VIR manual for annotated scan procedure

Preparation

Clean, restore, and pat dry the object

> (Take notes (*Timber log sheet*, remember to also log progress status) and photos as needed throughout this and all following steps)

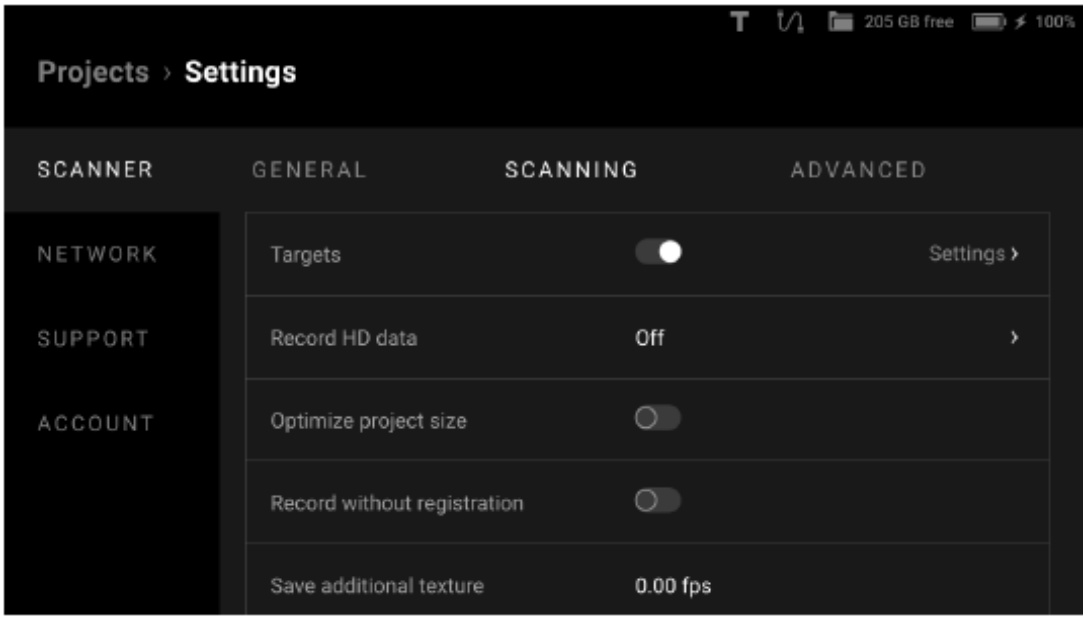
Place level (natural state/curvature) on supports on a horizontal table

For dark objects, avoid bright, reflecting background

Scanner settings

Each object is one LEO ***project***. Name the project after the object: *NNNNxMMMM*

Settings before you start scanning should be as follows:



To enter settings - Open settings located at the bottom left corner in the display. Navigate to the *SCANNING* tab and scroll down to select preferred settings.

Set scanning frame rate high unless scanning a really big object, e.g:

- **60 fps (30-60)**

If you are new to scanning, a lower frame rate may help avoid excessive data (frames).

If possible, scan with HD

- **Set HD recording data:**

  High for planks

Normal for 4-sided (e.g frame/keel…)

- **Supplementary texture:** set to **3 fps**
- **Texture exposure time:** set to **3,5 µs** (decrease for lighter objects) [according to Artec, this has no consequence when using the built-in texture flash, but a known bug currently means that a reboot is needed after having played with this setting]

Scanning

Set Exposure time and Brightness until satisfied. A good suggestion for our lighting conditions (4000K 100/80W ceiling- and mobile lamps) is around 60%.

Unlike the above, one setting is unique to each ***scan***: set texture **brightness** high for dark objects (not 100% though). Remember that it jumps back to the standard 33% for each new scan, **take note of the setting used and remember to reset after flipping the object**!

Scan at the 50-60 cm distance sweet spot. If it helps, lower the range to just above this. It is nice to use **distance** overlay during scanning and then switch to **quality** overlay during or after the scan for control.

