

# Stretching Guidelines for FS and ST Stretching Machines

Lu is the Unstretched Sample Length.

Ls is the Stretched Sample Length.

Rd is the Plus and Minus Reciprocating Distance for DLDM111LH and DMLHB.

St is the Reciprocating Stroke for DMLHP.

S% is the Stretching Percentage.

**The following are the limits on the operation of each Motor Drive Unit and Stretching Jig combination:**

## **DMLHB-FS or DLDM111LH-FS**

2 mm -- Distance between Sample Clamps when Moving and Fixed Clamps are touching

6 mm -- Smallest Unstretched Sample Length

74 mm -- Longest Unstretched Sample Length

120 mm -- Maximum stretching

134 mm -- Maximum Stretched Sample Length

Max Ls = 120 + Lu -- Lu < 14

Max Ls = 148 - Lu -- Lu > 14

S% = ( Ls - Lu ) / Lu = Ls / Lu - 1 = St / Lu

## **DMLHP-FS**

2 mm -- Distance between Sample Clamps when Moving and Fixed Clamps are touching

6 mm -- Smallest Unstretched Sample Length

134 mm -- Longest Unstretched Sample Length

120 mm -- Maximum stretching

134 mm -- Maximum Stretched Sample Length

Max Ls = 120 + Lu -- Lu < 14

Max Ls = 134 -- Lu > 14

S% = ( Ls - Lu ) / Lu = Ls / Lu - 1 = St / Lu

## **DMLHP-ST**

30 mm -- Distance between Sample Clamps when Moving and Fixed Clamps are touching

30 mm -- Smallest Unstretched Sample Length

365 mm -- Longest Unstretched Sample Length

120 mm -- Maximum stretching

365 mm -- Maximum Stretched Sample Length

Max  $L_s = 120 + L_u$  --  $L_u < 245$

Max  $L_s = 365$  --  $L_u > 245$

$S\% = (L_s - L_u) / L_u = L_s / L_u - 1 = St / L_u$

The following six charts show the possible combinations of  $L_u$  and  $S\%$  and  $R_d$  or Stroke for each Stretching Machine.

Figure 1 and Figure 2 show the FS Jig with the DMLHB Motor Drive Unit and the DMLHP Motor Drive Unit. Figure 1 shows the entire combination. Figure 2 shows the possible combinations at shorter  $L_u$  and higher  $S\%$ .

Figure 3 and Figure 4 show the DMLHP Motor Drive Unit with the FS Jig and the ST Jig. Figure 3 shows the entire combination. Figure 2 shows the possible combinations at shorter  $L_u$  and higher  $S\%$ .

Figure 5 and Figure 6 show all Motor Drive Units and Jigs on a single chart for comparison. Figure 5 shows the entire combination. Figure 6 shows the possible combinations at shorter  $L_u$  and higher  $S\%$ .

It can be seen that the DMLHP-ST allows the longest possible samples. The DMLHP-FS allows longer possible samples than the DMLHB-FS. The DMLHB-FS and DMLHP-FS allow the greatest  $S\%$  because they allow very small sample lengths, up to 2,000% for a 6 mm sample length. The DMLHP-ST has a minimum sample length of 30 mm which means the greatest  $S\%$  of the DMLHP-ST is 400%.

Figures 1-4 show how to determine stretching parameters. You can start with a desired  $S\%$  on the left vertical axis. Go across to the Red curve, then go down at that point to see  $L_u$  on the horizontal axis. Go up with the same  $L_u$  until you reach the Green curve, then go to the right vertical axis to see the Stroke or Reciprocating Distance. You could start with the desired  $L_u$  and then go up to find the maximum  $S\%$  where you hit the Red Curve and the Stroke or Reciprocating Distance where you hit the Green curve. It is not necessary to stretch this amount, the Red curve shows the maximum allowable stretching for that Unstretched Sample Length. Use a shorter Stroke or Reciprocating Distance in this case. You can calculate the resulting  $S\%$  using the equation  $S\% = St / L_u$ .

