

## Updating Old In-House Programs Using Matlab Software

By: Dr. Don McCann

ReGENco recently purchased Matlab software to update older Fortran computer programs. Matlab allowed several Fortran and Excel programs to be incorporated into one condition assessment program with superior graphics and better analyses. Limitations of the old programs were:

- 1) If an input error was made to a Fortran program, a restart was necessary and time was wasted. In addition, the cluster analysis program was limited to 15,000 ultrasonic indications. Multiple runs were necessary if more indications were present, which greatly increased the analysis time,
- 2) There were various plotting limitations of NDE data with Excel, and effective 3-D plotting of cluster flaws was not possible with Fortran,
- 3) Only two bore stress profiles were allowed,
- 4) A total of four separate programs were used for condition assessment of bored rotors, which meant an input error would require several re-analyses and valuable time was lost.

All previous programs have now been combined into one efficient Matlab program that provides powerful plotting features and handles big matrices effectively so there is no limitation as to the number of ultrasonic indications that can be analyzed in one run. Updated items also include:

- 1) Better methods to size cluster flaws. Our old method was improved, and the EPRI method was included as a option,
- 2) Four (4) different plots are now available to decide if the cluster flaws are planar cracks or insignificant volumetric flaws; both 2-D and 3-D plots are produced,
- 3) Any number of bore stress profiles along the length of the rotor can be input in the program,
- 4) The probability of failure is calculated for each flaw, and the total probability of failure for the entire rotor is obtained in an instant,
- 5) Popup windows are used to run everything,
- 6) The program can meaningfully compare and relate the UT clusters with magnetic particle/eddy current indications at the bore surface that was done manually before.

Eventually, all old programs like Fatigue Crack Initiation Program, Creep-Fatigue Crack Growth Program, Stress Analysis Program, etc. will be updated for improved efficiency and effectiveness with Matlab.