

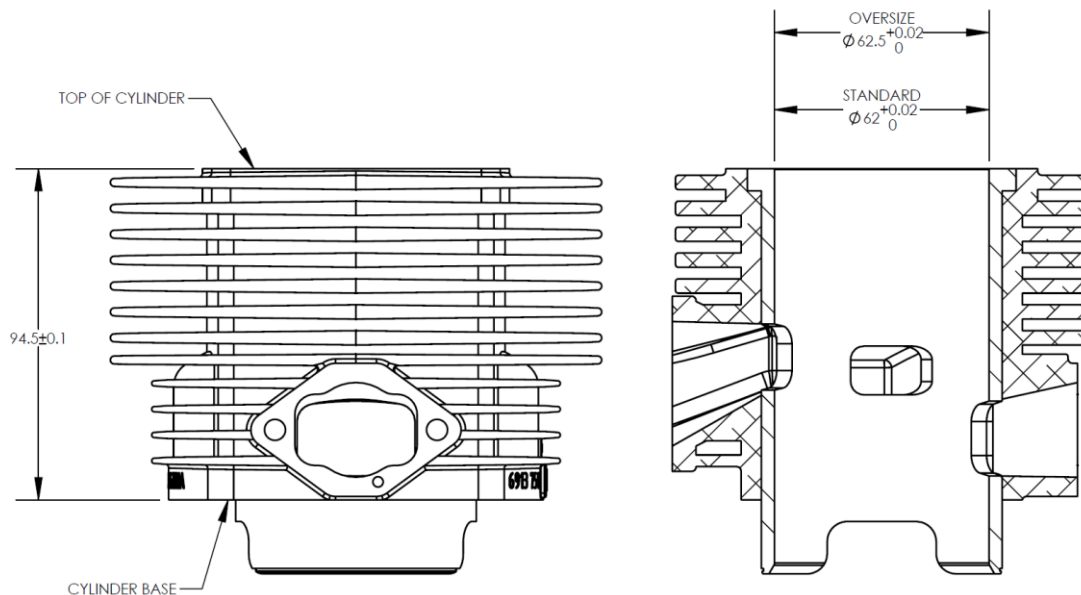
# MARK-3<sup>®</sup>

## SERIES

### 185cc Cylinder Cast Iron Sleeve Refurbishing

#### **Overview:**

This tech-note will outline the procedures for the refurbishing of the MARK-3 cast iron sleeve cylinder.



**Figure 1: Cast iron sleeve cylinder**

#### **Upsizing:**

A standard size MARK-3 cast iron sleeve cylinder can be oversized and fitted with an oversize piston. Follow these steps to oversize a cast iron sleeve cylinder:

1. Inspect the cylinder for damage. Discard if more than one cooling fin is broken or if the cylinder base is warped; the cylinder base can be faced one time to a maximum of 0.1 mm [.004 in].

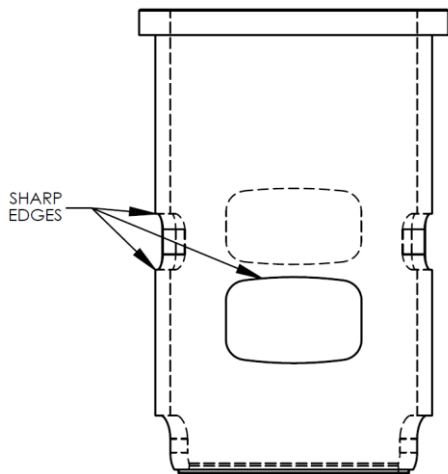
## TECH-NOTE

2. Bore the cylinder to 62.45 – 62.46 mm [2.4587 – 2.4591 in]. Ensure that the boring is done perpendicularly to the cylinder base.
3. Using a rotary file, chamfer the sharp edges of each port to an angle of 10° and width of 0.5 mm [.020 in].
4. Hone the cylinder to 62.50 – 62.52 mm [2.4606 – 2.4614 in] with a 45° cross-hatch. Surface roughness: 1 to 2 microns [39 to 79 micro-inches]. For optimal performance:
  - A 62.44 mm piston (red paint mark) will require a cylinder honing to 62.50 mm.
  - A 62.45 mm piston (green paint mark) will require a cylinder honing from 62.51 – 62.52 mm.
5. Inspect cylinder:
  - Measure final bore: 62.50 – 62.52 mm [2.4606 – 2.4614 in].
  - Measure perpendicularity between bore and cylinder base. Maximum allowable: 0.05 mm [.002 in].
6. Oil cylinder sleeve with 15W40 engine oil to prevent corrosion and bag. Store in cool and dry place.

