



3D Finite Element Stress Analysis of RainBird 700 Series Valve Housing, Phase 1

This report summarizes the 3D Finite Element Stress Analysis of the RainBird 700 Series Valve Housing, Phase 1, as described in the written specification provided by Anthony Manufacturing Co. The analysis was performed by Phoenix Analysis & Design Technologies, Inc. (PADT) under Purchase Order # 01-110988. A simplified 3D Finite Element overall model was constructed to represent the simplified Upper Valve Housing and its support. As per the specification, the internal ribs, the inlet boss and the central boss were not modeled. Plots of the final mesh are shown in Figures 1 and 2. The geometric and material information, along with the loading and boundary conditions were provided to PADT by Mr. Fred E. Hunt, PE, Anthony Manufacturing Co.

In addition to the information provided in the specification, a local refined mesh was also built to better define the stress distribution in the peak area of the interface corner. Its mesh is shown in Figure 3. A total of 4 loading cases were run for the overall model. Results for each case are summarized in subsequent sections.

Summary of Results

The results show the overall stress distribution for the overall model. Table 1 summarizes the peak stresses in the overall model as well as in the zoom model. Table 2 summarizes the peak stresses in the zoom model. Plots of the overall stress distribution (Maximum Principle Stress (S1) and Equivalent Stress (SEQV)) for each load case run as well as the exaggerated deflection of the part for each load case. The overall stress results for the zoom model are presented in Plots 12 through 15.

In addition, Figure 4 is a graph of the stress in the peak area relative to the interface corner, showing the strong stress concentration in the interface corner. Figure 5 is a similar graph for the zoom model. The results for the zoom model are contained within the report and will be furnished to the client as part of the contract work.

Table 1: Maximum Principle Stress (S1) and Equivalent Stress (SEQV) for Each Load Case in the Overall Model (PSI)

NODE	SX	SY	SZ	S1	S2	S3	SEQV
LS1: 40PSI							
20445	238.23	0.0000	0.0000	238.23	0.0000	0.0000	238.23
31333	60.486	3.6047	39.154	66.559	20.194	216.89	106.45
LS2: 125PSI							
30445	2139	0.0000	0.0000	2139	0.0000	0.0000	2139
21333	1715.9	76.722	1135.7	2047.7	0.0000	48.055	2755.3
LS3: 300PSI							
30445	4794.0	0.0000	0.0000	4794.0	0.0000	0.0000	4794.0
21333	4048.0	106.72	1312.7	4512.7	0.0000	12336	9364.7
LS4: 600PSI							
30445	9344.2	0.0000	0.0000	9344.2	0.0000	0.0000	9344.2
21333	3045.9	357.79	5331.0	6281.2	0.0000	24005	18217

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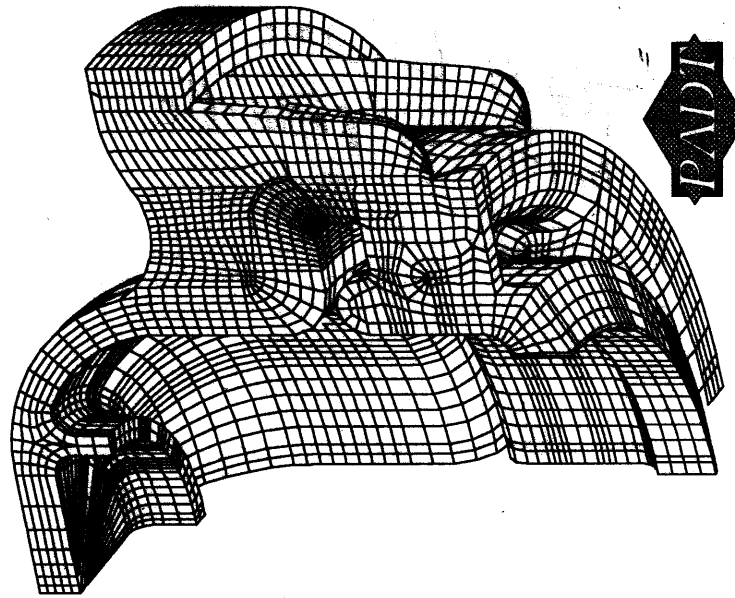
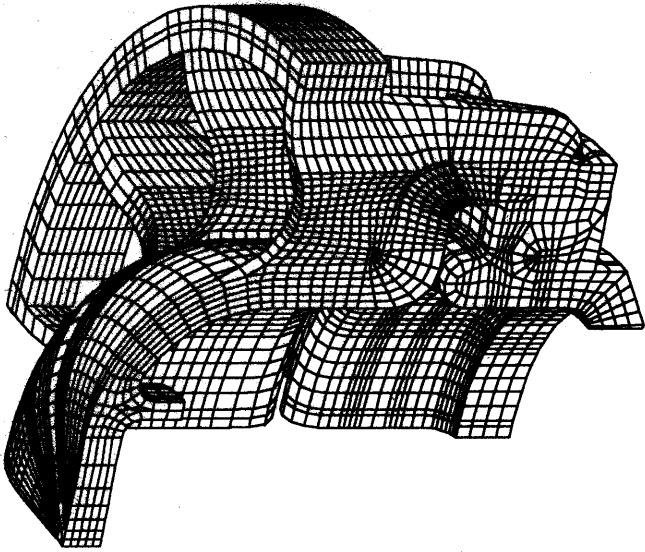
SX,SY,SZ = Stresses in Component Direction

