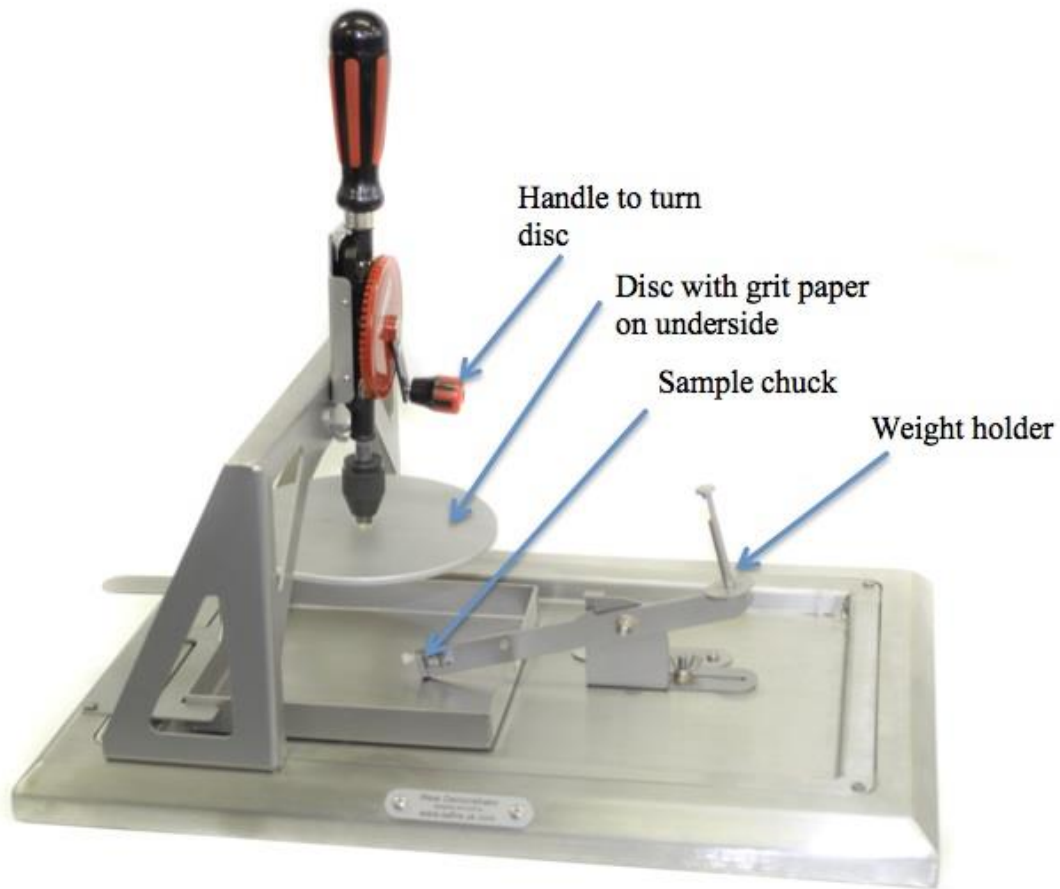# Wear Demonstrator

The inverted pin-on-disc rig can be used to determine the dimensional wear coefficient (k).

$$k = \frac{Volume\ lost}{applied\ load\ x\ sliding\ distance} \quad [\text{mm}^3\ \text{N}^{-1}\ \text{m}^{-1}]$$

For this experiment the applied load has been set to **0.5 Newtons.** You must determine the sliding distance of your test and measure the volume lost in the chalk sample.

Q1: Knowing the radius of the track is 60mm, what is the circumference (one rotation of the disc)?
[Hint: C = **πd]**

Q2: How many times does the disc rotate per turn of the handle? Therefore how far is ten turns of the handle (in meters)?

Q3: What is the length of your piece of chalk?

With help please load the chalk sample and zero the loading arm by applying weights until balanced.

Add 87g to arm, this equates to 0.5 N at the sample.

Run the test until you have measureable wear (hint rotate the handle a multiple of 10 times).

Q4: How many turns did you complete?

Q5: What was your sliding distance in meters?

Q6: What is the new length of your chalk?

Q7: What is the volume loss in cubic mm?
[Hint: volume of **cylinder = height** x **π** x **r^2**]

Q8: What was the dimensional wear coefficient (k) of your piece of chalk.

Extra questions if you have time

- What was the wear mechanism that removed the chalk material?
- Did it clog the abrasive paper?

- What would happen if crayon was used instead of chalk?

- What is the effect of test speed?