**FS - HP vs HB - Maximum Percentage Stretch (%S) and Reciprocating Stroke (or 2 x Rd)**

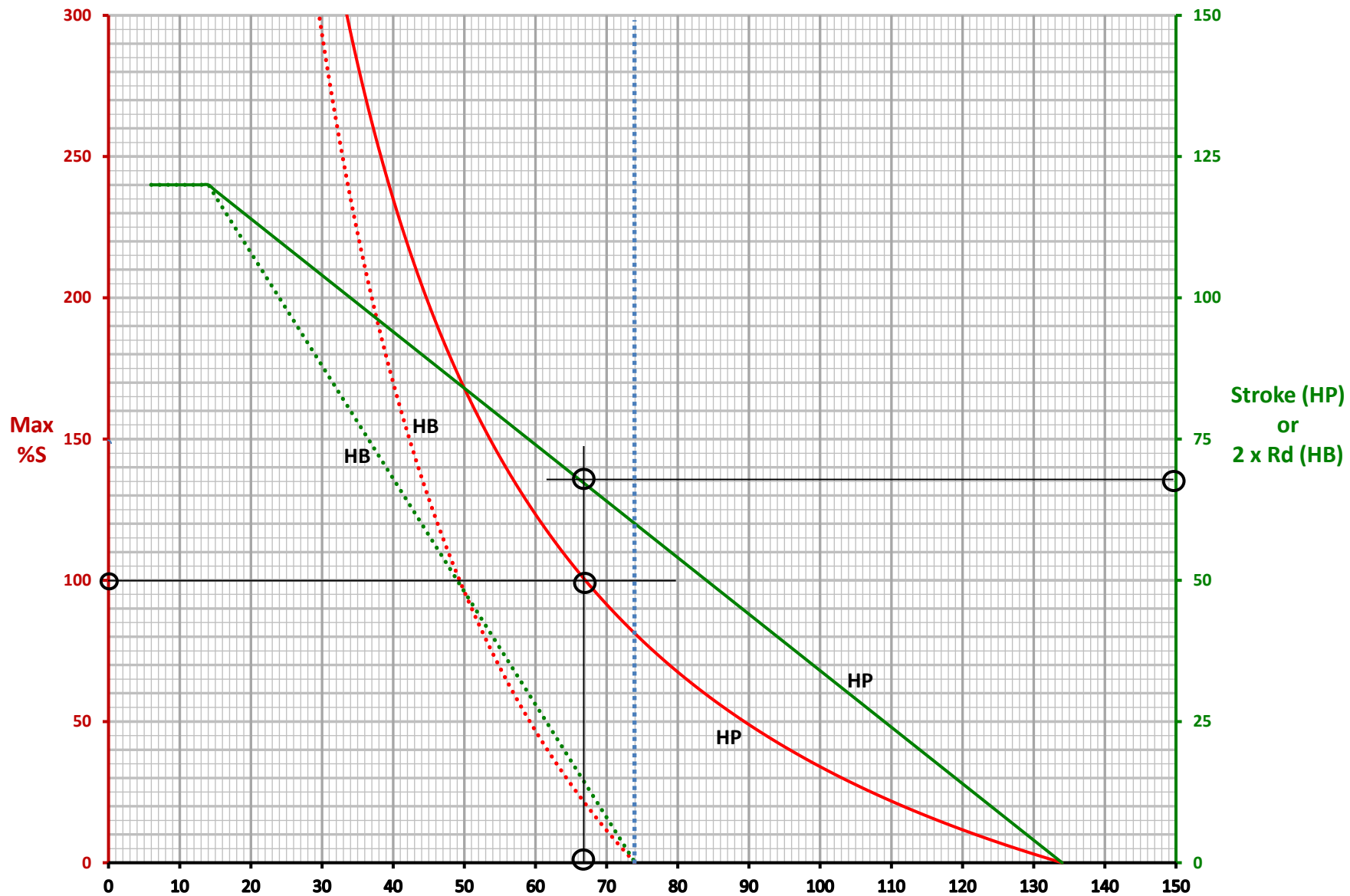


Figure 1: Lu – Unstretched Sample Length (not counting Clamping Distance)