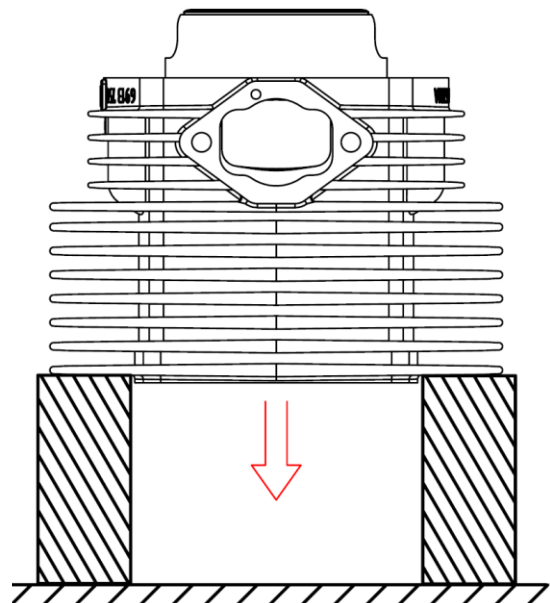
### **Re-sleeving:**

An oversized cylinder can be re-sleeved, machined and honed to the standard size. Follow these steps to re-sleeve a cylinder:

1. Using a rotary file, chamfer the sharp edges on the outside of the new sleeve on each port (see Figure 2). This will prevent scuffing on the cylinder casting when inserting the new sleeve.



**Figure 2: New sleeve – sharp edges**



**Figure 3: Old cylinder in oven at 220 °C; sleeve will fall down by own weight**

2. Inspect the cylinder for damage. Discard if more than one cooling fin is broken or if the cylinder base is warped; the cylinder base can be faced one time to a maximum of 0.1 mm [.004 in].
3. Machine old cylinder (sleeve) to a diameter 68 mm [2.677 in] and cut bottom of sleeve off in lathe. Remove all burrs. This will reduce tension between the sleeve and the cylinder casting in order to avoid seizure of the cylinder bore when removing the old sleeve.
4. Place the cylinder with old sleeve in an oven upside down (see Figure 3). Heat cylinder to a maximum of 220 °C [428 °F].
5. With the cylinder at a maximum of 220 °C [428 °F], the old sleeve will fall out by its own weight. Light pressure may be required to remove sleeve.

## TECH-NOTE

6. Check cylinder casting bore for damage and seizure. Seized / damaged cylinder must not be used anymore; repair is not recommended.
7. With the cylinder still hot, align new sleeve with cylinder. Drop in the sleeve and align ports (do not press). If the cylinder is too cool and the sleeve does not drop in, re-heat the cylinder to 220 °C [428 °F].
8. Let cylinder cool. Apply and maintain pressure on the top of the sleeve to hold it in place inside the cylinder during cooling. This will prevent the sleeve from moving up during the cooling phase.
9. Machine top of the cylinder sleeve to the overall cylinder height of 94.5 +/- 0.1 mm [3.720 +/- .004 in]. Ensure that the top and base of the cylinder are parallel within 0.05 mm [.002 in]. Surface roughness finish on the top of the cylinder: 3.2 microns [126 micro-inches].
10. Bore the cylinder to 61.95 – 61.96 mm [2.4390 – 2.4394 in]. Ensure that the boring is done perpendicularly to the cylinder base.
11. Using a rotary file, chamfer the sharp edges of each port to an angle of 10° and width of 0.5 mm [.020 in].
- 12.hone the cylinder to 62.00 – 62.02 mm [2.4409 – 2.4417 in] with a 45° cross-hatch. Surface roughness: 1 to 2 microns [39 to 79 micro-inches]. For optimal performance:
  - A 61.94 mm piston (red paint mark) will require a cylinder honing to 62.00 mm.
  - A 61.95 mm piston (green paint mark) will require a cylinder honing from 62.01 – 62.02 mm.
13. Inspect cylinder:
  - Measure final bore: 62.00 – 62.02 mm [2.4409 – 2.4417 in].
  - Measure perpendicularity between bore and cylinder base. Maximum allowable: 0.05 mm [.002 in].
  - Measure parallelism between top and base of cylinder. Maximum allowable: 0.05 mm [.002 in].
  - Measure the height: 94.4 – 94.6 mm [3.717 – 3.724 in].
14. Oil cylinder sleeve with 15W40 engine oil to prevent corrosion and bag. Store in cool and dry place.

Cylinder size	Bore	Honing	Cylinder height	Piston & cylinder clearance	Piston
<b>Standard size</b>	61.95 – 61.96 mm [2.4390 – 2.4394 in]	62.00 – 62.02 mm [2.4409 – 2.4417 in]	94.4 – 94.6 mm [3.717 – 3.724 in]	0.06 – 0.08 mm [.0024 – .0031 in]	61.94 mm (red)
					61.95 (green)
<b>Oversize</b>	62.45 – 62.46 mm [2.4587 – 2.4591 in]	62.50 – 62.52 mm [2.4606 – 2.4614 in]			62.44 mm (red) 62.45 mm (green)

**Figure 4: Summary table of key measurements**