Imperial Threads on HLV-H

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Internal headstock fixed gear box ratios are as follows

- spindle : intermediate shaft = 2 : 5
- intermediate : change shaft = 2 : 1 (knob position 1)
- intermediate : change shaft = 1 : 1 (knob position 2)
- intermediate : change shaft = 1 : 2 (knob position 3)

The 127t gear goes on the end of the change shaft. The reduction ratio of the external gears is then

\[
\text{change shaft : screw shaft} = \frac{127}{2\text{nd gear on stud}} \times \frac{1\text{st Gear on Stud}}{\text{Screw Gear}}
\]

Therefore given that the lathe has a 3mm pitch lead screw, letting

\[
R = \begin{cases} 
2 & \text{knob position 1} \\
1 & \text{knob position 2} \\
1/2 & \text{knob position 3} 
\end{cases}
\]

Then

\[
\text{Pitch} = \frac{2}{5} \times R \times \frac{127}{2\text{nd gear on stud}} \times \frac{1\text{st Gear on Stud}}{\text{Screw Gear}} \times 3\text{mm}
\]

Using the fact that \(\text{TPI} = \frac{25.4}{\text{Pitch (mm)}}\)

\[
\text{TPI} = \frac{\text{Screw Gear} \times 2\text{nd Gear on Stud}}{1\text{st Gear on Stud} \times 6R}
\]

The factor \(6R\) in the denominator is thus 12, 6 or 3 depending upon whether the knob is in position 1, 2 or 3.

As an example consider the manual for 39 tpi. This is knob position 3, first on stud 25, second on stud 45 and screw gear 65. Thus

\[
\text{TPI} = \frac{65 \times 45}{25 \times 3} = 39
\]