry did not have access to a family woodland of their own. We thought that if those working in forestry could achieve land tenure there could be many benefits to them, their families and the sector as a whole, and do a lot to help forest culture in Scotland.

Not long after we came across the Woodlot Licence concept from British Columbia, and we thought that we had come across one answer to these questions. These are a Licence from the Government of BC to grant tenure of Crown Forest land to families in BC. This has been running since 1948, with great expansion in the 70's, and sees local people take on the responsibility of managing, harvesting and restocking their local Woodlot within the terms of a Woodlot Management Plan and Allowable Annual Cut system.

Establishing as a co-operative in 2012, the Scottish Woodlot Association strove to set-up Woodlot Licences in Scotland along similar lines. We soon expanded our membership with similarly minded foresters, and started to do presentations talking about how Woodlot Licences would work and the benefits they could bring - getting small unmanaged woodlands back into management, giving forestry people an opportunity to achieve forest tenure, and a co-operative "family forestry" model of working. Throughout all this we received much encouragement from the Federation of British Columbia Woodlot Associations (FBCWA), who instantly "got" what we were trying to do. Later the International Family Forestry Alliance also assisted, and it soon became clear that the type of forestry we were hoping to achieve was quite a normal strand of forestry in many countries, often sitting happily alongside industrial private and large state parts of the sector.

Our first Woodlot Licence was on Corsewall Estate near Stranraer in Galloway, kindly hosted by Angus Carrick-Buchanan. This amazingly featured in Aileen McLeod MSP's " Scottish Woodlot Association, a First for Galloway" Debate in the Scottish Parliament in 2013.

We were thankful for all the support and interest coming from the debate. Many landowners got in touch with small woodlands that were generally unmanaged and we got some support from Forestry Commission Scotland to enable us to look at woodlands and help find potential Woodlot Licence holders.

Since then many more Woodlot Licences have been established and the Association has steadily grown in size. We now have several WL working in Dumfriesshire, and we're hoping that this year will see more set-up in other parts of Scotland.

We thought at the start that if we could get small scale tenure right, then the small scale management would naturally follow and happen on the ground. This has proved right and has been seen in the various approaches different Woodlot Licence holders have used to make the most of the woodland. Within agreed Woodlot Management Plan, and limited by a sustainable Allowable Annual Cut, Woodlotters have used small scale harvesting and continuous cover forestry techniques to get their Woodlot back into management.

At Caerlaverock Castle Wood, two local foresters work their two 15 hectare woodlots co-operatively doing selective thinnings, clearing ditches, windblow and respacing regeneration. This makes the woodland better both for wildlife and other estate interests. Speddoch Estate sees three Woodlot Licences, all worked differently but again co-operatively, with the Woodlotters helping each other with felling, restocking and other operations. One Woodlot has a horse logger, who works the woodland using their horses and is a base of operations for their firewood business. The other has a small scale sawmiller, who fells and mills in his Woodlot literally on his doorstep. The third one provides biomass for a farm small-holder. Co-operation has proven to be the key in all these situations.

With membership fees of only £20 a year for ordinary members, many people have seen the attraction of the programme and have got on board to help make Woodlot Licences a reality. The Association has tremendous gratitude for the many Landowners who have got in touch to support the Programme and those who have gone on to host Woodlot Licences.

Our current Licences are based on a 5-year Licence Agreement which is basically a standing-sale-with-restocking type arrangement between the Woodlot Licence Holder and the landowner. The Association provides support and assistance with Woodlot Management Plans, setting the Allowable Annual Cut, and help with marketing, administration and sourcing machinery.

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LOGIE TIMBER

New ASHS member Logie Timber was recently set up as a partnership between Alec Laing of Logie Estate and Mark Councill (forester and tree surgeon). The business will encompass a sawmill, wood drying kiln and showroom to process local Scottish trees and produce high quality timber products, with a key focus on furniture grade hard wood.

The key components of the business have been constructed or bought, and work is progressing towards a formal launch at the Logie Timber Festival, 4-5 May 2019 at Logie Steading (5 miles south of Forres in Morayshire).

The main product will be quality hardwood timber for the furniture market. The planks will then be processed in the workshop into finished or semi-finished timber boards ready for sale. The sawmill will also be used to process softwood timber, concentrating on larch and douglas fir products. In future, a workshop service for the finishing, jointing and planing of the timber boards will also be offered.

