Model Shipwrights of Niagara

Issue No. 5

MONTHLY MEETING LOG

Sunday, 8 January 2023

The Golden Horseshoe, Ontario, Canada

https://modelshipwrightsofniagara.weebly.com/

CLUB NEWS

The MSON is still not having face to face meetings. Hopefully in the spring we can once again try to plan a hybrid meeting via ZOOM for distant and house bound members, and face to face for local members that can travel to the new meeting site in NOTL.

MEETING ATTENDANCE

33 of the 44 members that had registered for the January ZOOM meeting were able to attend. On this day the MSON presently has a total of 94 members from across Canada, the USA, the UK, and the Caribbean.

MEETING PRESENTERS NEEDED

We are booking presentations from September 2023 through to June 2024 and would like to have some 5 minute regular model progress updates from individuals to supplement some new and fresh 15 - 20 minute main presentations. Will you answer the call?

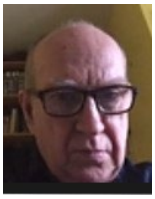
E-mail us at: ***modelshipwrightsofniagara@gmail.com***

REFERENCE BOOKS

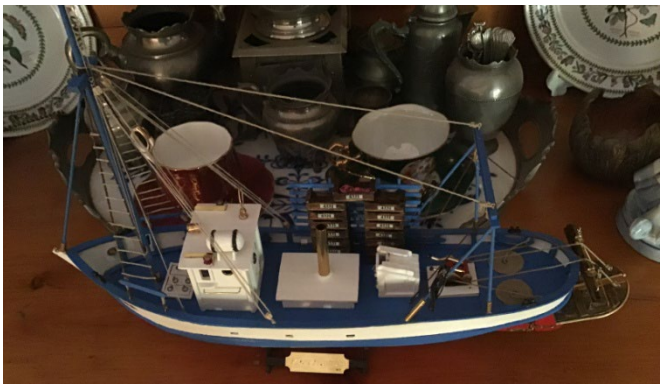
The reference and modeling books offered by **Tijs Theijsmeijer** via emailed to all on the 3rd of January have been distributed.

During Bruce's presentation on scratch building his 3 blade brass propeller at this January meeting Kurt Van Dahm recommended the book ***Modeling Building With Brass*** by **Ken Foran**. Ken is an NRG member and a master modeler. Kurt says this book is a must have for anyone building in brass.

RECENTLY LAUNCHED



Tijs Theijsmeijer reports that he just completed the 1:35 scale wooden kit model of the Spanish Mediterranean fishing trawler **Mare Nostrum** by Artesainia Latina. The full size ship measured 15 metres (49.2 ft) long and 3.5 metres (11.4 ft) across the beam, with a 10 ton displacement and powered by a 40HP diesel engine. The fine detailed kit contained all parts and complete DVD instructions. Tijs' model measures about 16" long, 10-5/8" high and 4-1/8" wide.



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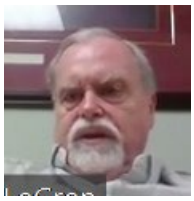
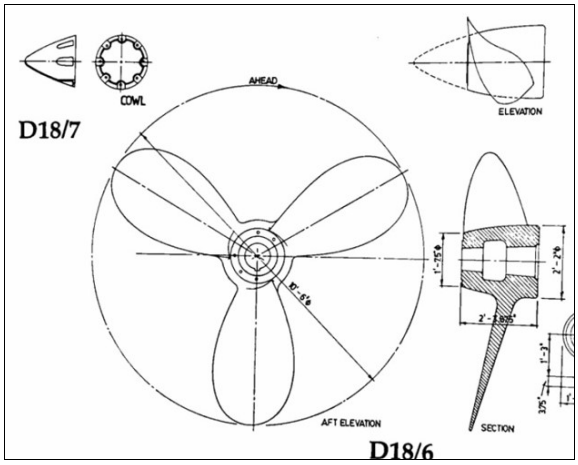
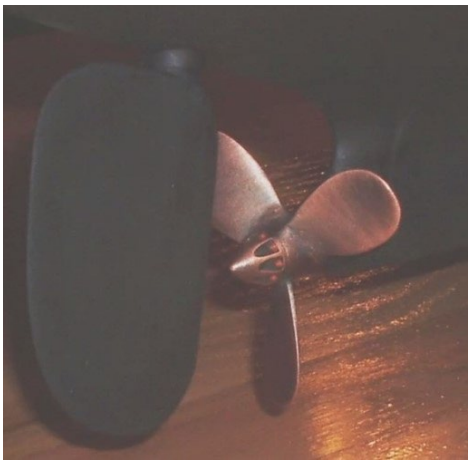
PRESENTATIONS



