Etching for Model Engineers

What you need to know to make your own nameplates etc.



Topics covered in this session

- Subjects: Types of plates
- Making artwork Options
- Plate preparation
- Etch resists
- Etching methods and available chemistry
- Final finishing

Locomotives :

- Name plates ,Makers plates, shed plates, numbers, warning and instruction plates.
- Wagons: Makers plates, loading plates,
- Weight plates, owner plates, repair plates etc.





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Preparing artwork

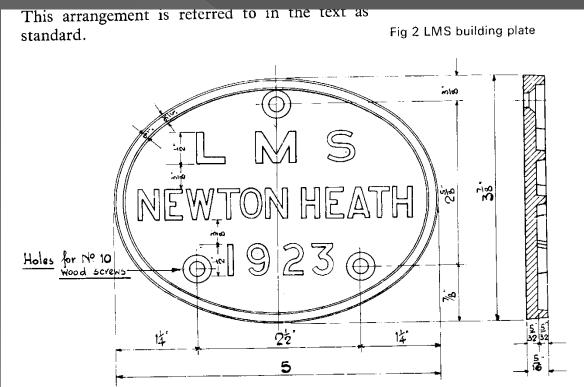
From Drawings sketches

From Photos

Warning : you do need to be familiar with use of vector drawing packages. Alternative method will be explained later.

From drawings

If you are lucky you can get hold of an original drawing.



About Scale

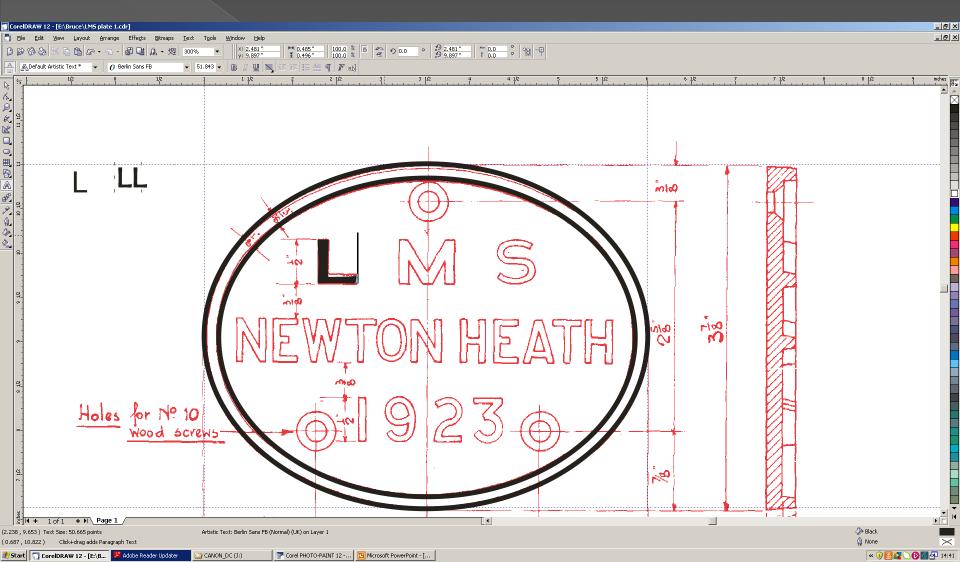
- For 5" models the scale factor works out at .0884 aprox.
- So for 5/32" depth a scale etch will be:
- 5/32*0.0884= 0.0013"
- Most plates are in fact less than 5/32", brass ones in particular may only 1/16"
- The Newton Heath Plate is only 0.44" across (5" scale)