SXY,SYZ,SXZ = Shear Stresses

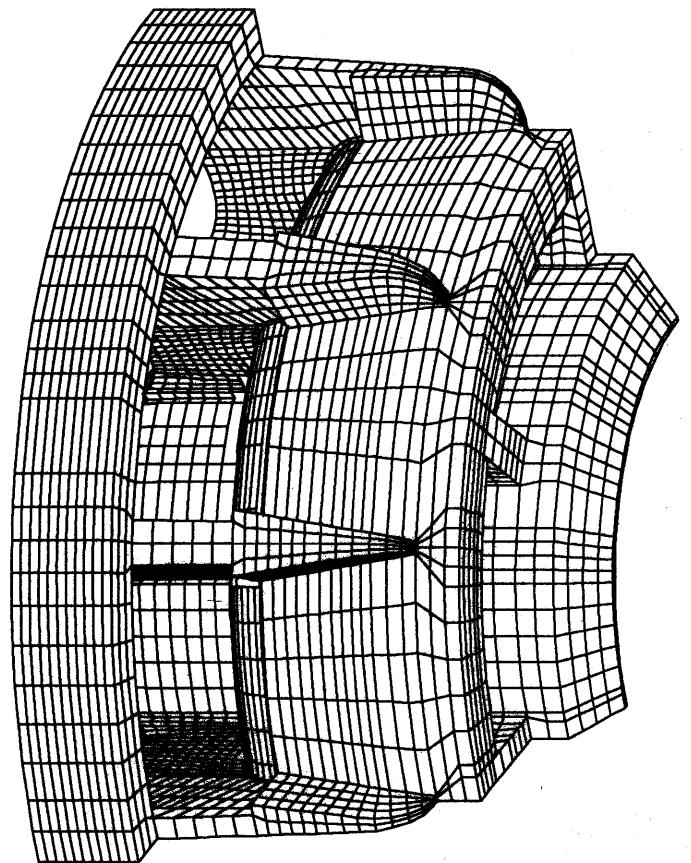
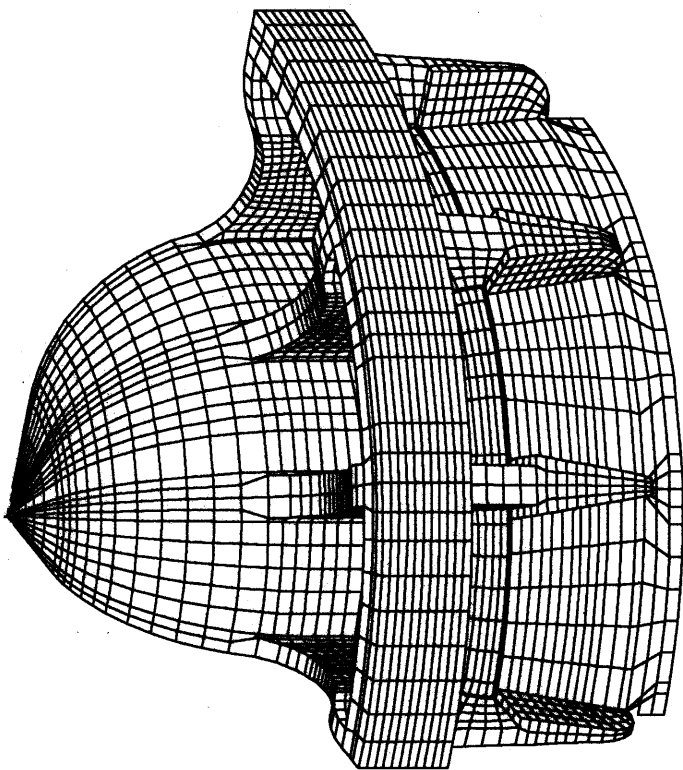
S1,S2,S3 = Principle Stresses

SINT = Stress Intensity

SEQV = Equivalent Stress



PADI



ANSYS 5.1
JAN 17 1995
10:12:54
PLOT NO. 14
NODAL SOLUTION
STEP=3
SUB =1
TIME=3
SEQV (AVG)
DMX =0.024539
SMN =29.793
SMX =8629
SMXB=12809
29.793
644.025
1258
1872
2487
3101
3715
4329
4944
5558
6172
6786
7401
8015
8629