The hardwood boards will be displayed for sale in a moisture-controlled showroom situated at Logie Steading, a local visitor centre that has an annual footfall of over 60,000 people. In due course, there will also be an online store and the timber will be available for sale via mail order and 'click and collect'.

The soft wood will be sold either roughly sawn or planed; some will be air dried and some sold green. This will be sold from the yard, website and showroom.

The existing and staple product lines of the businesses are rough milled softwood boards such as larch for flooring, cladding etc and rough milled hardwood boards to order (custom milled). Further processing is being added as equipment is installed.

The operation is on the site of the Logie Estate sawmill which was dismantled 30 years ago. Logie Timber rents a shed from Logie Estate to house the sawmill and workshop, as well as a covered space for airdrying stacks of timber.

As Mark Councill says: "I have already established my own successful tree surgery and forestry business in the area. The sawmill venture and my own existing business are two things I envision working symbiotically, each complementing and enhancing each other's success for the foreseeable future.

I have access to significant amounts of timber, which will be a huge financial benefit to the sawmill as I am able to source quality timber from forestry jobs that would otherwise be a waste product or cut up into firewood."

Alec Laing (who is the 5th generation of his family to own Logie Estate) brings a complimentary set of skills and experience to the business: "I have been working with my family at Logie Estate for 4 years. Having grown up here I moved away to train as a Mechanical Engineer and spent time working in the motorsport industry before helping my wife and her family run their 5 star holiday cottage business. Looking after 16 properties, managing building projects and working on many other sides of a successful family business gave me great practical and managerial experience. I am always looking to take the estate in new directions and concentrating on adding value to the natural resources we have here and in the local area is very important to me. This business has the added benefit of improving the management of the hardwood woodland which, due to its uncommerciality, has been under managed. I will be responsible for the administration side of Logie Sawmill, as well as assisting in the running of the mill and workshop."

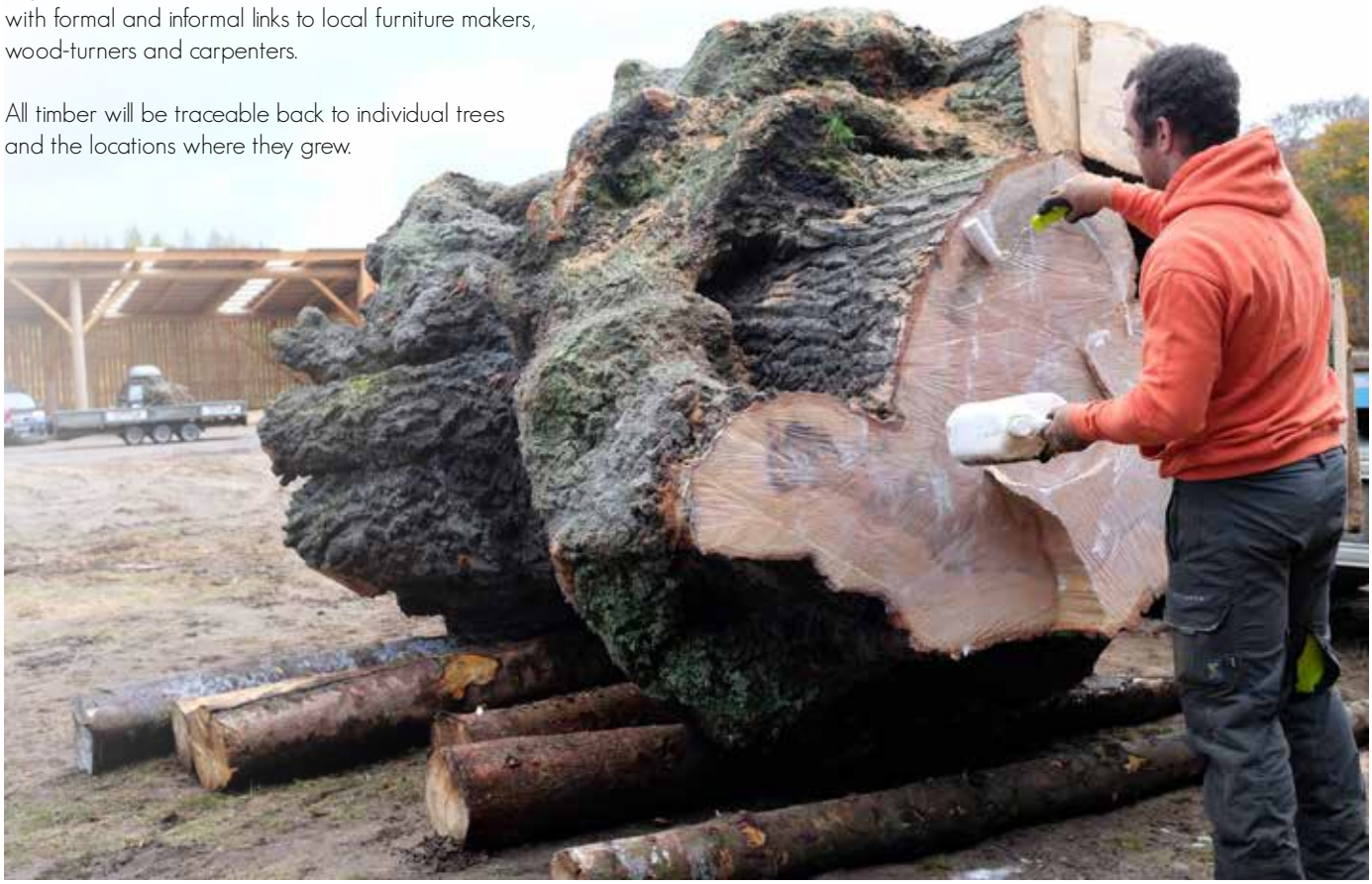
They have been advised and helped by Aaron Sterritt, and will work in tandem with Aaron as the sawmill starts to produce sawn timber. Aaron is an innovative furniture maker who is inspired by the natural characteristics of the wood with which he works. He relies on quality materials with locally sourced timber at the foundation of his work. Aaron says: "After completing a degree in Furniture Crafts I immediately set up my own business creating quality traditional handmade furniture. I have been running my successful handmade furniture business for 7 years and have recently relocated my workshop to Logie Estate. During this time I have built up an inherent understanding of Scottish hardwoods - their uses, qualities and characteristics.