**FS - HP vs HB - Maximum Percentage Stretch (%S) and Reciprocating Stroke (or 2 x Rd)**

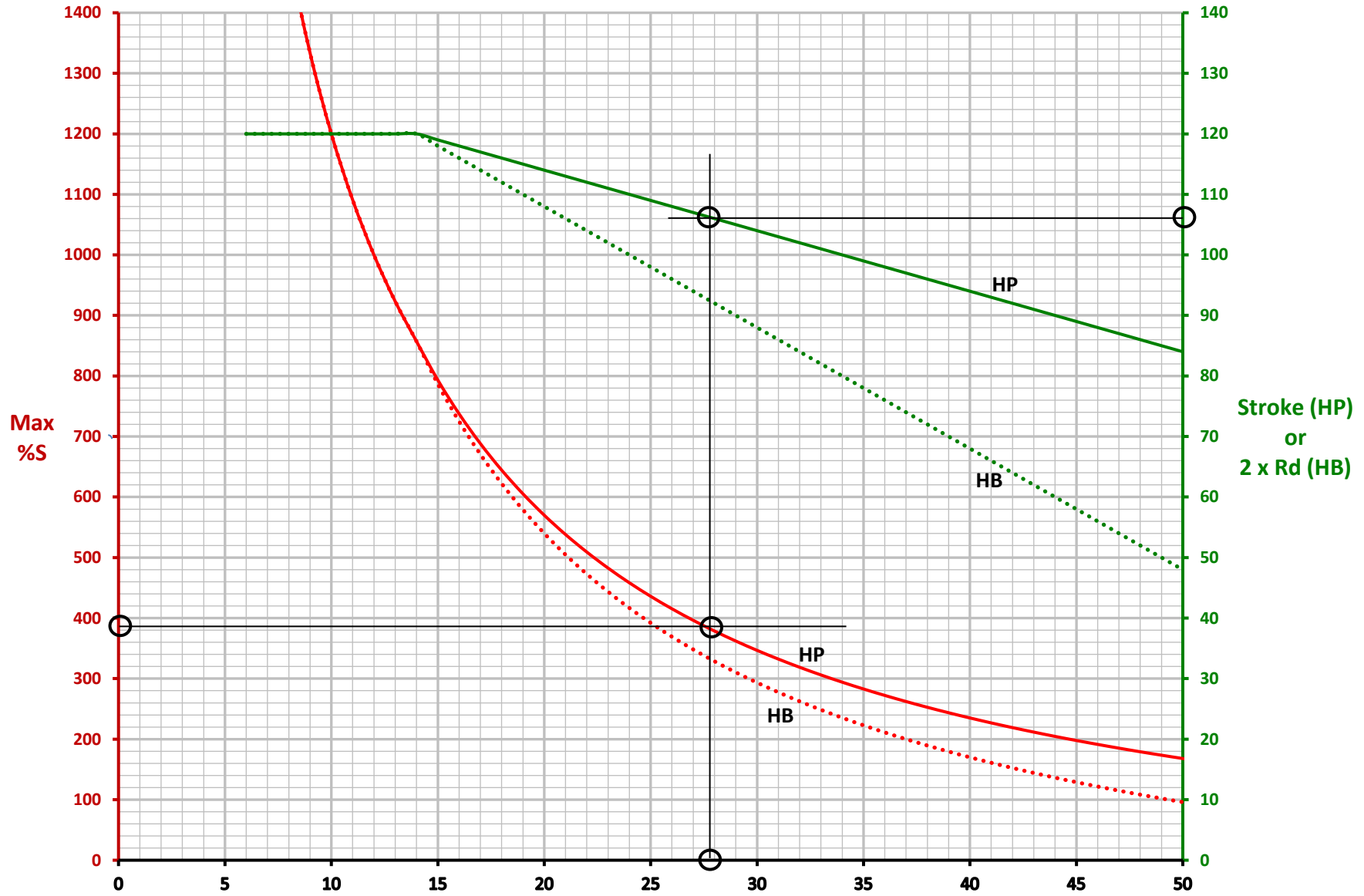


Figure 2: Lu – Unstretched Sample Length (not counting Clamping Distance)

