

A-210

**NATIONAL TRANSPORTATION SAFETY BOARD**  
**WASHINGTON, D.C.**

ISSUED: September 27, 1978

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Forwarded to:

Mr. W. H. Dempsey  
President and Chief Executive Officer  
Association of American Railroads  
1920 L Street, N.W.  
Washington, D.C. 20036

SAFETY RECOMMENDATION(S)

R-78-53

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About 2:10 a.m., on February 24, 1978, 19 cars and a locomotive unit of Auto-Train No. 4 derailed on the Seaboard Coast Line Railroad (SCL) track at Florence, South Carolina. Twenty-four of the 503 passengers were injured. The total accident damage was estimated to be \$774,029. 1/

The accident resulted from a locomotive axle failure which originated from an undetected internal defect that developed during the manufacturing process. The failed axle was part of the traction motor-wheel-axle assembly installed in the No. 2 position on the derailed locomotive unit. Manufactured by Bethlehem Steel Corporation in May 1972 to specifications prescribed by the Association of American Railroads' (AAR) Manual of Standards and Recommended Practices, the axle first was mounted in January 1973 on another Auto-Train Corporation locomotive. The SCL removed the axle twice for reconditioning prior to the accident. Each time, the axle was tested by the magnetic particle method prescribed by the AAR for an axle to be reconditioned, and each time the axle was found to be in acceptable condition. The axle also had been ultrasonically tested by the Bethlehem Steel Corporation at the time of manufacture, as required by the AAR. Ultrasonic testing is used to identify any voids in the axle which may have been produced at the time of manufacture. It is especially effective for detecting voids from which progressive fractures radiate.

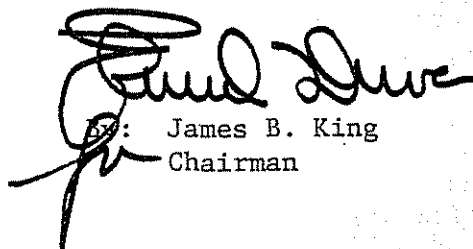
1/ For more detailed information on this accident, read "Railroad Accident Report--Derailment of Auto-Train No. 4 on Seaboard Coast Line Railroad, Florence, South Carolina, February 24, 1978," (NTSB-RAR-78-6). Copies of the report will be available after October 15, 1978.

Postaccident, metallurgical, chemical, and mechanical tests disclosed preexistent cracks and voids in the axle, some of which were produced when the axle was manufactured. Ultrasonic testing could have detected the voids and cracks in the axle had the axle been so tested when it was temporarily removed from service. Instead, the AAR's prescribed magnetic particle method was used, and the flaw remained undetected because the radiating cracks had not yet reached the axle surface.

Since the procedures and test methods currently prescribed by the AAR for use on used locomotive axles failed to detect this defective axle, the Safety Board believes the procedures for testing and inspecting used axles should be amended to require that axles be internally inspected and those with detectable internal defects be removed from service to avoid service failure. Therefore, the National Transportation Safety Board recommends that the Association of American Railroads:

Amend the procedures for testing and inspecting used locomotive unit axles before they are remounted to insure that internal defects can be detected. (Class II, Priority Action) (R-78-53)

KING, Chairman, McADAMS, HOGUE, and DRIVER, Members, concurred in the above recommendation.

  
Signature: James B. King  
Chairman