

Tie Maintenance and Replacement Planning System *TieLife*

ZETA-TECH's Tie Maintenance and Replacement Planning Model (*TieLife*TM) is an integrated tie life forecasting system that generates tie maintenance and replacement plans for all cross-ties in the system network. *TieLife*TM is an interactive user-friendly WindowsTM application that allows the user to make the most efficient decisions pertaining to tie replacement and maintenance.

*TieLife*TM utilizes statistical and empirical techniques for determining rail degradation based on actual inspection information. *TieLife*TM calculates remaining life of each homogeneous track segment, e.g., each mile; based on current tie condition, past and future traffic history, timber characteristics, tie replacement history, operating environment, etc. Life calculations include both mean (average) tie life and distribution about the mean so as to allow for specific determination of tie replacement requirements, by segment. *TieLife*TM calculates next tie gang due date for each segment and develops a short, medium, and long term maintenance and replacement plan.

The analysis steps utilize tie condition data taken from ZETA-TECH's *TieInspect* tie condition inspection system or from other appropriate tie condition data bases. This data includes poor, marginal and good tie condition together with curvature, track class, and track feature information.

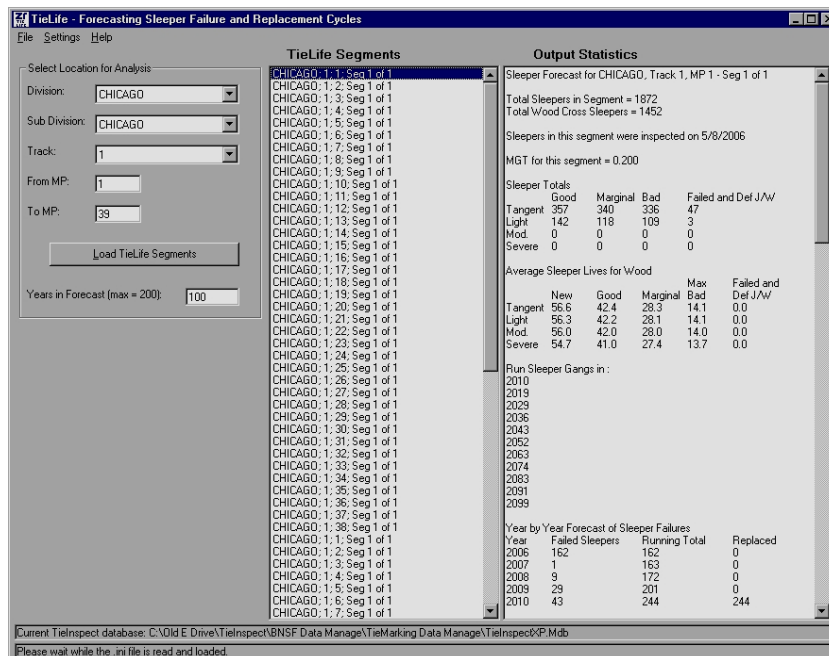
This data is combined with traffic data, track and geographical information to calculate the rate of future tie degradation on a per mile (or other appropriate segment) basis. The actual tie degradation behavior is based on failure distribution behavior as developed by the US Department of Agriculture Forest Products Laboratory. *TieLife* uses this degradation information, in conjunction with its own proprietary tie life model to calculate the rate of tie failure as a function of key track, traffic and

geographic parameters (e.g. climate). Based on these rates, and predefined safety/maintenance thresholds, a forecast tie gang date can be determined for each track segment.

The program allows the user to select track sections to analyze, perform analysis steps, edit analysis parameters, and generate reports. Several data tables are required as input, and the output is stored to separate

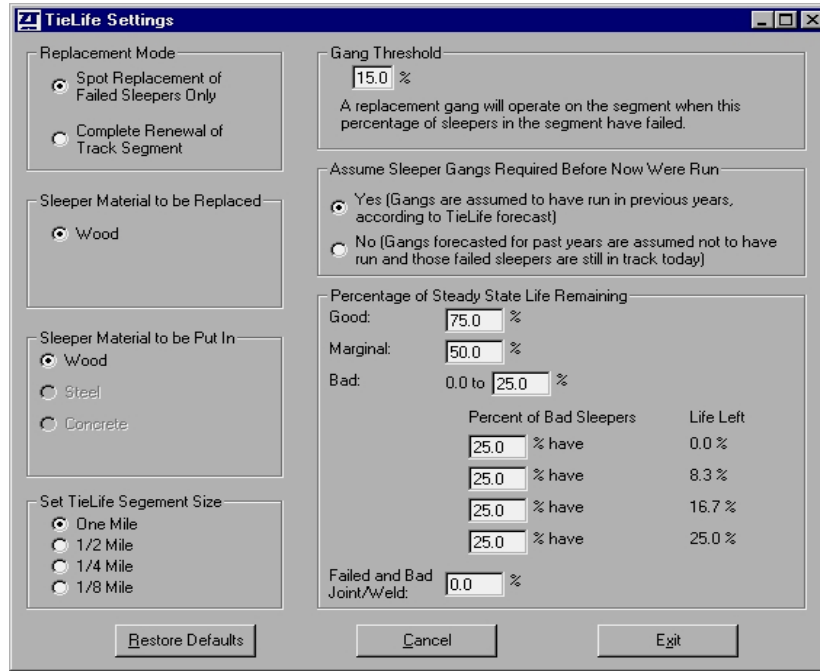
tables for further analysis and reporting. A milepost can be selected, analyzed, and the results dynamically shown as illustrated in the central screen shot.

One of the interesting and unique features of *TieLife*TM is the ability to edit several analysis parameters in order to understand the effects these parameters have on the resulting tie life. An example is the tie replacement thresholds which have a direct impact on tie gang schedules. As can be seen in the graph below, *TieLife*TM generates a mile-by-mile tie gang schedule



based on these user-defined thresholds (see second screen shot). Other reports are available through *TieLife*TM (not shown) including complete tabular

forecast by segment, summary tie requirements by year, and a host of others along with complete query capabilities.



*TieLife*TM generated tie gang schedule