An ideal scan path is: vertically down onto the top face, turning to a low pass facing one edge/side, pause, move and repeat both passes from the other edge/side. For long objects, Artec recommends beginning in the middle, which means that each of the above will be doubled in a 'bow tie' pattern.

Stay above the horizontal plane when scanning to avoid having support structure between the scanner and the object.

Move with a steady hand; use the stool on wheels for the low pass if you wish. Do not move too slowly (if new to scanning, you may wish to lower the scanning frame rate so you can move slower without creating so much data).

Do not be afraid to pause, but ensure that the scanner is tracking correctly when resuming.

It is advisable to end a pass by pointing away from the object and face the table/background when pressing the trigger to stop (avoids 'jerking').

Option: photographic texture: Before flipping sides: ***make sure to take photos of object for fine texture*** if so desired. Be sure to take the photos with the object in the exact same position/surroundings as when scanned. When photographing the ends of the object straight on, make sure to have sufficient background i.e. make sure the base on which the object is placed extends further than the object's ends so they do not "hover". Additionally, try to avoid more than one photo of ends straight on and instead take angled photos of ends.

When flipping sides: make sure to stabilize the object and maintain its curvature; that is, build the new supports before flipping and flip with the new table plane ("sandwich"):

First, use a straightedge to place support blocks along the *length* of the timber. When satisfied, put a lightweight channel roofing board between the timber and the straightedge to also level the support *sideways* (using blocks, wedges and e.g. tongue depressors). The structure needs not be horizontal, just

planar. (It is of course a prerequisite for this to work that the scanning table is level). If needed, strap the timber and the block/board together with e.g. ratchet straps to keep everything in place when flipping. Heavier timbers may additionally require a 'stretcher' in the form of e.g. a ladder with an attached plank, forming an 'L'. When flipped, slide the stretcher/ladder out but keep the roofing board (if too reflective, lay something with more texture on top of it during scanning/photo).

For each flip, create new Leo ***scans*** in **same *project*** (there is no point in creating new *projects*).

File transfer

Launch Artec Studio while having internet connection. Only then:

Use direct ethernet cable btw. scanner and 'WONDERWOMAN'/'DEADPOOL' PC (fastest and **only method that accepts HD!**) On scanner, set connection: *Computer*. Only after this, connect from PC.

Import only raw data and do not select the HD reconstruction.

(this also frees up the scanner sooner than reconstructing during import).

(Ideally, have two processing PCs/AS18 licenses, so one can download while the other processes).

Post-processing

Upon import, *duplicate* the entire project, 'collapse' and lock it. (This serves as backup during work in the copy, after which SD scans (recommended), or even raw scans, can be deleted if so wished)

In the copy:

delete the SD scans.

Run Tools>HD Reconstruction, choose **e.g. ½** and set **point density to e.g. 4x**. Aim for a **target frame count of c. 600 (600-800). Below 1000 frames: 8x, above: 4x.**

When done, delete the raw scans (the locked backup is still there).

Now is a good time to *save* the ArtecStudio project as NNNNxMMMM (folder with .a3d-file) to desktop or e.g. shared files as agreed.

Edit

the scans using the Editor/Eraser tool; Lasso is often the preferred tool but try your way around. Use *select through* wherever possible; it is often only worth turning off for *de*-selecting part of a surface and for removing small false polygons in cracks etc.

Remove support structure/background. (Although if you have more scans of the same setup, e.g. one with and one without blind nail indicators, you may as well align before cropping; the more geometry to align by the better). Scans that are already aligned out of the Leo (those created by scanning pauses) can also be cropped simultaneously.

Align

each scan and scans mutually. Any that are already mutually aligned, multi-select them to avoid repeating the process. First apply some manual orientation (Shift + left/middle mouse button rotates/moves the selected object(s)). Them apply multi-point alignment. Planks: be precise and choose features on middle of edges. However, point selection does not have to be extremely accurate.

Do not worry if it still looks wacky, the next step may solve it.