HP - ST vs FS - **Maximum Percentage Stretch (%S)** and **Reciprocating Stroke**

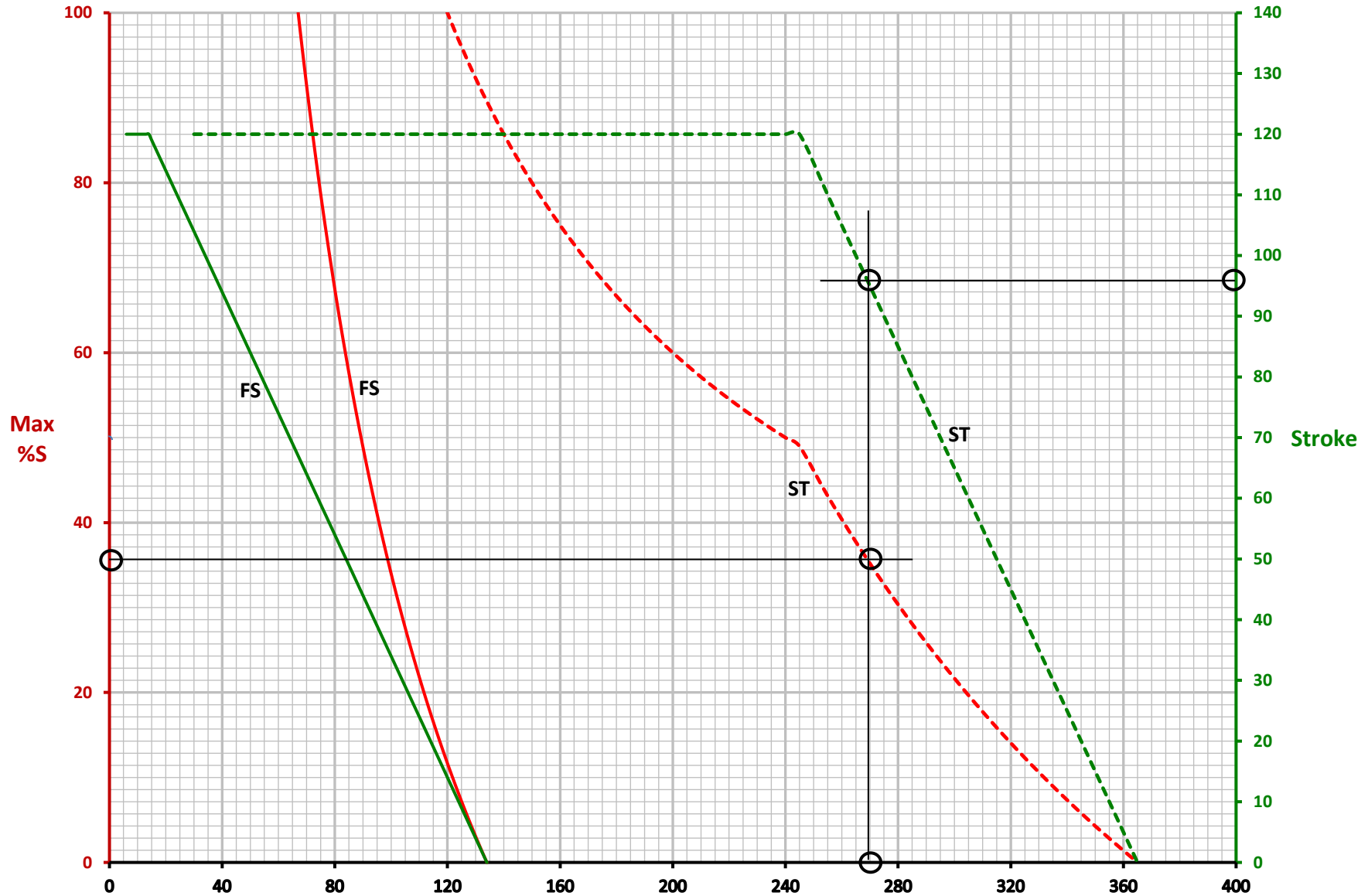


Figure 3: Lu – Unstretched Sample Length (not counting Clamping Distance)