Having also worked in forestry alongside my own business I have first hand experience of every process from the initial felling and extraction to the seasoning and drying of timber for my own furniture making purposes. Seeing through the process from tree to final piece has given me a full understanding of wood as a material and the knowledge of the standard required to produce quality furniture grade hardwood boards. This will help to ensure the customer is receiving the best product achievable."

Logie Timber is being set up to create high quality furniture grade hardwood. It will draw on valuable local knowledge and underused local materials, making high quality products to be sold in the Moray area and beyond. At present, many hardwood trees are felled for firewood or neglected due to a lack of viable options. Logie Timber will aim to promote the sustainable development of its surrounding local woodland resources and establish a thriving market for the sale of high quality hardwood timber.

Logie Timber also aims to be a hub for wood-users in the area, with formal and informal links to local furniture makers, wood-turners and carpenters.

All timber will be traceable back to individual trees and the locations where they grew.



Boards are photographed and labelled with a bar-code as they come off the saw, enabling precise stock control and information about species, origin and characteristics of each plank to be visible to customers at the click of a barcode scanner. In the longer term, they hope to acquire the skills and equipment to produce strength-graded structural timber.

In what may be a first for the timber industry, the sawmill aims to generate all the electricity needed to operate its machinery from the shed's 66 square metre solar roof. The sawmill is also connected to the grid, so that electricity can be exported when an excess is generated or imported if there is a shortfall.

Although their saw (Trak-met) has been cutting timber for the last year, the finishing touches are still being put in the workshop, including kiln (Scott & Sergeant), sander (Windex 1350), 4-sided planer/moulder (Logosol) and frame saw (Logosol).

The formal launch will be at the Logie Timber Festival, which will include: Horse Logging, Axe throwing, Tree climbing, Hand wood-carving, Firewood processing, James Jones, Pole lathe, Round Wood building, Chain saw carving, Hot tub manufacture, Tree talks and a guided walk, Children's bush craft, Furniture displays, Craft stalls, Painting, Music and Food.