Registration

Apply *Global registration*.

Align with only *geometry* unless it proves difficult in which case it may help to use *geometry and texture*. As standard setting use '*separate then collective*').

Planks: begin at a *Key Frame Ratio* of 0,5 and if needed increase until it works.

Solid or small timbers: begin at a *Key Frame Ratio* of 0,3 and if needed increase until it works.

The sweet spot is 0,5-0,6 (not possible to surpass the scans' *error* value displayed in the right panel).

Consider changing **Search feature within** - or rescanning if not successful. Max error should be <1 mm.

The registration process may reveal erroneous or just sub-optimal frames that can often be excluded if there are ample frames (and texture frames!). Right click the scan in the right panel and select *view frames*. The can now be played back using the *play/pause* button, navigated using the up/down arrow and, importantly, sorted by the *error* column with which it is easy to find and isolate/delete unwanted frames. Maybe your error can be lowered by removing just a few bad frames if there is enough overlap. Removing bad frames may also be relevant for the texture frames alone; they can be isolated by sorting by the column with the little texture icon, after which they can be played and navigated as above. Additionally, single frames can be cropped (singularly or using multi-selection) in this view. E.g. 'streaky' surfaces can be removed this way if it is undesirable to remove the entire frame.

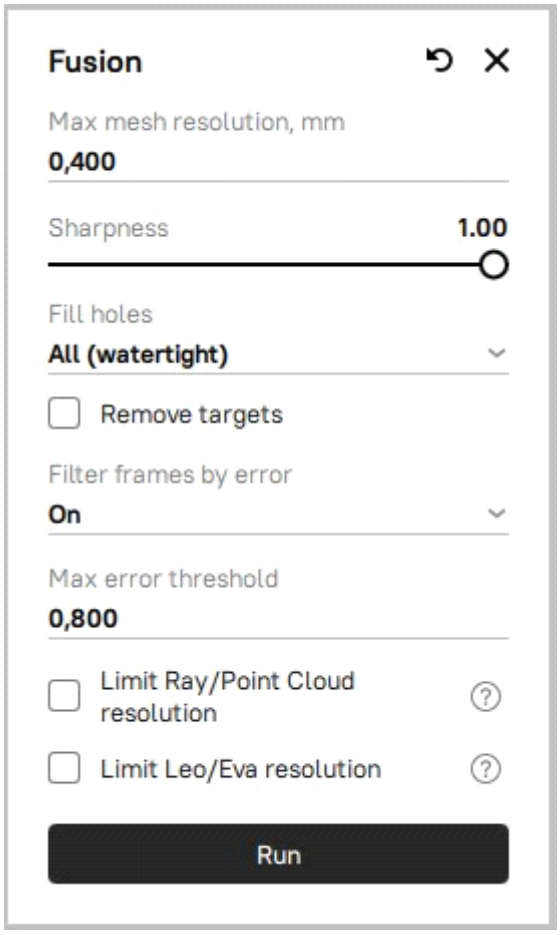
Outlier removal

Use standard settings:

3D-noise level: 3,0

3D resolution, mm: 0,5

Fusion



Max mesh resolution 0,4 mm [0,3 mm]

Max mesh resolution, also called 3D resolution, mm is the step of the grid (in millimeters) that the algorithm uses to reconstruct a polygonal model. In other words, this parameter defines the mean distance between two points in a model. The lower the 3D resolution value, the sharper the shape. When specifying values, keep in mind the default values, lower limits is 0,6