1) Bruce LeCren delivered a presentation of his method of **building the 3 blade brass propeller** used on his 1:48 scale static model of a scratch built Flower Class Corvette as there weren't any commercially available. He was inspired by William Mowll's method used on his HMS Thunder model. First he found a plan on page 120 in the book *The Flower Class Corvette Agassiz* by John McKay and John Harland. Important dimensions identified included the overall diameter, hub diameter and length. You must also pay particular attention to the blade orientation, the pitch on the hub, CW or CCW rotation, and the twist in the blade that equalizes the hydrodynamic forces across the length of the blade, and the tilt or cant angle.

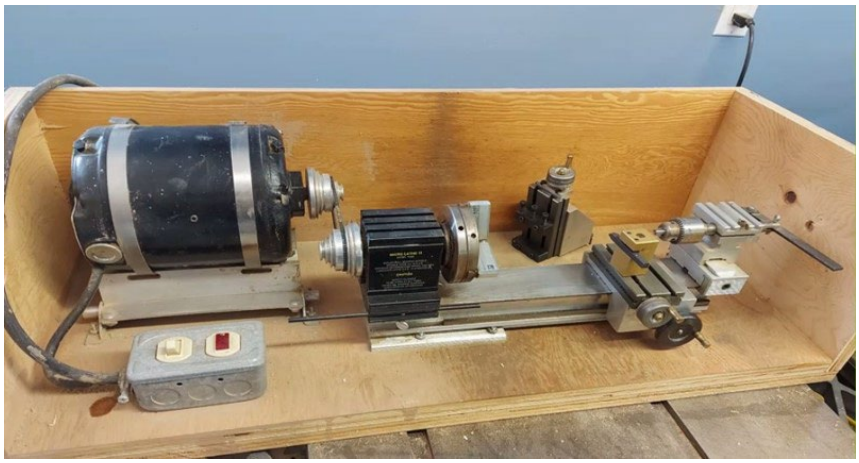


The Plan



The Completed Propeller Mounted

Bruce used 1/16" thick brass sheet for the blades and 3/4" diameter brass rod for the hub and cowling assembly. He machined his hub and cowling in one piece on his Taig Micro Lathe equipped with a 3-jaw chuck, and a cutter mounted in the tool post on the cross slide.