HP - ST vs FS - Maximum Percentage Stretch (%S) and Reciprocating Stroke

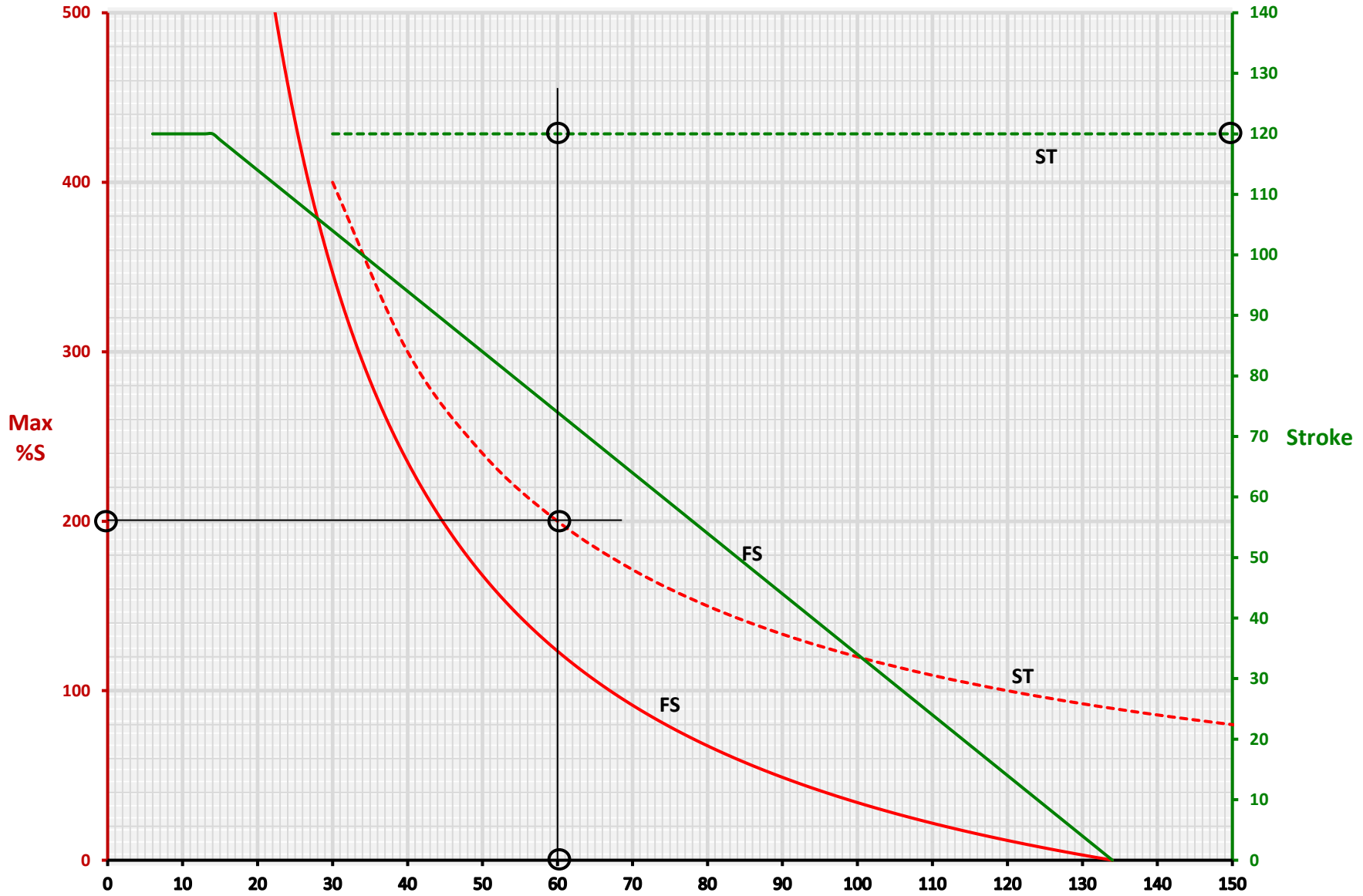


Figure 4: Lu – Unstretched Sample Length (not counting Clamping Distance)