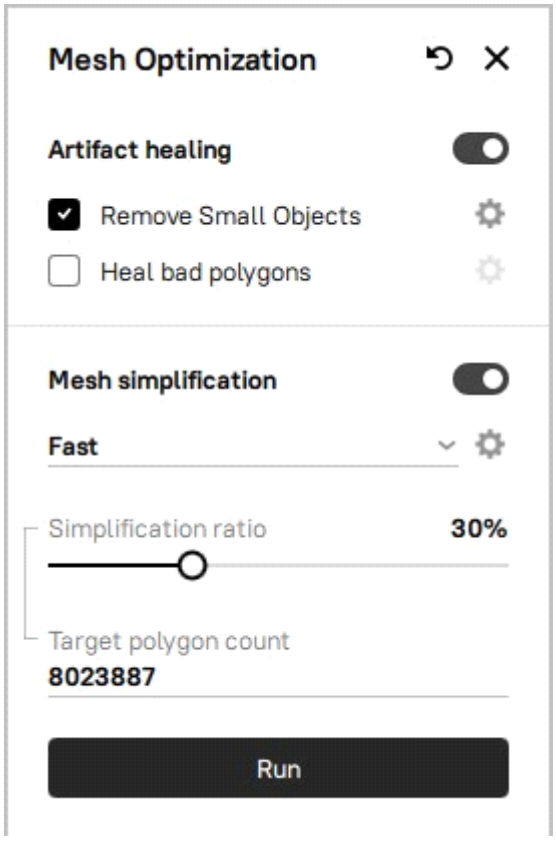
Watertight [unless otherwise desired; e.g. allow holes of clinker nail size upwards]

Sharpness: maximum (1,0)

Filter frames by error: On

HD sensitivity: medium (when full HD frame rate was used; can be increased to compensate for previously choosing a lower share of HD frames)

Mesh optimization and simplification



Remember to adjust the ***Remove small objects*** according to your object, e.g. if you have spheres from blind nail indicators in the model!

Heal bad polygons may be set with the first three options on.

For processing speed, use ***Fast*** mesh simplification to **30%** (25% if the timber is really large) although no smaller than 5.000.000 polygons (unless of course the unsimplified model already is below this).

Texture

1. Select the model to texture.
2. Select the scans to use for texturing (usually all *HD Copy of Leo…*, but if you have surplus scans, use only those relevant. In a complicated project (e.g. when attaching fragments or if moving unwanted frames to a dummy scan) it may be desirable to *Rename* the scans in the right panel.
3. Choose *Export*.
4. If needed, enable box "Reduce glare" and set reduction level avoiding extreme values (try out).
5. If needed, enable box "Suppress background colors" and set suppression avoiding extreme values (try out).
    - Primarily used if the background is bright and reflects onto object.
6. Texture size: next-highest value as standard.

If redoing the texture, and not increasing the size, the process can be sped up by using *Export – reuse UV map*.

Optional photo texture: 30-40 images in total (of the two sides), c. 10 per m length, will do. Import photos, rename appropriately. Select Scan/Sharp fusion and Photo set(s). If not working in total, do one side a time (Scan/photo set pair).

Save and export

Export the model (*Fusion*) as *NNNNxMMMM.obj* with *.jpg* to the folder *NNNNxMMMM* generated by Artec Studio.

Copy/move the ArtecStudio project as *NNNNxMMMM* (folder with .a3d-file) to:

Project-specific: M:\VIR2965_Svælget_2 (or similar for Svælget 1)

Prefix the folder name with '0_' (*0_NNNNxMMMM*) (the prefix is a code to enable sorting by progress)

General: Sagsdata\...\3D opmåling

Delete from local PC when QC'd to save disk space.

Also, objects that have reached this stage may be purged from the LEO scanner's internal memory.

Annotation

(for in-depth instruction/tips see also the file: *How to annotate a ship timber in Rhinoceros Manual (Køge 2) MHT comments.pdf*)

On your laptop, open the appropriate RHINO template (port plank, starboard plank, frame, longitudinal… – if orientation is unknown, pick the best and modify as appropriate). Rename file to *0_NNNNxMMMM.3dm* and save. Rename the parent layer to VIR*NNNNxMMMM* and enter the same in the parent layer's **Name** attribute.

Set layer SCAN active.

Import the OBJ (with texture).

Zoom to extents/zoom to selected object all viewports to see where the OBJ ended up.