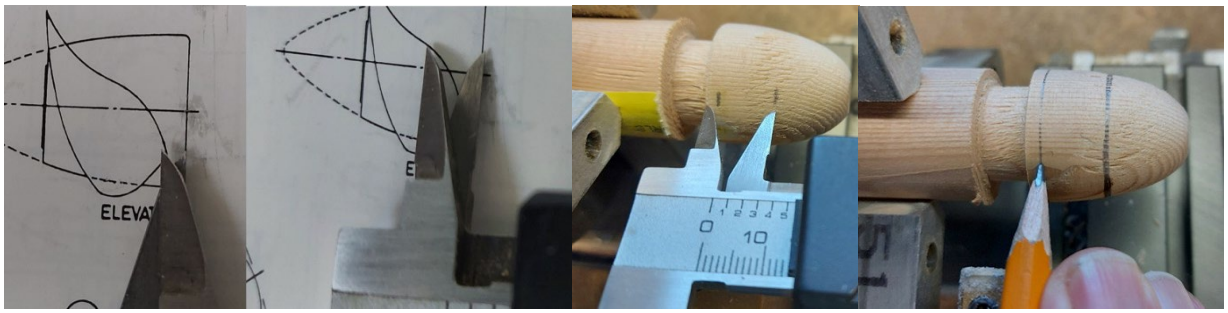


Taig Micro Lathe used on the Project

He also needed a number of hand tools, 4" file set, 6" bastard (coarse) file, a 1:48 measuring scale purchased at a model railroad shop, a small square for setup, a Sharpie for witness marking, vernier and dividers to transfer dimensions from the plan onto the work, and a mechanics vise to hold the blades while shaping and soldering the propeller. Bruce also had emery cloth to sand the metal, solder, paste flux, a plumbers propane torch and igniter. Bruce uses a paste flux because he had to build up and radius a big fillet. A core flux solder would not do the job. He also used soft solder because his model is static, not a working pond model, so he didn't need the extra strength in his blade to hub joints that would be provided by silver solder.

Bruce shaped his hub and cowling assembly to match the plan. He included a length of shaft off the back as it would be useful for holding the part and mounting to the model. He verified the dimensions against the plan at three of four places to confirm the taper by using both his divider and vernier as appropriate. The lathe was powered OFF during measurements to protect his knuckles from impact with a rotating 3-Jaw chuck!

Next he needed to cut slots to set the blades into. These locations were measured off the plan and transposed to the hub/cowling. Bruce had to make a wooden mock up to get photos for us as he hadn't taken any during the actual build. The two critical measurements, the aft and forward locations where the blade meets the hub, were transferred to the stationary part and the part was rotated in the lathe manually, to create lines around the complete circumference as seen below.



Bruce conveniently used the position of the three jaws to locate the base of his three blades instead of trying to mark off the requisite 120° intervals. Alternatively, he could have used graph paper against the base of the hub to get the required angles (intervals) and transferred those onto the hub (for example, graph paper will give 180 and 90 degree intervals for 2 and 4 bladed props). Next he measured the width of the blade root off the plan as seen below. This is the distance of the aft and forward end of the blade that contacts the hub. This was transferred to the hub and then a line joining the two witness marks was made using a flexible ruler (or cardboard would do in a pinch). This is the location of the slot that needs to be cut into the hub so the blade sits flat on the hub for secure soldering. This also sets the blade pitch at the hub.

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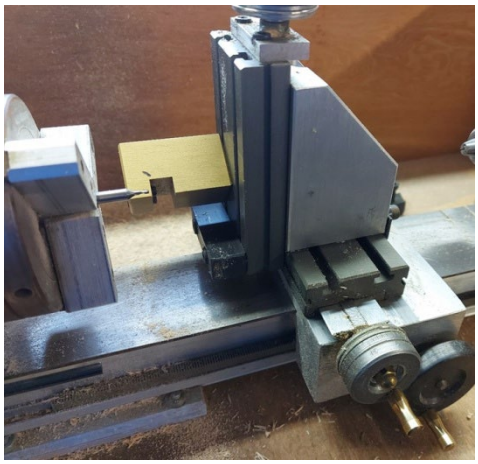
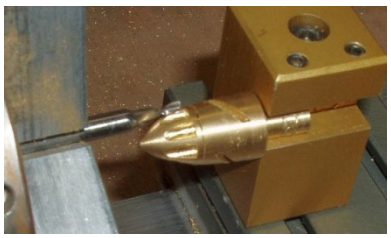
Bruce cut his slots on his lathe using a 1/16" cutter mounted in the 3-jaw chuck, because his blades were 1/16" thick at the root. The hub was set up in a tool post (brass-coloured in the photo below) which was mounted at an angle in the Taig vertical milling slide mounted on the cross slide. The angle of the tool post allowed the cutter to follow the marked line on the hub. He ran his cross slide in and out with multiple shallow passes to cut his slots while the cutter rotated in the 3-jaw chuck as can be seen below. He said the slots can also be cut with a hacksaw.




Bruce next had to make cavities in the cowling to hold the eight bolts that hold the cowling onto the hub. The base location was measured from the plan and scratched around the circumference onto the hub/cowling assembly. He used a larger cutter to suit the 2" bolt head diameter and moved the part into the cutter. His plastic bolt heads were sourced from the model railroad supply shop Tichy Train Group.

