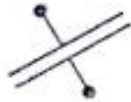
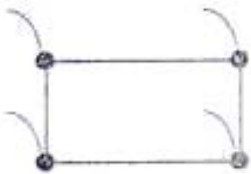
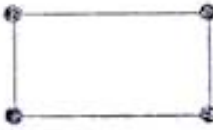


ภาคผนวก ข

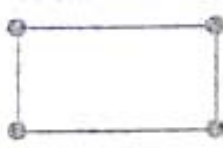
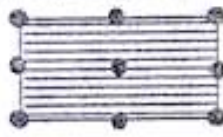
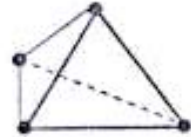
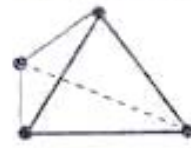
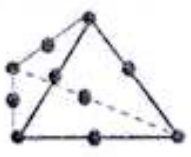
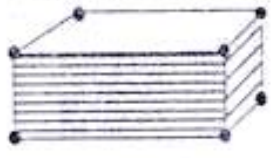
คุณสมบัติของเอลิเมนต์ที่ใช้ในการวิเคราะห์ไฟไนต์เอลิเมนต์

2-D Truss/Spar  Element Name: TRUSS2D Nodes: 2	3-D Truss/Spar  Element Name: TRUSS3D Nodes: 2	2-D Beam  Element Name: BEAM2D Nodes: 2
3-D Beam  Element Name: BEAM3D Nodes: 2 or 3	Rigid Bar  Element Name: RBAR Nodes: 2	Linear Spring  Element Name: SPRING Nodes: 2
Straight Pipe  Element Name: PIPE Nodes: 2		Elbow (Curved Pipe)  Element Name: ELBOW Nodes: 3
Linear Gap  Element Name: GAP Nodes: 2	Concentrated Mass  Element Name: MASS Nodes: 1	Boundary Element  Element Name: BOUND Nodes: 2

ภาพผนวกที่ 19 รูปแบบเอลิเมนต์ทั่วไปที่ใช้ในวิธีไฟไนท์เอลิเมนต์
ที่มา: Structural Research and Analysis (1994)

4-node Plane Quadrilateral  Element Name: PLANE2D Nodes: 4	8-node Plane Quadrilateral  Element Name: PLANE2D Nodes: 8	4-node Axisymmetric Quadrilateral  Element Name: PLANE2D Nodes: 4
8-node Axisymmetric Quadrilateral  Element Name: PLANE2D Nodes: 8	3-node Plane Triangle  Element Name: TRIANG Nodes: 3	6-node Plane Triangle  Element Name: TRIANG Nodes: 6
3-node Axisymmetric Triangle  Element Name: TRIANG Nodes: 3	6-node Axisymmetric Triangle  Element Name: TRIANG Nodes: 6	3-Node Thin Shell  Element Name: SHELL3 Nodes: 3
4-Node Thin Shell  Element Name: SHELL4 Nodes: 4	8/9-Node Thin Shell  Element Name: SHELL9 Nodes: 8/9	3-Node Thick Shell  Element Name: SHELL3T Nodes: 3

ภาพผนวกที่ 20 รูปแบบเอลิเมนต์ทั่วไปที่ใช้ในวิธีไฟไนท์เอลิเมนต์
ที่มา: Structural Research and Analysis (1994)