If/when importing an object with spheres for blind nail indicator (or for some other reason consisting of more than one volume, e.g. attached fragments), now is the time to *Group* them).

Move and orientate the mesh object so that it matches the viewport names and the symbols as well as the best fit to viewport X/Y/Z axes. This is best done in the planar viewports (Gumball, drag or command **Move** & command **Rotate**). If needed, move and orientate the X/O/Δ/* symbol (should be orientated so as to indicate both up/down and fwd/aft (head/dorsal fin up, nose fwd) however, the viewport names will direct in standard cases). If orientation is unknown, make an informed choice and subsequently make the necessary corrections to the Layout drawing texts.

(Holding Shift key locks the manipulation you are performing to the axes of that viewport's plane).

(-provided that the Cplane (construction plane) stays aligned to the viewport plane, if not, use command *Cplane*, press [v] (for viewport), press [Enter]. The Cplane can be locked; not sure exactly how it works…

When done, you may turn the Symbol layer visibility off if you prefer.

Set view Rendered, select the mesh object(s) and adjust the light settings (0% glare, perhaps also temporarily increase reflectivity during annotation for increased visibility): if texture is not displayed, select the mesh and click on Properties tab beside the Layers tab. There click on the little tube icon called Material. Then under Textures click on the file name, then on the '...' to select the file, and then find the .JPG file which should be in the same folder location as the .OBJ.

If/when importing an object with spheres for blind nail indicator, now Ungroup them and move the spheres to another layer, e.g. layer **Andet** or an aptly named copy of layer **Scan**. For each of them, use the volume centroid command to create – in layer **Jernspigre proxy for blind ende** - a proxy point sitting exactly 140mm from the bottom of the blind hole. Using point Osnap, you will later use this to create a 140mm long **Line** FROM this point THROUGH the matching point on the timber surface (the fastener centroid) and terminating at the bottom of the hole (so do *not* use the **Axis** command (see below) for these particular nails).

Going through the layer menu, and changing render mode (usually **Shaded_MOD_MAX**/**Rendered**) as best suited for the timber/layer, digitize features on the timber while simultaneously observing on the real timber to ensure nothing is missed. Usually this is best done in **Perspective** view. It is recommended to begin with marking all features on the real object with pins (suggestion: use different colours for different features), which are then removed as they are digitized. Also look to the timber log sheet where it may be noted how many of each feature to expect. As you go, remember to continue recording observations in writing on the *Timber log sheet* (and/or in the artefacts database) and take appropriate detail photos. It may turn out that this procedure is easier/faster to do for two people, one observing and reading to a PC operator; do what works best. Use a lamp to illuminate the timber surface for better observation.

Although it is perfectly possible to subsequently change layers for objects (Command: **ChangeLayer**), everything is much easier if you make a habit of ensuring that you have the correct layer active when digitizing (especially for fasteners, where derived objects are automatically created in adjacent/sub-layers).

Making sure that you have no undesired **Osnap**s (panel on left/bottom of screen) active, draw using the **PolylineOnMesh** command. However, for fasteners, use the **In-/OutFastener** command/button (right-/left-click respectively). The command line asks you to first click on the mesh you wish to "draw on", then to start clicking the nodes that will make up the polyline. You can undo a node by Ctrl-Z or typing 'u' + Enter. (You can also, after finalisation and using the commands **PointsOn**/**PointsOff**, edit the polyline nodes later, but remember that the automatically generated centroid of fasteners will be affected by all nodes, so this is probably most relevant for other types of polylines).

Close a curve ('c' + Enter) whenever the real feature really is a closed polygon. If sufficiently well-preserved/identifiable, a square nail hole may be digitized with only four points. Same for sintel holes. Open curves are finalised by single right-click or Enter (if made using In-/OutFastener, their centroid may have to be manually adjusted in the appropriate planar viewport and snapping to the viewport axes with [Shift] to keep it in the right plane (or using Gumball).

(Tip: the last used command can be recalled using right mouse click).

