## Plate Rolling Calculation Formula

The entries in the table with the subscript "1" are known quantities, while those with the subscript "2" are the quantities to be determined. Dc represents the diameter of the working roll closest to the upper roll. Symbols for conversion when the plate width varies are shown in the figure below. When material, plate width, curvature, etc., change simultaneously, solutions can be obtained by simultaneously solving the equations in the table below.

| No | Assuming Conditions |  | Conversion Formula |
| :---: | :---: | :---: | :---: |
| 1 | Different Bending Curvatures |  | $\mathrm{S}_{2}=\mathrm{S}_{1} \times\left[\frac{\mathrm{D}_{2}\left(\mathrm{D}_{1}+\mathrm{d}_{\mathrm{c}}\right)}{\mathrm{D}_{1}\left(\mathrm{D}_{2}+\mathrm{d}_{\mathrm{c}}\right)}\right]^{1 / 2}$ |
| 2 | Different Sheet Dimensions | $a 1 \neq c 1, a 2 \neq c 2$ | $S_{2}=S_{1}\left[\frac{b_{1}\left(b_{1}+2 c_{1}\right)\left(4 a_{1} L+2 b_{1} c_{1}+b_{1}^{2}\right)}{b_{2}\left(b_{2}+2 c_{2}\right)\left(4 a_{2} L+2 b_{2} c_{2}+b_{2}^{2}\right)}\right]^{\frac{1}{2}}$ |
|  |  | $\mathrm{a} 1=\mathrm{c} 1, \mathrm{a} 2=\mathrm{c} 2, \mathrm{~b} 1 \sim \mathrm{~L}$ | $S_{2}=S_{1}\left[\frac{b_{1}\left(2 L-b_{1}\right)}{b_{2}\left(2 L-b_{2}\right)}\right]^{\frac{1}{2}}$ |
|  |  | b1 ~ 2L - b2 | $S_{2}=S_{1}\left(\frac{b_{1}}{b_{2}}\right)^{\frac{1}{2}}$ |
| 3 | Different Sheet Materials | Rx is a Constant. Typically, $\quad \mathrm{Rx}=10-20$ | $S_{2}=S_{1}\left[\frac{\sigma_{s 1}\left(1.5+K_{00} / 2 R x\right)}{\sigma_{s 2}\left(1.5+K_{02} / 2 R x\right)}\right]^{\frac{1}{2}}$ |
|  |  | Ignoring Differences in Material Hardening. | $S_{2}=S_{1}\left(\frac{\sigma_{S 1}}{\sigma_{S 2}}\right)^{\frac{1}{2}}$ |
| 4 | Different Rolling Temperatures | $R x$ is a constant. Typically, $R x=10-20$. <br> During hot rolling, $\sigma s=\sigma \mathrm{bt}$. | $S_{2}=S_{1}\left[\frac{\sigma_{S 1}\left(1.5+K_{01} / 2 R x\right)}{1.5 \sigma_{b}^{1}}\right]^{\frac{1}{2}}$ |



Equipment Process Parameters

## Example:

Given $\sigma_{s 1}, b_{1}, D_{1}, S_{1}, \sigma_{s 2}, b_{2}, D_{2}$, find $S_{2}$
Solution: According to equation (1) in the table, we have: $S_{2}^{\prime}=S_{1} \times\left[\frac{D_{2}\left(D_{1}+\mathrm{D}_{2}{ }_{2}\right.}{\mathrm{D}_{1}\left(\mathrm{D}_{2}+\mathrm{d}_{\ell}\right)}\right]^{1 / 2}$ According to equation (2) in the table, we have: $S_{2}^{s}=S_{2}^{\prime} \times\left[\frac{b_{1}\left(2 L L-b_{2}\right.}{b_{2}\left(2 L-b_{2}\right)}\right]^{1 / 2}$ According to equation (2) in the table, we have: $S_{2}=S_{2}^{\prime \prime} \times\left(\frac{\sigma_{s 1}}{\sigma_{s 2}}\right)^{1 / 2}$

$$
\begin{aligned}
& =S_{2}^{\prime} \times\left[\frac{b_{1}\left(2 L-b_{1}\right)}{b_{2}\left(2 L-b_{2}\right)}\right]^{1 / 2} \times\left(\frac{\sigma_{s 1}}{\sigma_{s 2}}\right)^{1 / 2} \\
& =S_{1} \times\left[\frac{D_{2}\left(D_{1}+d_{c}\right)}{D_{1}\left(D_{2}+d_{c}\right)}\right]^{1 / 2} \times\left[\frac{b_{1}\left(2 L-b_{1}\right)}{b_{2}\left(2 L-b_{2}\right)}\right]^{1 / 2} \times\left(\frac{\sigma_{s 1}}{\sigma_{s 2}}\right)^{1 / 2}
\end{aligned}
$$