**HP/ST - HP/FS - HB/FS Maximum Percentage Stretch (%) & Reciprocating Stroke (or 2 x Rd)**

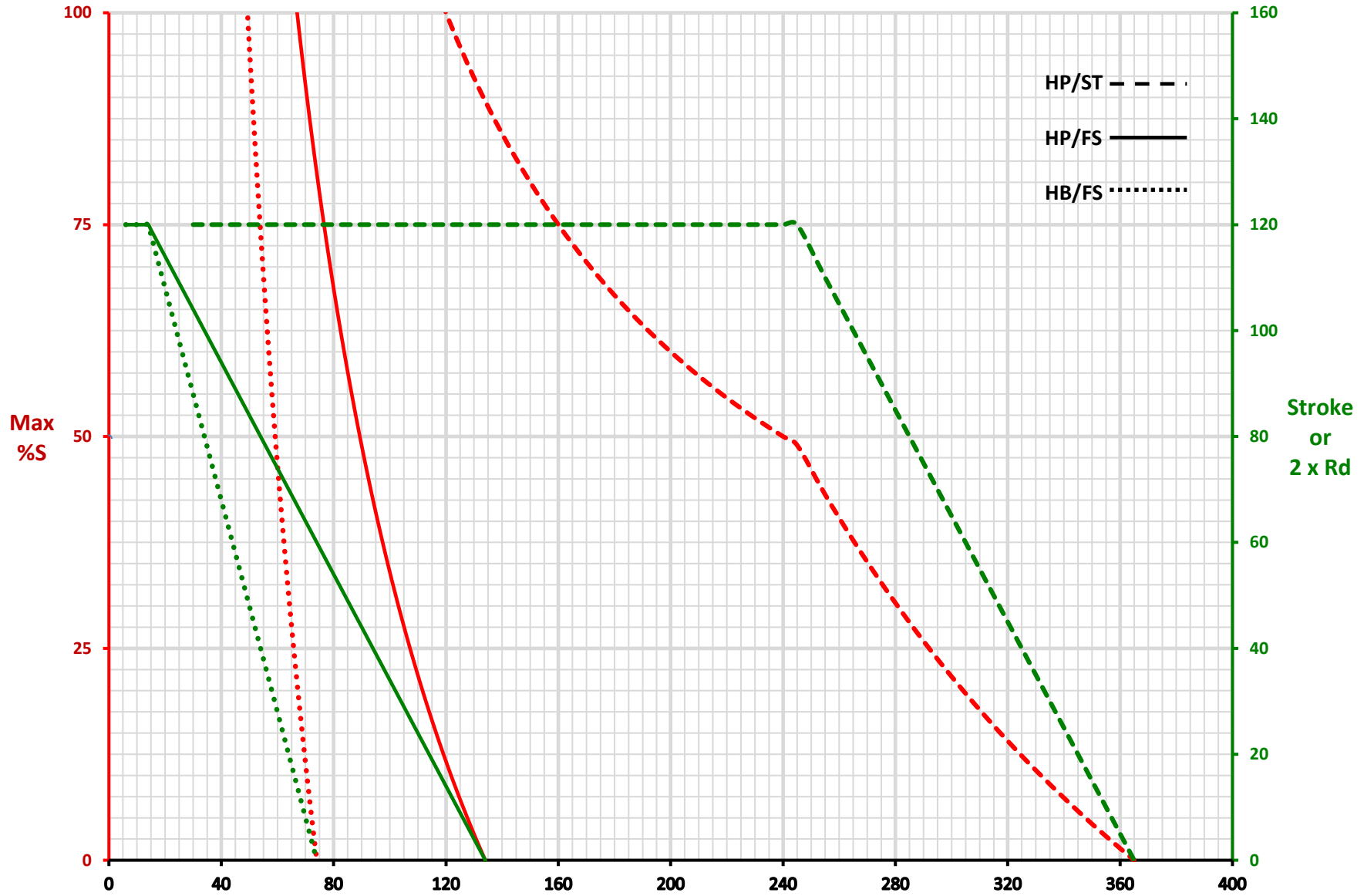


Figure 5: Lu – Unstretched Sample Length (not counting Clamping Distance)

