Vacuum Chucking

attaching a workpiece by

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Vacuum chucking – attaching a work piece by way of suction to a form connected to the spindle.

- Vacuum - reducing the pressure on one side of the work piece so that the atmospheric pressure forces the it into the form. Vacuum pressure is normally measured in mm/Hg or inch/Hg, a typical pressure would be around 20inch/Hg

Vacuum pump / generator options

- Commercial vacuum pump
- Vacuum generator
- Hobby vacuum pump.
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- Vacuum cleaner – not fit for purpose - designed for high flow low pressure.

Typical vacuum pump used in re-fridgeration industry.

Oil free vacuum pump.

Vacuum generator – (compressed air supply)

Hobby vacuum pump.

Chucking kits

Imported kits are available form various suppliers, the one I’ve seen has a pipe down the centre of the spindle and attaches to the work piece form on the chuck side of the headstock.

Attach to the lathe

- On the back end of the spindle the hole needs to be tapped with a pipe thread either BSP or NPT to suit the pneumatic fittings available.
- A swivel fitting is threaded into the spindle (Festo sell one but the recommended RPM is limited) and piped too the vacuum pump.
- On the faceplate a thin bead of silicon can be applied when screwing down the form. Thread tape is optional when attaching the assembly to the spindle.
- Forms are shaped to suit the work piece and closed cell foam used as a seal between the form and work piece. Sealing the wooden form is advisable.

Vacuum chucking for light work only !!

Cloths stand

Notes

Vacuum pump – right tool for the job – fit for purpose

Vacuum cleaner designed for high flow low vacuum pressure

Commercial use – cheapest – R12k

2nd hand beware of the repair / service costs – Vacutech - Roosefelt Park – Jhb. Could cost more than a hobby model.

Hobby model available from Vermont in Midrand about R2.5K not as strong as the commercial but does the job to a certain extent, bearing in mind vacuum chucks are used mainly for light duty work and finishing. Ideal for finishing the bottom of a vase where the “clamping” will not leave any marks. A vacuum chuck is never going to be as strong as a mechanical scroll chuck or Jam chuck for that matter.

Vacuum levels measured in mm/Hg or inch/HG – typically a vacuum of 20inch is what you would find in a laboratory environment for extraction. The best I can get from the hobby model is 16inch/Hg although they claim 26inch/Hg – I believe altitude has some influence though. A minimum vacuum pressure for safe working would be about 12”HG (300mm)

Notes

Lathe spindle needs to have a hole down it's cntr. – most have for morse taper removal.

There are different vacuum chucking kits available from various manufactures – Lourens has one – consisting of a tube fitting through the spindle centre, on one end it attaches to the fact plate, the other threaded to take pneumatic fittings and it must include a swivel fitting as well.

Swivel fitting – Festo sell one but the recommended RPM is limited – make one.

This fitting then needs to screw into the back end of the spindle, if there's no thread it can be threaded by making up a drilling jig and a tap jig to suit the spindle diameter. Thread either BSP or NPT to suit off the shelf fittings.

On the faceplate end a thin bead of silicon between the MDF and faceplate a sealing washer on one end or the spindle to face plate threads can be sealed with some thick grease – copper slip.

Stress that vacuum chucking is for light work – any catches and your work piece could go flying.

Jigs for holding work piece – formed MDF and closed cel foam