Drawn directly Many drawing packages will be able to produce such artwork

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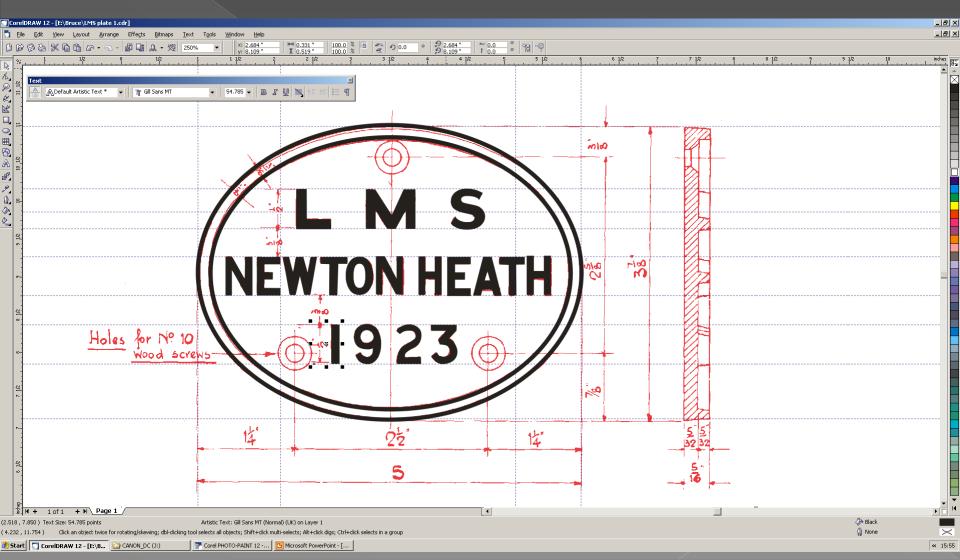
Load drawing into a layer and change to contrasting colour Overdraw as closely as possible



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Manipulate drawing to fit template



Add border to assist final trimming

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Don't forget to "mirror image" and scale to size

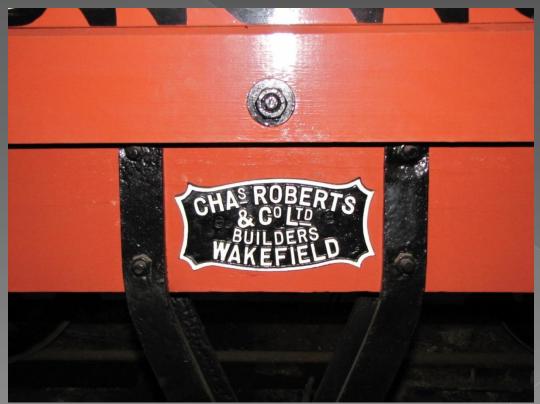
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From Photograph

Select image with good contrast and if possible size reference



Trim and import to drawing package



Run "trace" programme



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Clean up and invert colours



Add border and flip image

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Plate preparation

- Sample must be very clean.
- Use gloves
- Scrub with abrasives (vim, wire wool. brillo)
- Wet and dry 320 800 to remove any deep scratches

 Clean with solvents or better still use an ultrasonic cleaner with dishwasher powder. Rinse with clean water and wipe with iso propyl alcohol. (don't use meths)

Etch resists

Oirect transfer "Toner"

Photo resist film (negative)

Toner transfer

Laser printer (photo copier) toner makes a fair etch resist.

- Using Photo Paper (I've not tried this)
- Using Special transfer paper "Press and Peel"

Print on paper and transfer with a hot iron.

Using "Press and Peel"

- Output Content of the second secon
- To make max use of the "press and Peel" arrange to print on bottom of sheet first
- To aid feeding through printer tape paper edge to top of sheet.
- Set printer properties to B&W and dark



Reverse image



The right way round



Photo Resist

Traditional method used in industry

- Has used spray on photo resist which is messy and unreliable.
- Photo resist film is now available. Iron on using domestic iron or laminating machine. (EBAY search "negative photo resist")

Requires a negative mask and uv lamp.

Negative Mask What?

- As this a photographic method you need to prepare a "negative"
- Invert Black-White in drawing package
- Print on overhead film with laser printer or inkjet printer
- You can also make a negative using "letraset" or the like, large drawing and reduce with scanner or photo copier

Photo Resist - Method -

- Prepare brass plate. Must be very clean
- Apply photo sensitive film as described in instructions (Laminator, domestic iron)
- Work in subdued light
- Expose to UV light. (5 Mins aprox)
- Develop in developer provided.
- Wash and dry ready to etch

Photo Resist (uv exposure)

