

Course Description of AFGROW Advanced Training Class

This 4-day AFGROW advanced class is recommended for students who have completed the standard 3-day AFGROW basic training class. Students who have not attended the 3-days training class, but have practical experience using AFGROW will be able to receive benefits from this class.

This class will familiarize students with our Fracture Mechanics Database and will provide more advanced training on how these data can be used with AFGROW. This will include customized data searches, advanced curve fitting, formatting, and validation. The load interaction models in AFGROW will be explored in detail, and instruction on the use of interaction model parameters to fit test data will be provided. Practical life prediction examples will include wing attach fittings, multiple load path, and multiple crack problems.

Advanced COM automation training will be provided to assist students in complex and repetitive life prediction tasks.

A description of the material to be covered each day is provided below.

Day 1: Creating crack growth rate models using the fracture mechanics database (table lookup and another model)

The purpose of this training is to become familiar with the on-line fracture mechanics database and develop a clear understanding of how to use the data to develop a working crack growth rate model for use in AFGROW. Raw crack growth rate data are fairly limited, due to the time required to perform tests. Therefore, it is important to understand how to make the most effective use of available data. Students will learn how to interpret, validate, format, and import the data to AFGROW.

Day 2: Using load interaction models to predict crack growth rate data available in the fracture mechanics database and/or DTDH

This training will provide students with a working knowledge of the five load interaction models that are available in AFGROW. The purpose of load interaction modeling is to account for the effect of loading history on the crack growth life of a structure. There is not a single load interaction model that has been shown to work effectively for all materials and loading sequences. Different empirical models have been developed over the years that have been used by Government and industry to obtain reasonable results under different conditions. This training will provide students with a good understanding of how each model works, the strengths and weaknesses, and hands-on examples of how to use each model with actual test data.

Day 3: Practical life prediction examples

Students will perform life predictions using AFGROW for several typical aircraft structural geometries. Modeling complex structural geometries can be very challenging because the stress intensity solution may not be known, and a user may not know how to use existing models to closely approximate the best solution. Students will learn how to use the capabilities of AFGROW to create solutions that closely approximate the exact solution for a given geometry. Three examples will be used to show how to

account for load transfer, multiple load cases, and develop loading spectra. Time will also be provided to discuss modeling an example case proposed by the student(s).

Day 4: Advanced AFGROW COM API programming

One of the most powerful capabilities of AFGROW is COM automation. This allows a user to perform tasks with AFGROW that would not be practical with the standard user interface. In this course user will learn to use AFGROW COM interface methods, properties and events to modifying AFGROW model, materials, prediction parameters, beta correction and other AFGROW functions. This training will provide hands-on instruction on AFGROW COM API programming.

Upon successful completion of this course, students will be able to:

- Use COM to control AFGROW and perform repetitive tasks
- Create a different stress intensity factor solution/continued damage model using COM API
- Creating GUI to AFGROW in Excel