Iron nails/spikes: only the actual hole through the object is drawn in the main fastener layer **Jernnagler/spigre/-huller**; head/rove/clenching impression is drawn in layer **Hoveder/klinkplader/vejning**.

You will usually prefer to work in **Perspective** view and you will often need to rotate the view (holding right mouse button in the viewport; this can be done while in the middle of a command) to get the best view of the mesh surface you wish to place a node on. E.g. fastener holes: they should be digitized where the hole reaches its true, drilled diameter, not on the face of the timber where it is often widened during use as well as post-depositionally. Most features, once seen, are best digitized in **Shaded_MOD_MAX** view. Here the shadow will help you understand the geometry of e.g. a fastener hole.

Do not digitize features that are self-evident when observing the morphology of the mesh. Not all layers must always be used. Check the appearance on the Layout PDF templates and use this as your target level of information. Examples of "borderline cases": edges: whether an edge is original, damaged or even intentional is not only down to morphology. Use an Edge-layer to clarify when needed. Especially damaged edge (as opposed to original) can be worth noting. And most importantly damage in excavation vs. original damage. Tool marks: some can be seen in the scan (often most clearly in shaded view); if not, it may be digitized (or there may be cases where fewer than all toolmarks may be digitized to draw attention to and exemplify the tools used).

If unsure of which type of fastener or toolmark etc., use a superior category (E.g. Fastener if unsure whether bolt or treenail). Remember that all of this should also be described in the Timber log sheet and artefact database entry.

There are layers for recording of treenail wedges (rectangular **PolylineOnMesh** objects, made with **Near** Osnap to trim it to its treenail object) and (especially if the target is a drawing in Technical render) for a signature indicating that the treenail is still in the hole (X drawn as two two-node **PolylineOnMesh**s).

Wood grain should just be indicated as a few significant **PolylineOnMesh**s: main grain, branches, and major knots. When end grain is visible, take the opportunity to draw a few annual rings and radii, which can be used to estimate the pith location and hence dendrochronology suitability. Later, this geometry will, in its sub-layer be projected onto a cross-section for print illustration purposes.

Cross-sections and longitudinal section should await reassembly of sawn parts, if any. They can be created in a number of ways: single point-to-point using command **Section**, onto a pre-defined plane using command **Project**, or creating multiple sections at a time at a pre-defined distance using command **Contour**. I would choose **Section** for longitudinal sections as well as cross-sections (placed at each plank/frame intersection – on planks, immediately to the right of the frame impression); alternatively, use **Contour** for plank, keel etc. cross sections. Set a contour interval no greater than the vessel's frame

spacing. Create the closed-polyline sections in the sublayer **Snit (kontur) (original - slukkes)**. A section may turn out to be separate, unconnected polyline segments. For each of them, **Group/Join/CloseCrv** the result immediately after creation while still selected.

Now, in layer **Tværsnitsplan - linjer** and snapping to the ends of the cross-section objects, draw indicator line snippets for print layout. Hold Shift key to snap the direction to viewport axes (along which the cross-sections mainly lie) and make them 20mm long. For frames/curved timbers the cross-section may have another orientation; here you have to **Tan**-snap them to the cross-section object and then move them end-to-end with **End**-snap (move their proximal end to their own distal end).

In both cases, to move them 20mm clear of the mesh object, do another end-to-end move (for axis-true objects you can move them all at the same time).

Duplicate one set of indicator line snippets to be moved near the displayed rotated section (indicates the corner that corresponds to the other snippets). Move them a little further away, they will later be placed along the sections.

Return to the layer **Snit (kontur) (original - slukkes)**. Copy all objects into both of the other sub-layers (or even better: finalise one and copy all its content into the other to save time, see below). You can now turn off the original layer. These sub-layers are for catalogue print and strake plan print respectively.