Written by,
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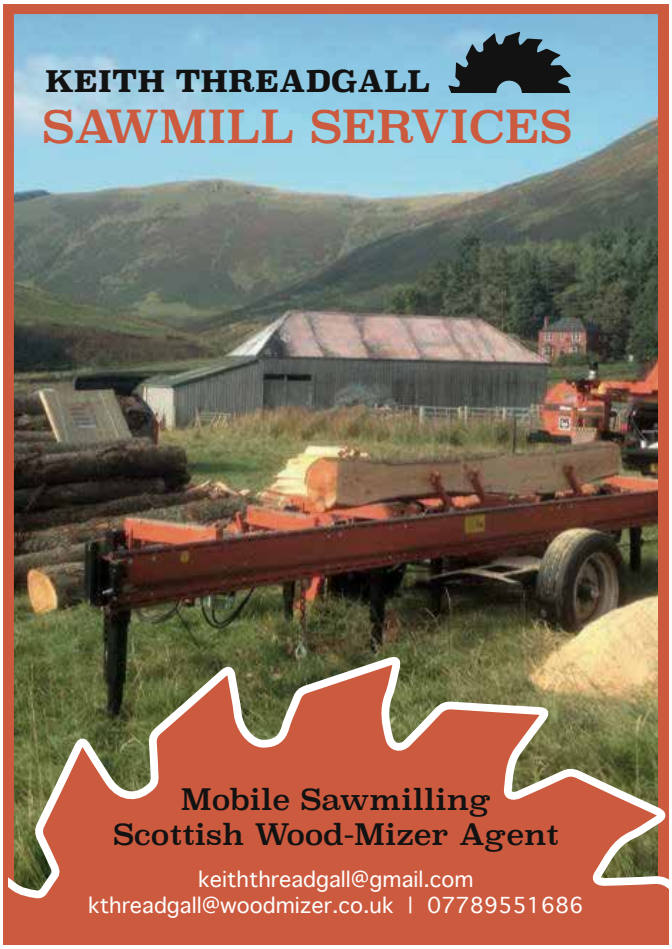

CONSTRUCTION SCOTLAND INNOVATION CENTRE

When was the CSIC set up and why?

We are one of eight sector-specific Innovation Centres launched by Scottish Funding Council, Scottish Enterprise, Highlands & Islands Enterprise, and 13 Scottish university partners as part of a programme to enhance innovation and entrepreneurship across Scotland's key economic sectors.

CSIC launched in 2014 to help drive innovation, productivity, and competitiveness across the Scottish construction industry.

We are here to de-clutter the construction support landscape in Scotland and support businesses, from the smallest link in the supply chain, to the largest multinational companies, realise their fullest growth potential. The best way to do this is to innovate, collaborate, and engage with a variety of partners – which is where CSIC comes in.

What are the main aims of the CSIC?

We exist to help Scotland's construction industry become stronger and more competitive by unlocking the innovation within it. Most companies don't realise that in many ways they are already innovating, and if they only connected the dots a little more strategically, they could unlock exciting new opportunities and commercial value. We are here to help connect those dots, and also to bridge any gaps between a company's potential and reality when it comes to developing new products, refining existing processes, or collaborating to fix an industry-wide issue.

Our vision is to inspire and enable a step-change in how the construction industry perceives innovation. We want to stop people thinking of innovation as an 'out there, other people do it' concept to a 'vital, everyday business function' approach. We want to help Scotland's construction sector to become world leading, sustainable, and economically robust.

What opportunities and facilities are available to businesses?

We provide free or low-cost facilities, training, insights, relationships, and practical support to help empower businesses to unlock commercial value through innovating. We've even got hot desking facilities, meeting and event spaces.

Our £3m Innovation Factory just outside Hamilton can help companies try out new ideas by using our state-of-the art prototyping facilities and 30,000 sq ft factory workspace. We can also put them in touch with academic researchers and other business partners who can investigate different solutions for any challenge.

We can even help with upskilling and educating your workforce through our calendar of CPD and education seminars, or we can work with you from concept to commercialisation on any project that will contribute to Scotland's construction industry.

If you think we can help you, please get in touch – we'd love to meet and hear more about your business and your ideas.

Where did the idea for the Innovation Factory come from? What will it offer?

The Innovation Factory was born from the realisation that the construction industry's ability to "do" innovation is often restricted because piloting and prototyping (if it happens at all) usually takes place on live construction sites, with tight deadlines and clients with little appetite for risky new solutions.

