Gaussian heat source

The conical shape gaussian heat source is computed according the formula

Qr=Qo exp(-r^2/ro^2)

Where r=(x^2+y^2)^½

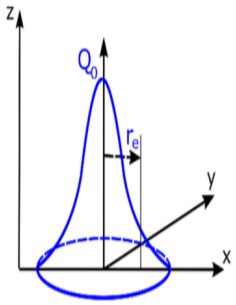
Qr is the source intensity, Qo is the maximum source intensity

ro is the geometrical parameter describing the heat source position.

The cylindrical shape gaussian heat source is computed with the formula

$$q(x,y,z,t)=\frac{Q_L}{\pi r_0^2 d}\exp\left(-\frac{x^2+(y-vt)^2}{r_0^2}\right)u(z)$$

The thermodynamic boundary conditions on the external surfaces of the solid comprise heat transfer for convection and radiation.



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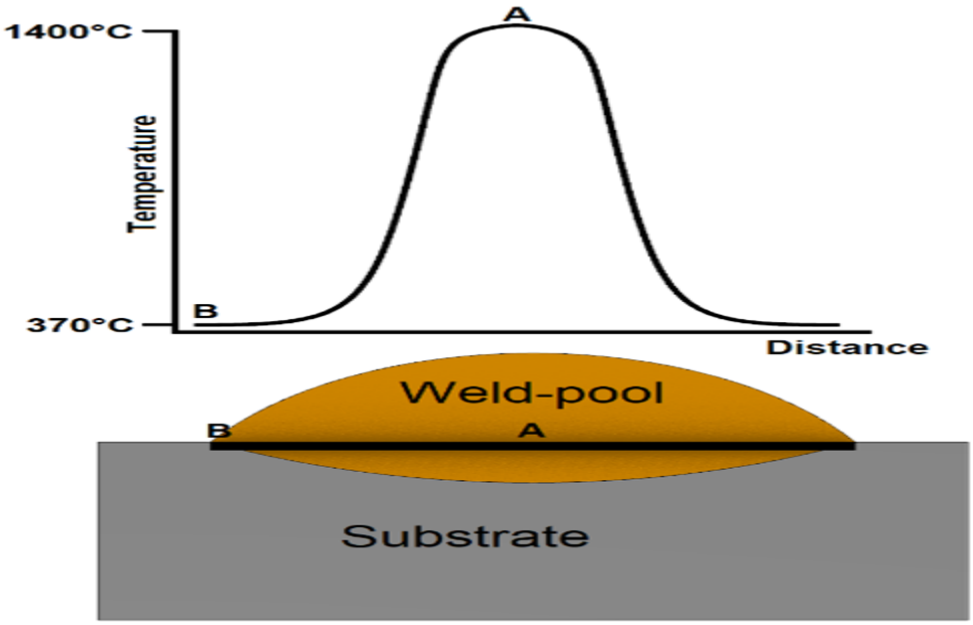
The temperature profile across a solidifying weld-bead fits a gaussian curve.. The higher the heat input, the flatter the curve, as weld-pool temperatures are relatively more uniform. Whereas lower heat input results in a higher temperature gradient, resulting in a more "pointy" curve



We will use the gaussian distribution because it is symmetric about the mean and the distribution near the mean is more frequent. The skewness of the curve is zero

The temperature distributions at four instants during the simulation, in which the heat input was taken constant.