For the former, for planks in the inboard face viewport, for frames in the aft face viewport, **Move** (holding Shift) all cross-sections perpendicularly away from the mesh object towards the plank's/frame's top and then for each of them **Rotate** them 90° towards the right (rotating around the top edge, flip the lower edge clockwise), and **Hatch** them. Group the hatch and the contour.

For the latter, rotate them similarly and **Move** them perpendicularly 'up' from the mesh object, so that they will be printed "inside" the timber. **Hatch** them. Note that if hatching with multiple objects selected, the hatch may not lie in the same/correct plane.

> (Tip: finalise the entire strake plan layer through to rotating. Then make a copy of everything and **ChangeLayer** it to the catalogue print layer. Then move the objects).

Dendro samples can be drawn using **Section**. Their location along the timber (e.g. 50mm from an existing cut) can be constructed in the following way:

1) In (for planks) Top view, draw a line 50mm from a snap point on the upper edge of the cut, holding shift. Repeat for the lower edge.
2) Draw a rectangle with a width corresponding to the saw width and a height sufficient to bring the opposite corner well clear of the plank.
3) Snapping to the outer corners of the rectangle, draw the two **Section**s representing either side of the saw cut. Place the one towards the extracted 50mm sample in layer **Dendroprøve** and the other in layer **Recent skade**.
4) Delete the lines and rectangles.

(If the cut is not axis-true, the rectangles must be constructed by extruding the line to a surface instead).

A saw cut made in the field should be drawn as a proper closed polylineOnMesh in layer **Recent skade** (perhaps later to be moved to layer **Dendroprøve**. Additionally, it should be duplicated, the copy moved the known width of the saw blade away from the cut and placed in layer **Andet**. This will serve as the target surface for **Orient3Pt** when digitally reassembling a sawn timber. Later it should be replaced by a true closed polylineOnMesh in layer **Recent skade**.

Reassembly: identify three conspicuous pairs of *Reference* and *Target* points on the two matching sawn ends. Snapping either to the saw cut polylines or the vertices of the actual meshes, draw the 2x three points and name them 1,2,3 with a **Text** object of a size readable in your work zoom level (e.g. 150mm) snapped to the point object. The part you wish to move is called *Reference*, the one you wish to move *to* is called *Target*. You may wish to choose a different colour/layer for the Reference/Target text objects for clarity. Some may find it easier to work with line snippets instead of points (one end snapped to the desired point), but with anything but the points turned off (see below) everything should be quite clearly visible. [Is there a point in first using *SetRedrawOff*..?]

Group the Reference point-/text objects with their mesh object (and any other, already digitized objects, if any).

Set ***display off*** for all except the Reference-, and Target points and their text objects. (Anything *Group*ed will still be influenced by the ensuing command).

Orient3pt – follow the instructions in the command line.

Usually, because of the unevenness of the saw cut, there has to be some subsequent **Rotate**/**Move** to get it exactly right.

Delete all point and text objects when satisfied.

> (If, in another type of workflow, you are assembling *components*, not sawn parts/fragments, your Reference-, and Target points will of course be the fastener centroid point objects. Make (temporary) copies of them in a work layer and assign them text objects and proceed as above, remembering to have ***Group***ed everything that must move together!)

Samples with an orientation: (caulking, intact tar patches, etc.): On both timber face and extracted material, place one stainless pin in one end and two in the other, making sure that the ends match. Also, use the orientation of the nail heads to indicate a direction 'up'. This way the sample's orientation can be correctly indicated in the annotation by drawing lines and using command **Arrowhead** to indicate the pinhead direction. Place in layer **Prøver, andre**.

Using **Point** Osnap, create desired extended fastener axes for layout and cutting objects for 3D-printing in appropriate layer **Jernn./Jernbolte/Trænagler – akser** using the **Axis_12 or Axis_30** command/button. However, for blind holes, use a regular **Line** command, starting at the proxy point, snapping through the hole centroid, and setting the line length to 140. In this case, the cutting object must be drawn in the appropriate layer using **Cylinder** (or **Pipe**, if an axis is already present). A blind hole without known/measurable depth/direction is made as a small **Cylinder** 'button' perpendicular to the timber face and penetrating 6mm into it.