Being able to take all the industry's innovation activity off the critical path, into a warm, dry, safe, controlled environment where it's ok to take risks and do things differently and people are encouraged to fail, learn and repeat, is critical to allow industry the room to grow its innovation culture. That was the key driver for the Innovation Factory.

- CLT Press

- CLT vacuum press

- CNC router

- CSIC Site 100

- Timber framing line 2

- Timber framing line

In short, we are a one-stop innovation support shop for any construction or construction-related business that wants to futureproof itself in a sector where technology is already causing widespread disruption and offering equally exciting opportunities for growth.

Here's what businesses can access:

• 30,000 sq. ft. of advanced manufacturing workshop space filled with state-of-the-art production and prototyping equipment and technology. This includes (to name just a few!) an industrial robotic cell capable of a wide range of applications including concrete 3D printing, a stonemaker that automates the process of brick and block production, and a vacuum press capable of manufacturing 3x13m cross laminate timber panels and glulam timber components, using homegrown timber.

• collaboration and training facilities

• an experienced and knowledgeable team to help get ideas and projects off the ground

• ongoing CPD and networking opportunities through our training calendar in association with academic and industry leaders

A full list of equipment plus details of what they all do can be found here:
http://www.cs-ic.org/innovationcentre/innovation-factory/equipment/
Anyone interested in following up should contact email: hello@cs-ic.org,
telephone: 0141 212 5250

Written by,
Anna Chambers

CONSTRUCTION SCOTLAND INNOVATION CENTRE

If you are considering using the facilities at CSIC, funding may be available to support the costs.
For more information, contact Andy Leitch, Timber Development Policy Advisor
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A SLOW PROCESS

As much as I loathe the concept of 'branding' it's hard to deny that a well thought out 'brand' and an engineered 'campaign' to introduce products and fashions, do often succeed remarkably well.

They say, first recognise a trend, then identify a need, work out if you can at least go some way to satisfy that need, develop a brand and exploit it for all you're worth. That seems to be the lesson from America. The word exploit, smacks of dirty commercialism and all its connotations, is not to everybody's liking. But we need to eat.

I'm wondering if other ASHS members might like to consider the possibility of sparking off a fashion, a 'movement' in the use of Scottish grown and processed timber. Should we be attempting to engineer a demand that would benefit the whole industry, by creating a fashion centered on Scottish grown wood. Stimulate the public to become participants in the fashion by encouraging them to seek out Scottish wood in the products they buy.

A design led movement that follows trends in arts and culture is, in my opinion, more likely to be successful than one that talks about trees, woodlands and the rural community (sorry).

Before you dismiss me as a crackpot, just consider how many of our big Cities like Glasgow, Liverpool, Newcastle and now Dundee are looking to Arts and Culture for transformation and future prosperity. Heavy industry abandoned these Cities and I'm suggesting we could look at these transforming cities as an analogy for Scottish Forestry and learn from their experiences. Having said that, I've not spent my life in forestry, so perhaps I should keep my opinions to myself.

Nevertheless, I'll press ahead. As a model, I've searched the origins of Art Deco, it appears to have been recognised as a movement in 1925 at the International Exposition in Paris although by all accounts its origins date from ten years earlier. As far as I can gather, Art Deco wasn't orchestrated, at least not initially, it seemingly came about by coincidence. No one person or Company in charge (that might be the secret of its success). Interestingly, those involved in the Art Deco movement, crossed many disciplines, furniture makers, architects, house builders, artists, graphic designers, jewelers, interior designers, fashion designers and of course, lidos & ocean liners.

Wikipedia tells me that the term Art Deco comes from Arts Decoratifs. At the time the Public appetite was for modernity and a palate for bright new colours.

So, what are the similarities between then and now? As I see it, the growing Public appetite for sustainability, environmental responsibility and sourcing local, natural materials is one that is likely to grow. And, I think I'm right in saying that the ASHS membership is a broad church, with members involved in most areas of forestry, processing and design. It seems to me we have an enthusiastic nucleus of a movement already. Unlike Art Deco, that spread across America and Western Europe, a movement surrounding Scottish wood is realistically, only going to remain local. However, it could be encouraged to spread into the rest of the UK. For example, Scottish seed potatoes have a reputation across the UK as superior, of course, the environment and conditions in Scotland mean they are superior. I wonder if a similar case could be made for Scottish grown timber.



