

Nip and Crown Testing Kit

for Rubber Covered Rolls

Technical Bulletin

This Valmet Nip Width Impression Kit, as seen in **Figure 1**, has been specifically designed to determine the actual working nip widths of a pair of rubber covered rolls under operating conditions. This impression may be used to determine the need for corrective measures, such as recrowning or refinishing, or to determine more satisfactory roll pressures for given operation.

These impressions should be retained and may be referred to periodically. They should be compared with successive impressions to check rate of wear, roll performance, etc. Nip width impressions should be taken when rolls are not rotating and only when the machine is down and felts (if used) are removed or pushed to one side.

Time and labor spent in determining proper crowns for rubber covered rolls will be more than compensated for by improved performance and decreased maintenance costs.



Figure 1. Nip Impression Kit

Using the nip testing kit

Make certain that both the top and bottom rolls are clean and relatively dry in the area in which the nip width impressions is to be taken.

Remove kit from box and unroll on bottom roll (white paper down) at line of contact between top and bottom roll. Make certain that carbon and paper are centered, so that nip impression is in center area of paper.

If rolls are horizontal and on same vertical plane, the kit will normally remain on roll without use of tape. If rolls are offset or overhang, we suggest the use of small strips of pressure sensitive tape to hold the sheets in proper position.

Bring the rolls together gently at first, then gradually load to normal operating pressure. Wait for approximately one minute after pressure has normalized before separating rolls. The carbon sheet may then be removed and disposed of and the nip width impression evaluated.

Types of carbon impressions

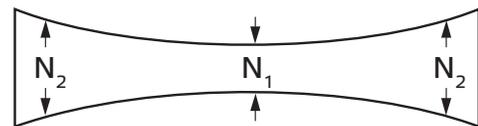


Figure 2. Rolls are not crowned.

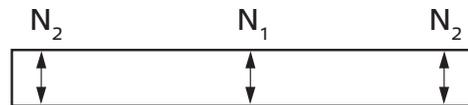


Figure 3. Rolls are properly crowned.

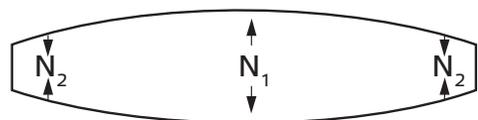


Figure 4. Rolls have too much crown.

Determination of roll crown from nip width impression

Having determined the nip widths under the desired loadings knowing the diameters of our rolls, we can determine the additional crown for the roll by use of the following formula:

where:

$$C = \frac{(N_2^2 - N_1^2) (D_1 + D_2)}{2D_1D_2}$$

C = additional crown required i.e., the difference in diameter between the center and 2 in. in from the ends of the dub

N_1 = nip width at center of roll

N_2 = nip width 2 in. in from the ends of the dub

D_1 = diameter of top roll

D_2 = diameter of bottom roll

or if rolls have equal diameters:

$$C = \frac{N_2^2 - N_1^2}{D}$$

As an example let us assume that we have two 12-in. diameter rolls, and we find that the nip widths are 0.9-in. on the ends and 0.7-in. at the center under the loading at which we desire to run the rolls. Then by our formula since:

$$C = \frac{(0.9^2 - 0.7^2)}{12} = \frac{0.81 - 0.49}{12} =$$

$N_1 = 0.7$

$N_2 = 0.9$

$D = 12$

$$C = \frac{(0.9^2 - 0.7^2)}{12} = \frac{0.81 - 0.49}{12} =$$

$$\frac{0.32}{12} = 0.027 \text{ in.}$$

If our rolls were originally ground straight face we would now put a crown of 0.027-in. into the rubber. If the crown were originally 0.030-in. it would be increased to 0.057-in. If the situation were reversed and the nip at the center (N_1) were 0.9-in. and the nip at the ends (N_2) were 0.7-in., our indicated crown would then be - 0.027-in. indicating that the nip already contained too much crown. Now if the crown of our roll were 0.030-in. then the proper crown would be 0.003-in.

It is frequently helpful to determine crowns for various loadings so that if one desires to change the loading then the proper crown for the roll will be immediately available. The crown as determined above is, of course, the combined crown for two rolls involved. The amount of this crown put into the top and the bottom roll will depend on the individual machine and operation.