HO Scale Hex Bolt Heads

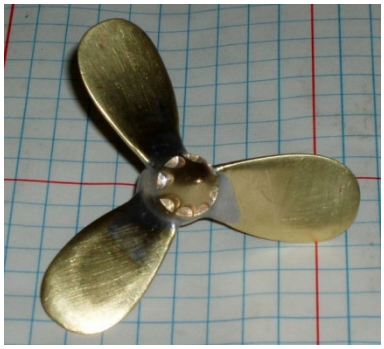


Cutting Cavities for Bolt Heads

To make the blades Bruce first cut three pieces of 1/16" brass plate. He drew the shape of one blade from the reference plan onto one plate and then stacked and riveted the three plates together with #14

copper wire so he could cut three at once. After finishing shaping with a file the individual blades were clamped in a vice by their base or root and twisted with pliers. Finally the hydrofoil shape was filed onto each blade. The blades were held in place in their slots against the hub using three hose clamps as three provided better control than a single clamp, and then they were soldered.





Bruce applied the flux paste first, then heat, and finally the solder. He applied enough solder to build up the fillet (radius in the joint). The solder could still be added when the heat was removed and short blasts of heat were applied afterwards as needed.

After cleaning up with a file and emery cloth the propeller was sent out to be plated, first with a copper sub-base and then finished with a second bronze layer as soft solder will not take bronze plating directly. When it came back from the shop the eight hex bolt heads were epoxy glued into their cowling cavities. These were air brush painted with Vallejo Bronze 69062.

HMCS Chicoutimi - K156 - 1:48 Scale

(Awarded Journeyman Silver at the 2021 NRG photo modeling contest)

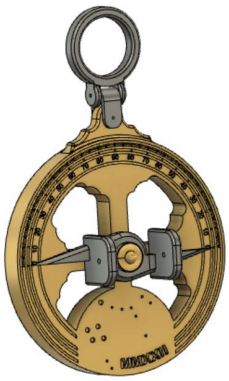
She presently resides at the Calgary Naval Museum

After this Bruce entertained us with a progress report on his conservation work on the model of the Hudson Bay Company ketch **Nonsuch** of 1660, for the Wardroom of the Naval Reserve Base HMCS Nonsuch of Edmonton, Alberta. Bruce then gave us a quick review of his 1:48 scratch built model of the RCMP schooner **St. Roch**. These will be presented in detail at meetings in March (St. Roch) and June (Nonsuch). The March meeting will review how to loft frame shapes from the line drawings of St. Roch.

2) Morton Stoll gave a demonstration on how he uses his "really old" **plank bender**, a 40 year old **Areopicolla tip** inserted into a variable 25-60W soldering iron base. Mort keeps his at a medium setting as too high a setting will scorch the wood. The roller gives the plank more support, holding it to the iron surface. It can be used upright mounted in a vise or upside down on a block of wood. Mort soaks his plank in water for a few minutes and then the plank is rolled over or under the ironing surface, bending the plank over it by hand to shape it.

He followed this up by showing us a second device, a **Kammerlander Plank Bender** that resembled a soldering iron tip. It has a bevelled tip that has a convex or rounded surface and operates at 30-120W. Although this unit has a higher wattage capability he says it does not scorch the wood. Mort uses this tip for smaller bends.

3) Alan O'Neill made a presentation on **3D printing a Mariner's Astrolabe** and then explaining **how early explorers and navigators used the instrument** to locate themselves.

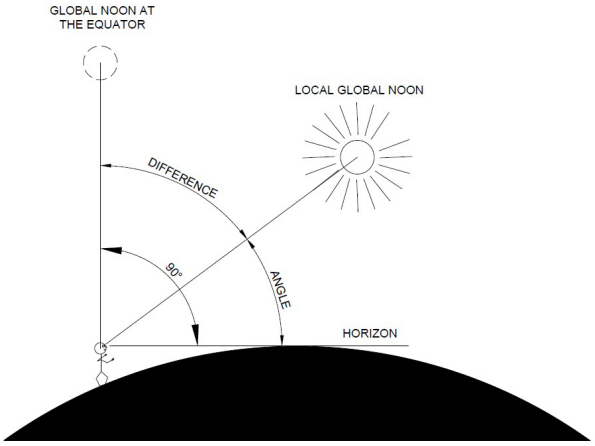


All books about the early explorers and navigators seem to suggest locating themselves involved difficult mathematics and that didn't satisfy him as Alan wanted details, so after considerable searching, he found them. First he needed an instrument and 3D printed his own Mariner's Astrolabe. This mid 15th to 18th century device consisted of a weighted body, spinning alidade or pointer and gimballed ring assembly so it would hang vertically. Alan created his 3D model (seen to the right) using the free hobbyist version of Fusion 360 and adorned the ballast face with two star maps, the Little Dipper with Polaris and the Southern Cross with the Pointer stars and Achnar.