Now, my tiny wood working business is at the arty end of the spectrum and it will not have escaped your notice that a Scottish Wood movement with a bias towards Arts and Culture is obviously to my advantage. But my thinking here, goes deeper than self-promotion (OK, not that much deeper).

To succeed a movement would need a central theme and a common thread. Obviously, the use of Scottish wood is the theme, with Scottish Working Woods authentication essential. As for the thread, that could be (all ideas welcome) the concept of 'slow'.

By way of explanation, in the world of clothes, one of the current trends is for 'Fast Fashion'. There are online retailers that offer highly desirable clothes at the height of fashion, at inexpensive prices. The clever bit is, to participate in Fast Fashion a customer, (as I understand it), accepts the goods are unlikely to be of high quality. Fast Fashion is so called, (apparently) because one buys an item online, it's delivered either the same day or the next and then worn once or twice before being thrown away.

A product made from Scottish Wood, is likely to be the antithesis of Fast Fashion. By way of illustration, say I want a new chair. The process of finding a maker, ordering a chair, waiting and paying handsomely for it, would probably be seen today by wider society as old fashioned. Added to which, my new chair's useful working life, is probably longer than my own.

But, this ***'slow'*** process is far more cutting edge, responsible and 'with it', than Fast Fashion. The purpose my proposed ASHS ***'Slow Fashion'*** movement (I'm only calling it that in the absence of something better) would be to show the British Public, that to be really 'with it,' you need to think slow.

As a starting point, I'm looking for ideas and contacts, not a commitment to spend money. If anything does get off the ground, I imagine it too will be a slow process. If we get it right however, it could be self-perpetuating. Let me know if you're interested.

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MARTI BESPOKE

Coming from a wealth of experience, Marti offers unique flair with every creation. "Working with wood is like a focussed meditation, interacting and communicating with the lines, the curves, and the grains, the wood expresses itself and my hand merely shapes and connects the pieces to form a beautiful marriage of the whole."

From Scotland, Marti has been involved in construction and design almost from birth. His father, a multi-trade builder, had a passion for design and construction which was evident from the many house moves involved in Marti's early life. Being surrounded by tools, ongoing construction and development, Marti was fascinated with the process and submerged himself in his creative surroundings. This love of design, fabrication and challenge is the source of his passion for creation.

When building his first home at the age of 26, a few months after the passing of his father, there spawned an indulgent burst of creation at every corner. From the pink and blue kitchen and the molten lead filled wooden sheet flooring, to the kingsize double bed swinging from the ceiling. Marti maintains a dedication to creation of the unusual and eccentric.

Working now as Marti Bespoke for the last 7 years, many interesting projects have been completed. From gift designs, to very beautiful and often huge furniture, to the design and construction of various summerhouses and garden rooms, each totally unique and built to fit specific needs, budgets and possibilities. "When I see a beautiful piece of wood, it's like it begins to speak to me, wishing to be appreciated and live a new existence, as a caterpillar becomes a butterfly."

- Dem Bones 'Wasteland Artifact' - A Wanderer's Wish

Skills

Learning, applying, and sharing new skills is imperative to the creative process. New skills and new materials combine to produce exciting new direction, possibilities, and structural design. Venturing into new skill sets has spawned from applying a creative new direction towards commissions over the last year, such as: steam bending wood to create a beautifully unique concealing unit for a radiator and electric meter; carbon fibre infusion processes, used to produce a light-weight, waterproof, and slim line roof for a very dramatic triangular building, adding a whole other dimension of style and design to an already stunning summerhouse.

- Steam Bent Radiator Cover

Knock Old Castle

My good friend and long-time client, Bruce Walker, invited me to undertake the challenge of designing 14 totally unique doors and frames, and 2 oak ceilings on an entirely new wing for the revamping of Knock Old Castle.

- Knock Old Castle Doors 2

- Picasso in timber

- Knock Old Castle

To undertake this exciting venture, I used castle estate grown timber - which I had been involved in the processing of years earlier - from wind-blown trees. The ceilings were designed and installed with the natural edge of the wood cut into the next section of wood, resulting in free-flowing beautiful movement throughout the ceiling. Realising my vision for the doors involved an amazing process of design, challenge, construction and installation. Each door became a stunningly unique character in itself, brilliantly mirroring the different vibe of each room they lead to.

