

ISG 04-03 Software Summaries

- Normal & Pearson Calculator

This Excel based calculator provides a simple and quick analysis for T90 and T99 minimum values determined by Normal and Pearson methods. The Pearson method is similar to normal analysis with the additional consideration of population skewness. This method should only be used on sample sizes of 100 or more and within a skewness range of -1 to 1. The calculator also determines if the lowest value is an outlier using Bonferoni analysis. To run the calculator, the following information is entered in the input box: mean value, standard deviation, lowest observation, specification minimum (if available), skewness (required for Pearson), sample size, and confidence level for outlier check.



- MMPDS Static Allowables Software – new name MIDAS (MMPDS ISG Design Allowable Software)

This software is used to determine minimum mechanical properties according to MMPDS guidelines using a template for direct analysis and a separate template for indirect analysis. Direct analysis methods of regression, Weibull, Pearson, Non-parametric, and normal can be computed. Regression analysis determines if there is a thickness effect to the data and if there is a good fit to a linear and/or quadratic regression line assuming a normal distribution. If there is a significant thickness effect, but a lack of fit, the program will allow you to override and continue with the regression analysis in spite of the lack of fit. A warning is shown that results should be used with Engineering Judgment. It is helpful to view the data in this way, as sometimes it indicates where the data should be split for non-regression analysis such as Weibull and Pearson. A query function does allow the thickness range to be set for analysis. Weibull and Pearson are used for minimum sample size of 100 with skewness between -1 and 1. Non-parametric analysis is used for very large data sets (minimum of 299 required) which do not fit regression, Weibull, or Pearson methods. Normal analysis is shown for comparison or used for small populations with sample size between 30 and 100. The indirect method is used to determine reduced ratios for secondary properties, such as compression, bearing, and shear.

Multiple data files (of the same type – direct or indirect) may be imported for analysis. Combinability of data may be determined by selecting multiple files and performing the analysis. The Anderson-Darling method is used to determine combinability. The software also shows thickness and population histograms of the data and probability plots for the Weibull and Pearson methods. The analysis results and graphs may be exported or printed.

- Stress-Strain Analysis Tool

This Excel based analysis tool is used for the analysis of stress-strain curves; tensile to yield, tensile full range, compression and compression tangent modulus. The curves are analyzed individually to determine the modulus and Ramberg-Osgood

shape factor. Graphs allow a comparison of the individual curves to determine if there is a thickness effect or orientation effect. Individual curves can be grouped to construct a typical curve. The modulus and yield strength values used for the final curves can either be determined by the analysis or input into the tool. Final curves are constructed in the tool. The data and resulting graphs can be saved in smaller files which can be imported back into the analysis tool. Instructions and a tip sheet are included in the tool.

- **Fastener T90 Calculator Software**

The Fastener T90 Calculator tool is used for the analysis of aerospace fastener joints. Fastener joint allowable design data, contained in chapter 8 of MMPDS, are obtained from the statistical determination of a “T90” design allowable curve. These ultimate and yield design allowable “T90” curves are determined from multiple regression curve-fit models of the fastener test data which, in turn, are adjusted to ensure that the level of confidence of the T90 curve is 95% and is below 90% of the fastener strengths.