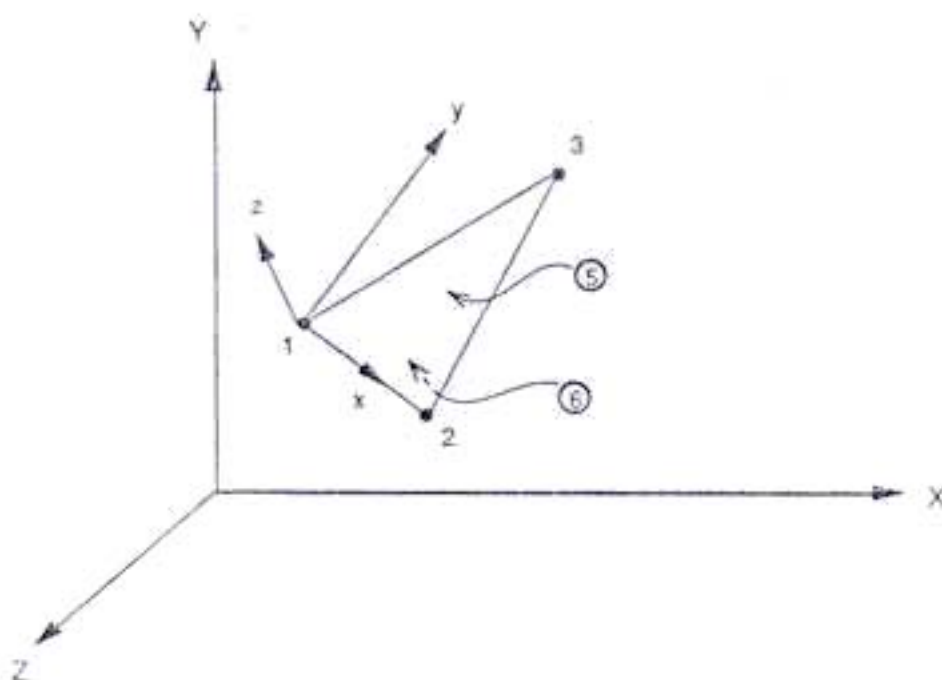
4-Node Thick Shell  Element Name: SHELL4T Nodes: 4	3-Node Composite Shell  Element Name: SHELL3L Nodes: 3	4-Node Composite Shell  Element Name: SHELL4L Nodes: 4
8/9-Node Composite Shell  Element Name: SHELL9L Nodes: 8/9	2-Node Axisymmetric Shell  Element Name: SHELLAX Nodes: 2	4-Node Tetrahedral Solid  Element Name: TETRA4 Nodes: 4
4-Node Tetrahedral Solid with Rotational DOFs  Element Name: TETRA4R Nodes: 4	10-Node Tetrahedral Solid  Element Name: TETRA10 Nodes: 10	8/20-Node Solid  Element Name: SOLID Nodes: 8/20
8-Node Composite Solid  Element Name: SOLIDL Nodes: 8	8/20-Node Piezoelectric Solid  Element Name: SOLIDPZ Nodes: 8/20	General Stiffness  Element Name: GENSTIF Nodes: 2

ภาพผนวกที่ 21 รูปแบบเอลิเมนต์ทั่วไปที่ใช้ในวิธีไฟไนต์เอลิเมนต์
ที่มา: Structural Research and Analysis (1994)

ตารางผนวกที่ 1 คำอธิบายของเอลิเมนต์ต่างๆที่ใช้ในวิธีไฟไนต์เอลิเมนต์

Element Name	Description	Basic FEA System
BEAM2D	Two dimensional elastic beam element	*
BEAM3D	Three dimensional elastic beam element	*
BOUND	Boundary element	*
BUOY	1-node spherical buoyant element (usually used with IMPIPE element)	N/A
CLINK	Convection link	N/A
ELBOW	Elastic curved pipe (elbow) element	*
ELINK	Electrical link	N/A
FLOW2D	Two dimensional fluid flow element	N/A
FLOW3D	Three dimensional fluid flow element	N/A
GAP	Gap element	*
GENSTIF	General stiffness element	*
HLINK	Hydraulic link	*
IMPIPE	2-node immersed pipe or cable element	N/A
MAG2D	2-D magnetic element	N/A
MAG3D	3-D magnetic element	N/A
MASS	General mass element	*
PIPE	Elastic Straight pipe element	*
PLANE2D	4 to 8-node plane and axisymmetric element	*
RBAR	Rigid bar element	*
RLINK	Radiation link	N/A
SHELL3	3-node thin shell element	*
SHELL3L	Multi-layer 3-node shell/plate element	*
SHELL3T	3-node thick shell element	*
SHELL4	4-node thin shell element	*
SHELL6	6-node thin shell element	*
SHELL4L	Multi-layer 4-node shell/plate element	*
SHELL4T	4-node thick shell element	*
SHELL9	9/8-node shell element	*
SHELL9L	Composite 9/8-node shell element	*
SHELLAX	Axisymmetric shell element	*
SOLID	8- to 20-node 3-D solid element	*
SOLIDL	Composite 8-node solid element	*
SOLIDPZ	8- to 20-node 3-D solid piezoelectric element	*
SPRING	Spring element	*
TETRA10	10-node tetrahedral solid element	*
TETRA4	4-node tetrahedral solid element	*
TETRA4R	4-node tetrahedral solid element with translational and rotational dof	*
TRIANG	3- to 9-node triangular plane and axisymmetric element	*
TRUSS2D	Two dimensional truss/spar element	*
TRUSS3D	Three dimensional truss/spar element	*

