**HOW TO CALCULATE TUNNEL OVEN SIZE**

The work space width and height of a tunnel oven will be the width and height required to clear the existing conveyor loaded with parts plus clearance for installation of the conveyor on to the supports of the oven. To estimate the heated length, you will need:

- *Loading density* –Total number of parts in distance along belt (parts/lineal foot)
- *Production rate* –Total number of parts processed in a given time period (parts/hour)
- *Dwell time* –Total length of time that parts spend in heat zone (hours)

It is important to understand the relationship between belt width, production rate and heat zone length. Doubling the belt width will double the production rate, or allow the heat zone to be half as long. Similarly, doubling the production rate will require a belt twice as wide or a heat zone twice as long. Feel free to contact Grieve directly for any specific questions related to tunnel ovens or continuous oven processing.

Calculating Loading Density

Loading density is the number of parts per lineal foot of belt in the direction of travel. This information can be taken from the existing conveyor and part loading. For a visual description of the dimensions required, refer to the graphic below:

Top view of conveyor belt
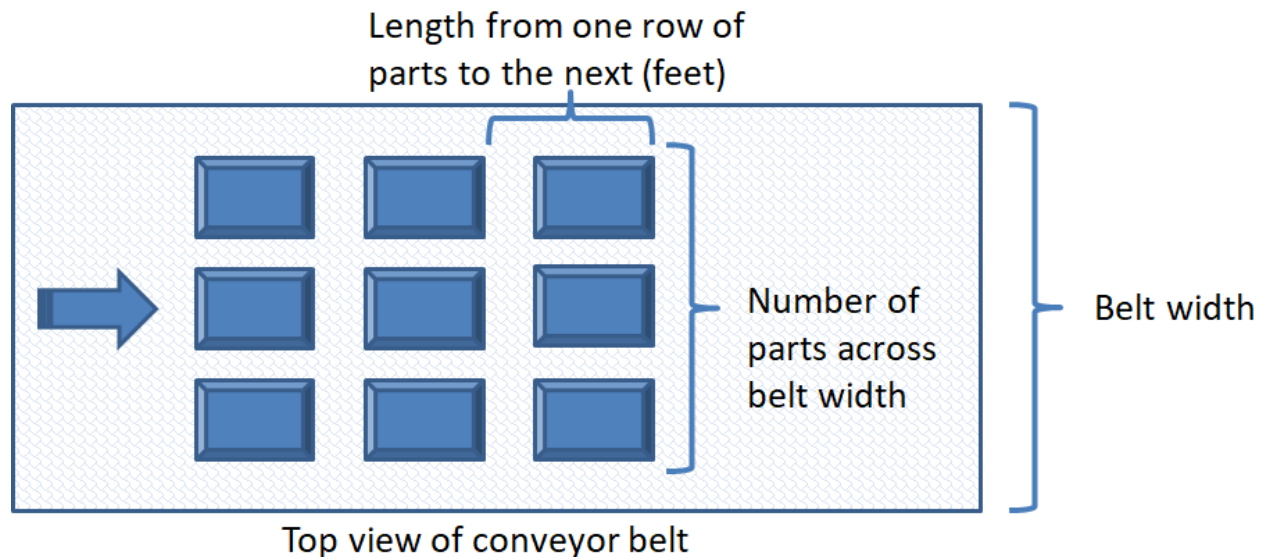
The loading density will be the number of parts on the belt per lineal foot divided by the number of feet between rows of parts in the direction of travel.

$$Loading\ density \left(\frac{parts}{lineal foot}\right) = \frac{Number\ of\ parts\ across\ belt\ width}{Length\ from\ one\ row\ of\ parts\ to\ the\ next\ (feet)}$$

Calculating Length of Heat Zone

The minimum required length of the heat zone is a function of the production rate, dwell time, and loading density as follows:

$$Heat\ zone\ length\ (feet) = \frac{Production\ rate\ \left(\frac{parts}{hour}\right) x\ Dwell\ time\ (hours)}{Loading\ density\ \left(\frac{parts}{lineal\ foot}\right)}$$

To the calculated heat zone length should be added a factor of safety of at least 10% to account for lower temperature at open ends of oven. A Greater factor of safety should be used for high temperature ovens or those with a wide belt.

Approximate Tunnel Oven Size

Equipment **width** will be approximately 3 feet wider than belt width to accommodate belt bed clearance, insulation, duct work, control enclosure, and belt drive.

The heat zone **length** will only be a portion of the oven's overall length. The length of load and unload zone, unheated vestibules and cooling zone must be added to the calculated heat zone length.

Approximate equipment **height** will be the sum of:
- distance from the floor to the bottom of the work space
- work space height (height of conveyor and parts, plus 6 inches; not less than 15 inches total)
- heat chamber height of 30 to 42 inches depending on blower size.

It is important to understand all requirements of the system for accurate sizing. Refer to the graphic below.

Circulation Diagram

Full vertical air flow forces heated air down through parts.
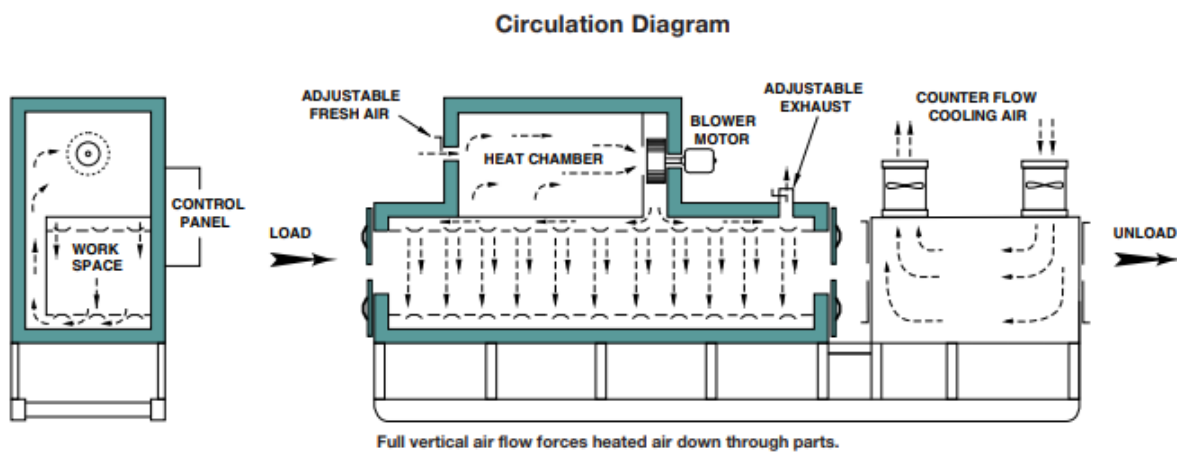
Feel free to reach out to Grieve directly for more accurate sizing and for any specific questions related to tunnel ovens, contact us.