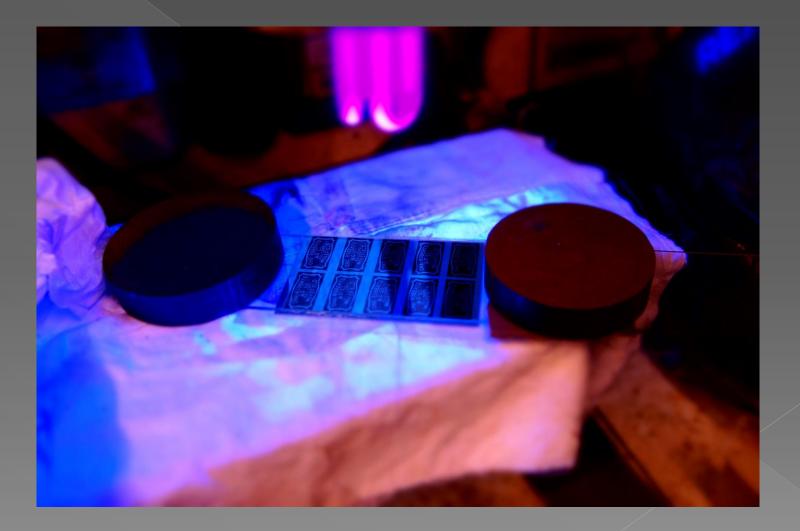


Photo resist (developed image)



Final inspection and fettling

Cut to convenient size for etching tank.
Drill holes at each end
Paint back and exposed areas
Leave to dry for 24hrs

We now have our plates ready to etch

Undercutting Arrh!!!

- All etchants will undercut to some extent. (literature suggests 10-15%)
 Keep etchant agitated so as to keep fresh chemicals close to surface of plate. (you can overdo this)
 KEEP SOLUTION WARM SO AS TO KEEP ETCHING TIME DOWN.
- Anticipate and make mask bigger.

Danger Chemicals (corrosive)

- Etching chemicals are generally acidic.
 Care must be exercised in their use.
- Wear gloves, eye protection and old overalls or better still plastic apron.
- Some solutions emit corrosive fumes which cause metal items to rust. Keep containers closed and avoid over agitation

Etching Chemicals

Ferric Chloride

Cupric Chloride (acid solution)

Ammonium Perchlorate

Electro etching

Ferric Chloride (wear gloves)

- The traditional etching solution
- Make up a 25-35% solution. (+ Citric acid optional)
- Etch at 35-40C
- Suspend from edge on stainless wire (vertical)
- Use air agitation using fish tank pump and bubble device
- Etch takes 1-1.5 hrs for 0.015"

Etching- Ferric Chloride



Cupric Chloride (Use gloves and mask)

- Extensively used in industry as rapid etchant.
- Difficult to prepare at home
- Strong Acid and Hydrogen Peroxide required.
- Fumes and rusts metal in vicinity (Keep in closed container)
- Works rapidly, produces good etch

Ammonium Perchlorate

- Make a solution 250gm/l
 Etch at 30-35C
- Agitate with air flow (fish tank pump)
- Clear solution so easy to see.
- Does not attack mask
- Do not keep as chemical degrades
- Theoretically the slowest etchant. (Not so in practice)

Electro-Etch

- Pass current through electrolyte (copper Sulphate)
- Anode (+) copper sheet
- Cathode (-) plate
- Current flow 500ma aprox.
- May need experiment.
- Requires Photo resist as toner is conductive and comes off.
- Produces clean etch,

Finishing -paint?

Trim to size with file/rotary tool

- Paint as required. (use thin paint Spray)
- Use roller / glass plate to apply detail colour.
- Or polish off paint to reveal brass.

Fix to model and enjoy your efforts

Recommendations for beginners

- Use "Press and Seal"
- Etch with Ammonium Perchlorate
- (Ferric Chloride next choice)
- Don't keep chemicals.
- Be prepared to experiment
- Expect 50% failure rate to start with

Ref data

- Press and Peel" <u>www.ronlin.co.uk</u>
- Chemicals/ solvents "APC Pure" <u>www.apcpure.com</u>
- Ferric chloride Search EBAY
- Photo Resist sheet Search EBAY "Negative Photo resist"
- Containers storage Search Ebay "Kartell reagent bottle"
- Ultrasonic tank www.machine-dro.co.uk