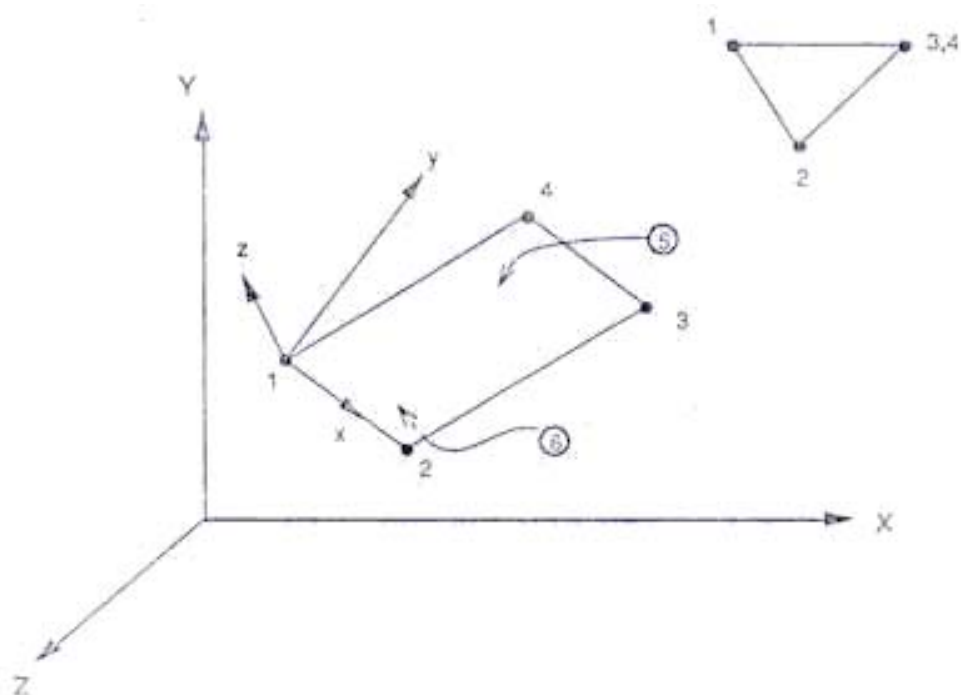
ที่มา: Structural Research and Analysis (1994)



XYZ: Global Cartesian Coordinate System
 xyz: Element Coordinate System
 O: Face Numbers for Pressure Application
 (positive when applied inward)

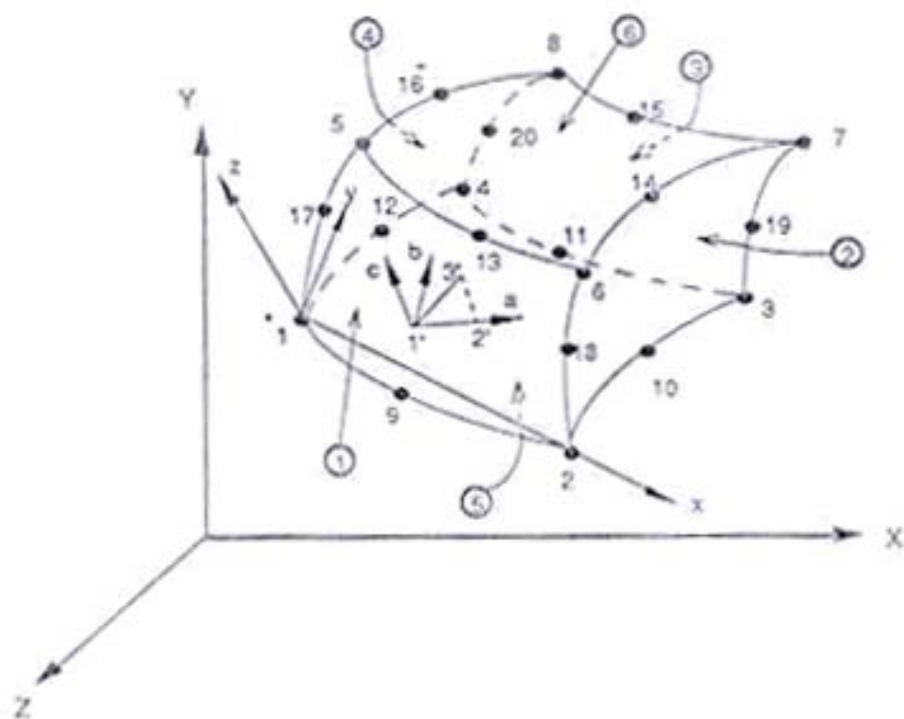
ภาพผนวกที่ 22 Nonlinear Triangular and Quadrilateral Thick Shell

ที่มา: Structural Research and Analysis (1994)



XYZ: Global Cartesian Coordinate System
 xyz: Element Coordinate System
 0: Face Number for Pressure Application
 (positive when applied inward)

