

Exercise 1***Additional Exercises***

If you have additional time after completing the other exercises in this workbook, you may wish to investigate some of the other capabilities of P3/FATIGUE not specifically covered in this class. (It may be very helpful to refer to the P3/FATIGUE manual and the Example Problems and please don't hesitate to ask the instructor for help if you desire to tackle one of these suggestions.) Some of these, in order of increasing difficulty, are:

- A1: Try using elemental stress or strain results in some of the previous exercises and compare the answers. This could significantly change the fatigue lives, and you must be aware of the stress results being used. In some cases it will give better results as nodal stresses/strains are sometimes averaged from adjacent elemental stresses/strains. This could give erroneous results if the local elemental coordinates are not taken into account. This generally applies to shell elements.
- A2: Try running some of the previous exercises in stand alone mode. That is, outside of PATRAN. This will give you a good feeling for which P3/FATIGUE modules are executed and in what order as well as the appropriate files needed and generated at each step.
- A3: If you have access to an external FE code (not P3/FEA) such as NASTRAN, ANSYS, ABAQUS, MARC, etc., and the appropriate PATRAN results translator, try duplicating FE results of one of the exercise problems and re-running the fatigue analysis with external results files.
- A4: Investigate multiple load cases. Re-run one or some of the exercises through P3/FEA and define another load case, so that there are at least two in the results file. Then set up a P3/FATIGUE job where you associate a different time history loading to each FE load case. You can make them simulate any type of loading you wish: moment, pressure, force, etc. Just make sure that they are compatible with the FE loads and make sense. Re-run the fatigue analysis. This will give you a good idea how P3/FATIGUE deals with multiple FE loads. You may also do this with other FE codes.
- A5: Try defining a transient analysis and running a fatigue calculation using the transient results. You may use P3/FEA to do this or any other FE code if you have access to one. Remember that the loading-time history is defined in the transient analysis and represented in the resulting stress/strain time history results. Therefore it is not necessary to define a load-

time history using PTIME or reference a load-time history.

A6: If you have your own model/components on hand, try performing a fatigue analysis on your own FE models.