One is used to locate the North Pole and the other the South Pole. To this he added the year of printing, 2022, in Roman numerals. Additional ballast (15 one cent coins) was added in a covered cavity in the rear as the 3D printed Astrolabe hadn't sufficient weight to hang properly.

The device is held by the ring with the edge facing the stars, which

includes the sun, and the alidade is adjusted so either the sun's beam shines through the two sighting plate holes and onto the palm of the hand, or night stars are seen through the two aligned holes. **DO NOT LOOK DIRECTLY AT THE SUN**. Then the angle above the horizon is read off the scale. This part seems simple enough. To find his latitude (north-south), solar high noon must first be identified for his location which Alan did with a levelled sundial aimed due north. The shortest shadow created by the noon sun seemed to be at 1:17 PM EDT (12:17 PM EST).



The next step is to read the angle of the sun above the horizon at this time and record both. His was 64°. This angle was then subtracted from 90° which yielded 26° This must be corrected for the tilt of the earth on the day of the reading. The earth rotates around the sun in an elliptical orbit so the number of days between the winter/summer soltice and spring/autumn equinox are not equal. Early explorers were supplied four year period tables created by astronomers (as everything reset on the leap year) so they could read the declination angle of the sun from them. Alan used tables supplied by the US Government National Ocean and Atmospheric Administration website to discover two things. First, the angle of declination at 12:17 PM EST on the date of his reading was 16.56°, and second, that he had apparently identified high noon incorrectly as the table showed the sun was still rising at 12:24 PM EST, 7 minutes later. Alan added 16.56° to his 26° to reveal his latitude at 42.56° which equals 42° 34' 12" North. His phone GPS read 43° 1' 12" N which equals 43.02°. Alan's calculation was 0.46° off.

1' (minute) is 1 nautical mile = 1.15 statute (land) miles. With 60' in 1° he deduced his calculation was 31.74 miles off. Early navigators on a tossing ships deck could find themselves hundreds of miles off.

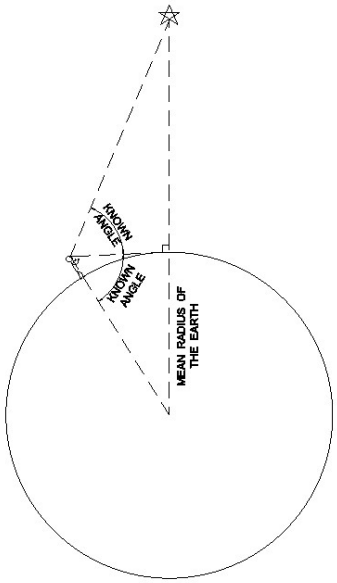
If Alan were using his Astrolabe to sight Polaris, the North Star located at the tail of the Little Dipper, all these calculations would not need to be done. The angle of elevation of Polaris (which lies almost directly at true north) is a direct indication of latitude.