This process ran for approximately 18 months and included collaboration with various other artisans, carpenters, stone masons and glaziers, each with their own style and artistic qualities, and the project remains a huge achievement for all involved. A short documentary of the entire castle refurbishment is available on YouTube under "Knock Old Castle Recombooberation", and the castle is now a five star holiday destination at the gorgeous location of Skelmorlie in the West coast of Scotland.

Collaboration

Collaborating with other artists is always an adventure. To have ideas develop between two or three minds creates lovely curves on the path of the creative journey, and recently working with two other creative minds, Jamie Campbell and Graeme Miller - creative not only in their musicianship, but gifted with their hands, vision, and designs, and with Graeme's engineering background - has revealed a world of new concepts, possibilities and creative ventures.

At the end of most large commissions, involving sometimes months of daily designing and problem solving both mentally and physically challenging artworks, there is time for a more relaxed approach to artistic creation involving simpler design processes and faster production rates. The bespoke gift designs offer that respite as it satisfies my need to create and indulges my love of beautifully crafted items. "As trees we must flex in the wind. As our path is our wind, we must yield. Sometimes a storm, but more often a breeze."

Becoming a father at the age of 42 was a significant life changing moment, and as a full time single parent, this brings other challenges and massive rewards. Having spent so much time exploring different regions of the world and immersing myself in different cultures has been an inspiration to style, design and methodology in many aspects of the work. This year, taking my daughter Karli inter-railing around Europe on an artistic and cultural sabbatical, gaining huge insight into the works of Gaudi, Dali and Da Vinci, the architectural wonders of Ljubljana, Budapest, Berlin, and around 17 other wonderful countries, has ignited a true enthusiasm, and wonderfully productive unique design processes have ensued.

- Witches House 3

- Wizards House Frontal 2

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WANTED: MAN FOR SHOOTING TREES

I was visiting an estate by the A1 close to Wetherby. My object was to collect ash scions from selected trees on three areas of the estate that had been selected for their outstanding quality. Having already collected from one area, I was parked in a lay-by close to my next area, when a police car drew up behind me.

The tallest policeman I had ever seen alighted from the car and approached me. 'We have a report of a man in the woods with a gun' he said, 'Would that be you sir'?
I replied in the affirmative.
'Would you mind telling me what is your business.'
'I am shooting ash trees'.
He began to laugh. 'Have you recently escaped from somewhere sir'? he enquired, still chuckling.
I replied in the negative, and thought to myself that I had found the original laughing policeman.

I explained what I was doing in some depth, and all the while he regarded me with an amused grin upon his face, and it was only when I showed the bundle of twigs collected from my previous visit that he began to believe me.

After inspecting my shotgun certificate and checking the serial numbers on my 12 bore, and writing everything down, he then suggested that I should have reported my intention to the local police station prior to my visit.

I explained that all details of the collection had been previously agreed by the Estate and that I had visited the Estate Office prior to starting work. I further pointed out that the Estate was a large game Estate with obvious shooting stands and high seats indicating a busy shooting estate. He was not impressed, and squeezed himself into his police car and departed.

I went into the nearby wood, found my trees and collected my scions. On returning to my car I found a note on my windscreen asking me to call in at the local police station, suggesting that my gun was

not on the National register. I did not do this, as I knew my gun had been checked only three weeks previously. I did not hear from the police again.

Prior to my involvement in collecting samples a great deal of work had been carried out by what was originally The British and Irish Hardwood Improvement Project, known as BIHIP. This organisation, now under the name of Future Trees, was set up to provide a quality gene pool covering hardwood species of oak, ash, sweet chestnut, walnut and latterly sycamore.

PLUS trees, those of superior form, and general good quality were selected and documented, and vegetative material collected in the form of mature shoots (scions). This material was then grafted onto selected stocks from known provenances. The outcome of the grafting process means that in using Mature wood, further collections of vegetative material or indeed seed may be collected within a few years of grafting, without the resultant waiting time of perhaps 20 years for straight seeded materials.

Future Trees now have seed orchards set up in Northern Ireland, Ireland, Scotland, England and Wales stemming from these operations. A quality gene pool for the above species has been captured for future use.

The practice of taking scions by shooting small branches will probably be a thing of the past. The opening up of forest areas to public access now presents a danger to the public, their children and dogs etc.. Any future collection will need to be carried out using climbers.

Written by,
Gavin Munro

Saw & Tooling Services (Est 1987)

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