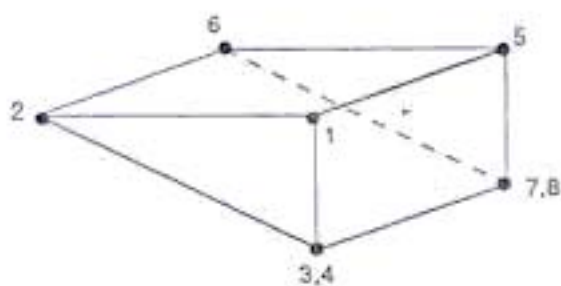
ภาพผนวกที่ 23 Nonlinear Quadrilateral Thick Shell
 ที่มา: Structural Research and Analysis (1994)



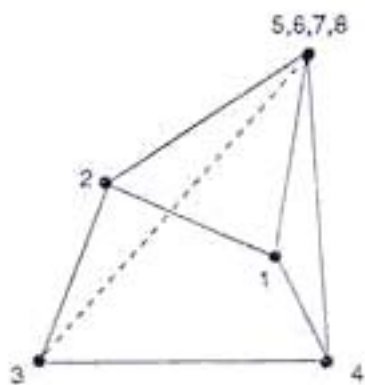
XYZ: Global Cartesian Coordinate System
 xyz: Element Coordinate System
 abc: Material Coordinate System
 O: Face Number for Pressure Application
 (Positive when applied inward)

ภาพผนวกที่ 24 3D Isoparametric Solid

ที่มา: Structural Research and Analysis (1994)

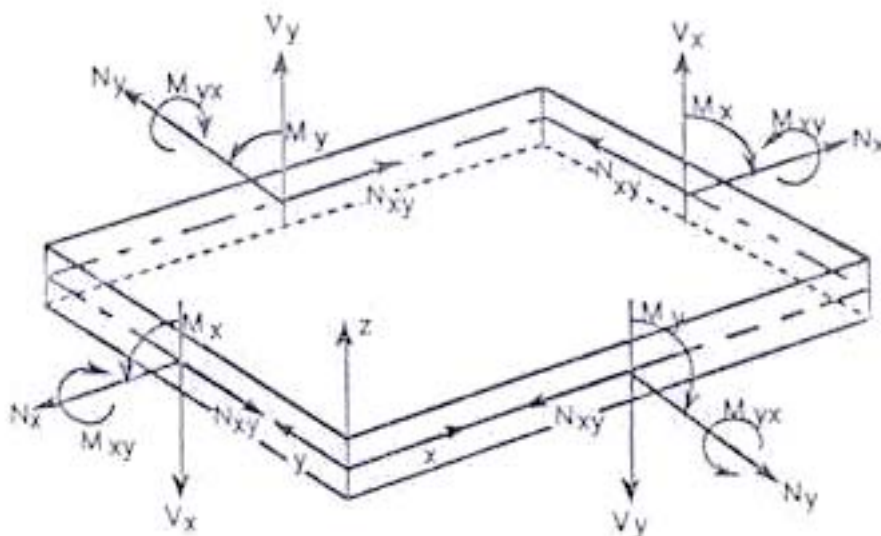


Prism Shaped Solid Element



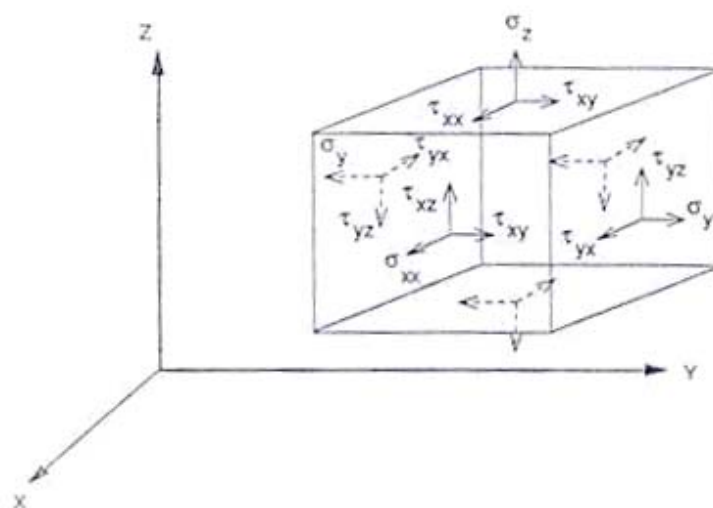
Pyramid Shaped Solid Element

ภาพผนวกที่ 25 Nonlinear 3D 8-Nodes Solid
ที่มา: Structural Research and Analysis (1994)



ภาพผนวกที่ 26 Direction of force and moment components per unit length as defined by COSMOS/M for Nonlinear Thick Shells

ที่มา: Structural Research and Analysis (1994)



ภาพผนวกที่ 27 Direction of force and moment components as defined by COSMOS/M for 3D Isoparametric Solid

ที่มา: Structural Research and Analysis (1994)