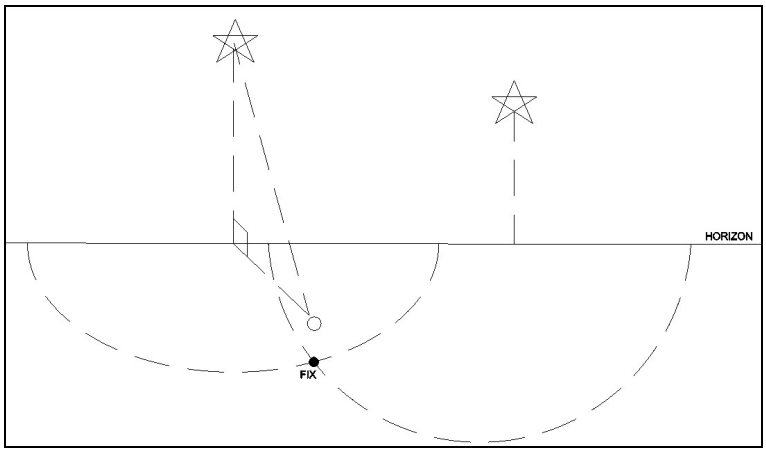
To determine his longitude (east-west) Alan needed to know the time difference between high noon at his location and that at the Prime Meridian, Greenwich, England. As he had identified solar noon to be at 12:17 PM EST and the time difference between time zones is +5 hours, Alan combined the two to reveal the solar noon time difference was 5 hours and 17 minutes, or 5.2837 hours. The earth rotates 15° per

hour, multiplied by 5.2837 hours yielded 79.255° West. His phone GPS read 79° 15' 18" W of the Prime Meridian which is 79.255°! Alan did not understand how his longitude could be correct when his latitude was wrong... then he discovered the Equation of Time.

As the earth's orbit around the sun is an offset eliptical path and not a centred circular path, the rotational speed of the earth on its axis changes due to the influence of the sun when we are closer or further away from it. 24 hours in a day is actually an average. In November two days are as much as 16 minutes and 23 seconds longer whereas in February one day is 14 minutes and 20 seconds shorter. This is why we have a leap year... to reset everything.

Once again astronomers provided a four year table and Alan discovered that on the day of his reading the time correction was minus 5 minutes and 53 seconds, almost a full 6 minutes. Knowing his identification of solar noon was about 7 minutes off, this time correction would have brought him much closer to his actual longitude.





Early explorers and navigators did not have accurate timepieces to identify the solar noon time difference between their location and that of the Prime Meridian. So how did they do it? They read the elevation of multiple known stars at dusk, recording these angles and the time observed. Then they referred to tables that told them at what time and where on the globe those stars could be seen directly overhead on that day. Now they had to make calculations to correct the location for their sighting time of the day knowing the earth spins 15° per hour, taking care to get the rotational direction correct. They then used the trigonometry of a right angled triangle to deduce the distance they were from that location. The formula Tangent = Opposite / Adjacent was rearranged to A=O/T. The angle (T) was the elevation of the star above the horizon. The known distance of the opposite (O) side of the right angled triangle was the distance to the centre of the earth which had been calculated in 430 BCE (which is another facinating story). Dividing 'O' by 'T' revealed the distance 'A' from them to where the star was

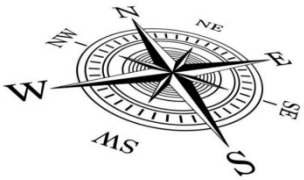
directly overhead. With multiple star sightings and calculations they could plot multiple arcs on a flat map and where the arcs crossed each other was their location. They called this "getting a fix".

During the day they could plot their travel progress from a known "fix" with compass directional heading and log speed readings, throwing the "log" overboard and timing the feed rate of the equally spaced "knots" on the rope passing through their hand to determine their ship's speed.

To learn more about finding longitude with time (*link provided by Myles MacInnis*):
https://www.dailymotion.com/video/x7v3om8

That concluded our presentations and monthly meeting.

A special thank you to all members that have stepped up to present and add to our meeting content with comments and questions at all our meetings. It is your attendance and participation that make this club successful and helpful to other members.



The MSON
Helping to keep fellow modelers on course since 2008

Our next meeting will be held on **Sunday, 12 February 2023**
Forum opened at 1:15 PM ET for a 1:30 PM start

As always meetings and membership is open to all and free!
Notices will be e-mailed.

The upcoming February meeting presentations:

- **The Falkirk Wheel** - by *John Garnish* (15 minutes)

The worlds only rotating boat lift linking two canals with a 35 metre (115 feet) elevation difference replacing 11 lift locks

- **HMS Agamemnon** - a kit bash by *Mike Draper* (15 minutes)

6 months ago Mike thought he had 20 hours work left to finish her... is he done?

Have you anything you would like to share at a meeting?

If so please send us an email.
Modelshipwrightsofniagara@gmail.com