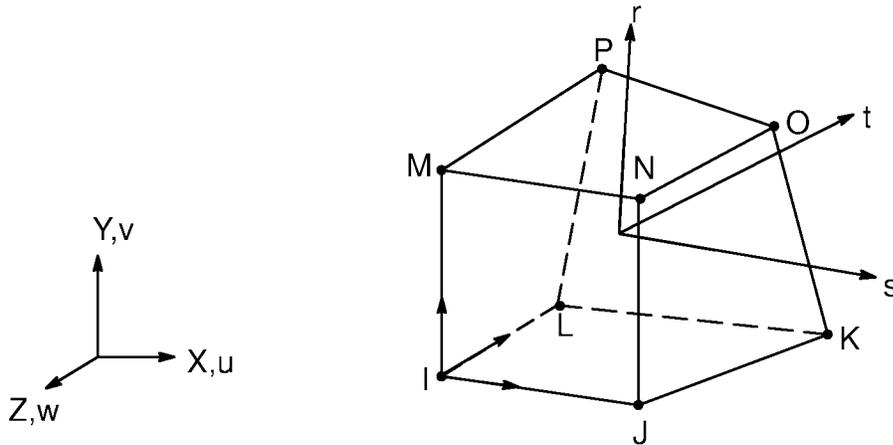


14.64 SOLID64 — 3-D Anisotropic Structural Solid



Matrix or Vector	Shape Functions		Integration Points
Stiffness Matrix	Equations (12.8.18-1), (12.8.18-2), and (12.8.18-3) or if modified extra shape functions are included (KEYOPT(1)=0) and element has 8 unique nodes: equations (12.8.19-1), (12.8.19-2), and (12.8.19-3)		2 x 2 x 2
Mass Matrix	Equations (12.8.18-1), (12.8.18-2), and (12.8.18-3)		2 x 2 x 2
Stress Stiffness Matrix	Same as mass matrix		2 x 2 x 2
Thermal Load Vector	Same as stiffness matrix		2 x 2 x 2
Pressure Load Vector	Quad	Equation (12.5.8-1) and (12.5.8-2)	2 x 2
	Triangle	Equation (12.5.1-1) and (12.5.1-2)	3

Load Type	Distribution
Element Temperature	Trilinear thru element
Nodal Temperature	Trilinear thru element
Pressure	Bilinear across each face

References: Wilson(38), Taylor(49)

14.64.1 Other Applicable Sections

Chapter 2 describes the derivation of structural element matrices and load vectors as well as stress evaluations. Section 13.1 describes integration point locations. Section 13.5 defines positive definite matrices.

14.64.2 Stress–Strain Matrix

As referred to in Section 2.1, the stresses and strains are related by:

$$\{\sigma\} = [D] \left(\{\epsilon\} - \{\epsilon^{th}\} \right) \quad (14.64-1)$$

when using **TB,ANEL,,,0** or

$$\{\epsilon\} = \{\epsilon^{th}\} + [D]^{-1} \{\sigma\} \quad (14.64-2)$$

when using **TB,ANEL,,,1**. The input must use the same order of components as given in Section 2.1, i.e. $\epsilon_x, \epsilon_y, \epsilon_z, \epsilon_{xy}, \epsilon_{yz}, \epsilon_{xz}$. While $\{\epsilon^{th}\}$ is restricted to orthotropic input, $[D]$ may be input as a full anisotropic matrix because 21 independent values are used in its makeup for this element. Symmetry of the $[D]$ matrix is ensured, but it is up to the user to provide values so that the matrix is positive definite. If it is not, the program will terminate.