

# RailTest™

## Ultrasonic Testing Frequency System



### What is RailTest?

The *RailTest* software package, developed by ZETA-TECH Associates, Inc. is a comprehensive ultrasonic testing frequency scheduling program that utilizes actual railroad data to forecast the frequency with which rail segments should be tested ultrasonically. The system makes use of the extensive research performed by the Federal Department of Transportation, Volpe National Transportation Systems Center and ZETA-TECH Associates, Inc.

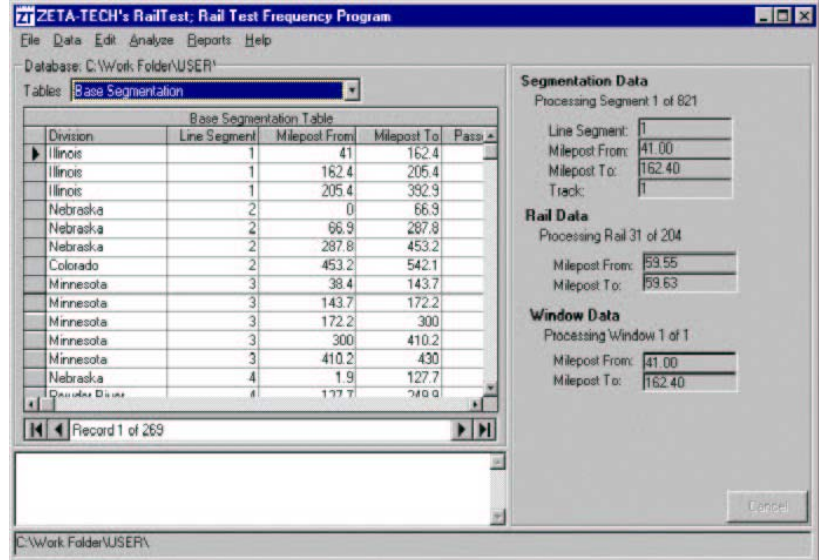
### How Does RailTest Work?

*RailTest* utilizes statistical and empirical techniques for forecasting future rail failure rates, probability of failed defect detection, and growth rates of rail flaws. The test frequency is then determined for a threshold level of risk for each specific track segment based on properties of the track and the maximum desired level of risk. *RailTest* will determine if the current test frequency is too high, too low, or correct for maintaining the target level of risk.

The primary inputs to the system are defect and tonnage history for each section of track for which the test frequency is to be determined. The test frequency for a given segment can be determined based on the defects (service and detected) located on that segment, the tonnage carried over the segment, and the historical test frequency.

### Benefits

- Helps users determine how often to test rail ultrasonically while managing risk of broken rail-caused derailments
- Determines defect development rates based on actual test data and rail defect history
- An ultrasonic testing frequency can be determined for each track segment
- Identifies locations of track with high risk of service defects
- Tool for prioritizing ultrasonic testing and UT resource allocation



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### Features

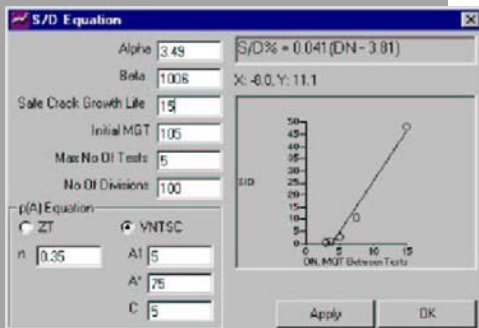
- Easy-to-Use Windows™ application
- Forecasting based on historical rail defects and testing history
- Set site specific target risk levels to manage level of risk on different track segments
- Set defect parameters specific to type of operation:
  - Freight
  - High-speed Passenger
  - Transit
- Determine locations that require more frequent testing to achieve target risk levels
- Determine locations where less frequent testing can be allowed to maintain target risk and allocate resources to higher priority tracks

Using a pre-defined track segmentation file, each segment is processed by locating the defects that have occurred on the segment for a given time frame (typically the last year). Based on a target level of risk (service defects per mile per year), the resulting service and detected defect rates, and the historical test frequency, a forecast test frequency is determined that insures the risk factor is constrained.

*RailTest* allows the user to include only those defect types that are reliably found by ultrasonic testing and therefore control test scheduling. In addition the level of risk and several other parameters can be varied to allow for sensitivity analyses to be performed. A constant segment length can be defined that breaks traditional segments into shorter segments for analysis purposes. This allows the user to obtain a clear picture of defect clusters as they normally occur in track.

*RailTest* is equipped with an easy to operate calculator function (see below) that allows the user to perform an analysis for a particular segment by specifying the length, defect and inspection history, and other track parameters. This option provides the user with immediate results for a segment under analysis. This immediate response allows the user to perform "what if" analyses for better understanding of inspection requirements.

Segment Characteristics		Calculated Results	
Length (mi)	130.6	Test Interval (MGT)	10.5
Annual MGT	8.8	Adjustment Interval (MGT)	2.9
Previous Test Frequency		Calculated Frequency (MGT)	6.7
No. Tests Last Year	3	Recommended Frequency (MGT)	6.7
Test Frequency Last Year, MGT	2.9	Tests Per Year	1.3
Risk (service defects per mile per year)	0.1	Days Between Tests	279
No. Tests Last Year:		Change From Last Year (%)	-129.0%
Defects	5		
Del/Mj	0.00		
Del/Mi/Test	0.00		
Service	5		
Detected	7.5		
Total	8		



Several factors that control defect initiation and growth play a major role in defining inspection frequency. The form shown at left allows the user to edit the parameters that help to define inspection frequency. These factors include safe defect growth life, Weibull parameters, inspection reliability parameters, (with respect to defect size) and a host of others that define the basis for determining inspection requirements.