**HP/ST - HP/FS - HB/FS Maximum Percentage Stretch (%) & Reciprocating Stroke (or 2 x Rd)**

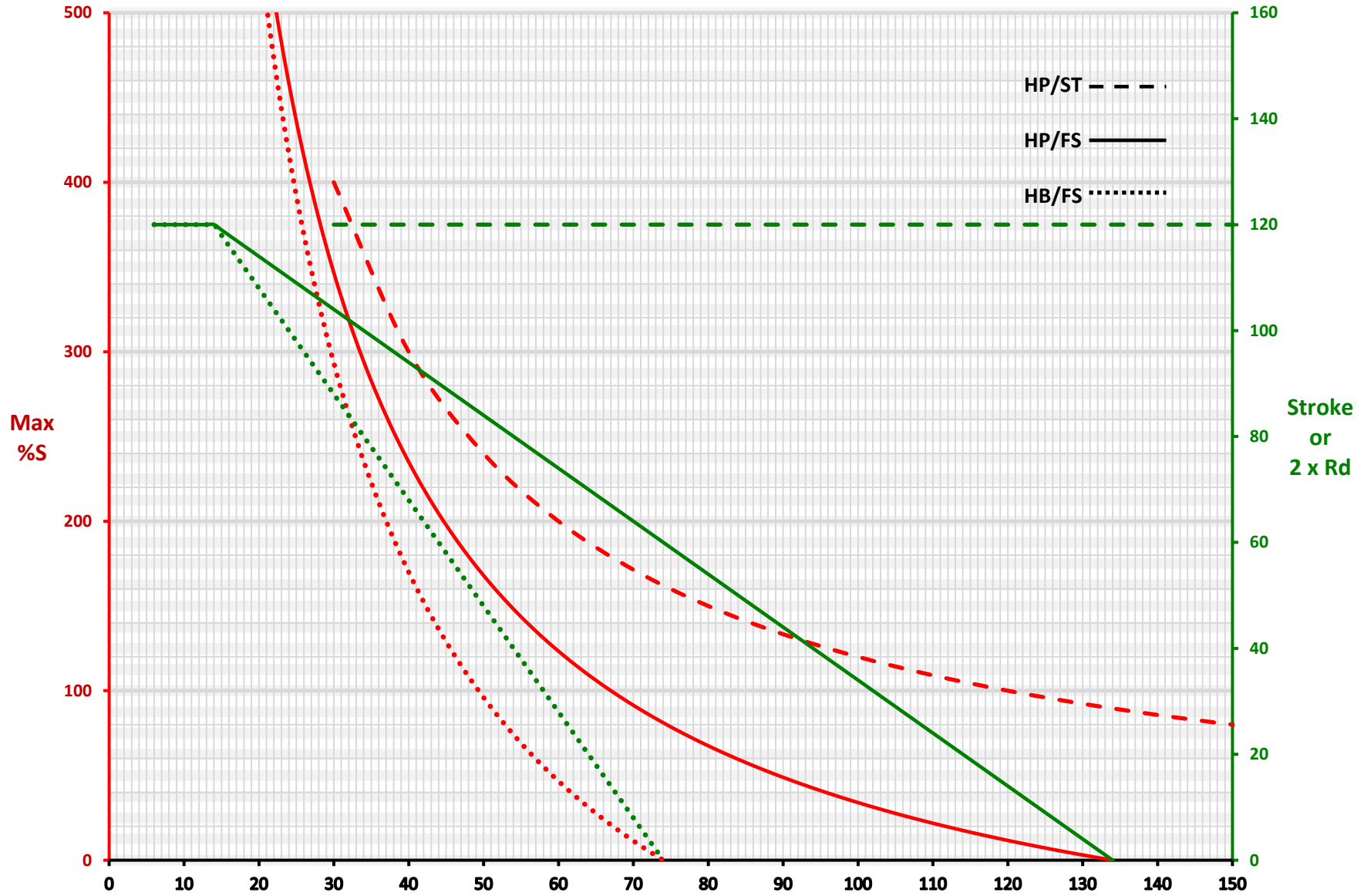


Figure 6: Lu – Unstretched Sample Length (not counting Clamping Distance)