Rename (not copy) the file to *a_NNNNxMMMM.3dm* (**A**nnotated)

Option (e.g. if not transferring log sheet to a database): finalise a Timber log sheet WORD-document (p1) as *NNNNxMMMM.docx* and save to the same folder as above

Rhino pdf layout – can be postponed

Ensure object orientation/location in each parent viewport is correct (it should be if performing the above correctly, if correction needed, select everything/entire group before manipulating!)

See which layout template fits the object best (A4 portrait/A3 landscape/1:10/1:20). (If needed, the detail frames can be stretched/moved, and it is also possible to duplicate a layout and scale it differently – remember to change the scale bar).

The easiest way to ensure best fit and mutual alignment across the three/four *Details* ('frames'/views) on the Layout is to first zoom to object extent, which will place it centrally, and subsequently scale to 1:10/1:20/other as appropriate. **CHECK SCALE BEFORE PRINTING!**

If needed (agreed default already set), turn on/off appropriate layers: double-click the Detail ("frame") in the Layout and **HideLayerInDetail** / **ShowLayerInDetail** – this way you can keep your preferred view/everything on in the normal viewports.

Fill in the metadata text cells as appropriate (use the project-specific template copy with most filled in), notably:

Open SARA and create the next available Drawing no. (as a Tr). Enter this in your Layout.

If timber orientation is unknown, replace the direction- and face/edge indicator texts on the Layout with appropriate 'Ukendt orientering / orientation unknown'-text.

Print (to PDF) the chosen Layout with all *Details* set to **Rendered** [this copy should perhaps be entirely without annotation (in which case it may be desirable to print it before beginning annotation), TBC]

Make a copy of the chosen Layout and set all *Details* to **Shaded_MOD_MAX** and print to PDF. [TBC: perhaps from within Rhino print the two layouts as one 2-page PDF in one operation]

Save the PDFs as one 2-page document *NNNN-Tr-MMMM.pdf* in the same folder as above.

Rename (not copy) the RHINO file to *al_NNNNxMMMM.3dm* (**A**nnotated, **L**ayout)

Preparation for digital and physical model building – can be postponed

Copy the mesh into both of the SOLID layers.

For digital use:

Decimate the mesh if so desired.

Using command **Loft** between the two fastener hole end objects, in layer **Realistiske sammenføjninger**, create true-to-life (conical, etc.) fastener holes. Note how you can assist the alignment of the loft rails to create simpler geometry.

For physical models (assembly of 3D-prints):

ReduceMesh to a resolution that fits the purpose (current project specific: BY 95%); e.g. the resolution/layer thickness of the target 3D-printer applied to the scale in which the object will be printed. [Alternatively, ShrinkWrap may be a more desirable method for reduction, TBC]

Unless already made using the **Axis_12/30** command, using **Point/End** Osnap to the axis objects, create fastener cutting objects for physical model building in layer **Model-sammenføjninger** using the fastener cylinder button. (The fastener diameter is, for the time being, set in the Macro). **Pipe** can also be used.

General: Create engraving **TextObject**s (NNNNxMMMM), project/place them on the mesh surface, extrude them.

Project specific: filename-based engraving text is added by the 3D print facility as they will determine how many segments the print will consist of (filename will be suffixed with '_a', '_b' etc.)

For both:

Modify the mesh copies in the SOLID layers with command **MeshBooleanDifference** between it and the relevant cutting objects (is subsequent patching/welding of holes needed..?)

Save as .stl and/or .obj as appropriate.

Archiving

When finished (at any stage; both with/without layout/solids), group everything (except perhaps (certain?) layout objects..?)

Rename (not copy) the RHINO file to:
am_NNNNxMMMM.3dm (**A**nnotated, **M**odel)

if doing this *prior* to layout or to plainly:

NNNNxMMMM.3dm if *both* layout and model jobs are completed.