CLAIMS

1. A system for measuring structural integrity comprising:

a self-contained rapid modal testing trailer that delivers an impact load to a structure being tested and records data resulting from the impact load in a data acquisition program, the testing trailer comprising:

an impact device that delivers the impact load; and

a sensor assembly that extends from the testing trailer to engage the structure.

2. The system of claim 1, wherein the impact device comprises a falling mass that impacts a strike plate to deliver the impact load.

3. The system of claim 2, wherein when the falling mass strikes the impact plate, a rebound control assembly is activated to catch the falling mass from striking the strike plate a second time on a rebound.

4. The system of claim 3, wherein the rebound control assembly comprises a rebound control actuator and a rebound control arm, and upon a hall sensor detecting the falling mass striking the strike plate, the hall sensor communicates this contact to a controller that activates the rebound control actuator, which extends the rebound control arm to catch the falling mass.

5. The system of claim 1, wherein the impact load is adjustable.

6. The system of claim 1, wherein the sensor assembly engages the structure to be measured via a stabilizer foot.

7. The system of claim 6, wherein the sensor assembly extends from the trailer via activation of an actuator.

8. The system of claim 1, wherein the impact device is controlled using a controller.

9. The system of claim 1, wherein the sensor assembly is controlled using a controller.

10. The system of claim 1, wherein the sensor assembly comprises a floating spring loaded accelerometer.

11. The system of claim 1, further comprising data processing software and an automated data quality check to check recorded data records.

12. The system of claim 11, wherein the checking comprises checking for excessive erroneous noise, dropped channels, overloading of the load cells, and/or proper time synchronization of the independent data acquisitions

13. The system of claim 1, wherein the sensor assembly may be extended in multiple directions parallel to the structure before engaging the structure.

14. The system of claim 1, further comprising reference sensors that are synchronized with the data acquisition program and located on the structure at a point of high modal amplitude relative to other locations on the structure.

15. The system of claim 1, wherein the impact device comprises a falling mass that falls along linear guide rails, and upon detection of a rebound of the falling mass after impact on a strike plate, the impact device engages brakes that engage the linear guide rails and stop the falling mass from rebounding into the strike plate.

16. A system for predicting bridge structural parameters comprising:

a graphical user interface that allows a user to access structural forecasting data about a bridge model;

a finite element analysis engine that allows for adjustment of the bridge model based on certain structural parameters; and

a bridge data storage system that retrieves structural data from the bridge model and shares the structural data with the graphical user interface.

17. The system of claim 16, further comprising: a model-experiment correlation module that allows for updating of the bridge model based on boundary conditions, continuity conditions, and material properties.

18. The system of claim 16, further comprising a live load rating module that updates the model with standardized ratings information.

19. The system of claim 16, wherein the graphical user interface allows a user to change the certain structural parameters.

20. The system of claim 16, wherein the graphical user interface allows a user to change geometry of the bridge model.