



DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

49 CFR Part 232

[Docket No. FRA-2025-0127]

RIN 2130-AD51

Permitting Use of Computer-Based, Three-Dimensional Simulation for Periodic Refresher Training on Brake Systems

AGENCY: Federal Railroad Administration (FRA), Department of Transportation (DOT).

ACTION: Final rule.

SUMMARY: This rule permits railroads to use a simulation that is instructor-led, computer-based, and three-dimensional (3D) to satisfy the hands-on portion of periodic refresher training under FRA's brake system training requirements, consistent with waivers FRA has granted to date. This computer-based 3D simulation training can provide employees with randomized scenarios that may not be readily available for hands-on training and facilitate real-time feedback on performance of duties.

DATES: This rule is effective [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

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SUPPLEMENTARY INFORMATION:

I. Background

Consistent with Executive Order (E.O.) 14192, *Unleashing Prosperity Through Deregulation* (90 FR 9065, Feb. 6, 2025), and E.O. 14219, *Ensuring Lawful Governance and Implementing the President's "Department of Government Efficiency" Deregulatory Initiative* (90 FR 10583, Feb. 25, 2025), FRA is reviewing its regulatory requirements in

49 CFR parts 200 through 299 and updating requirements to reduce unnecessary burdens without compromising transportation safety.

Under 49 CFR part 232, FRA prescribes Federal safety standards for freight and other non-passenger train brake systems and equipment. On July 1, 2025, FRA published a notice of proposed rulemaking (NPRM) that proposed to allow railroads to use “three-dimensional virtual simulation” to satisfy the hands-on portion of periodic refresher training under FRA’s brake system training requirements, consistent with waivers FRA has granted to date. See 90 FR 28667 (July 1, 2025).

During the comment period that closed on September 2, 2025, FRA received comments from the following six entities: the Association of American Railroads (AAR) and the American Short Line and Regional Railroad Association (ASLRRA) (jointly filed);¹ the Brotherhood of Locomotive Engineers and Trainmen, a Division of the Rail Conference of the International Brotherhood of Teamsters (BLET);² the Brotherhood of Railway Carmen Division (BRC) of the Transportation Communications Union;³ the International Association of Sheet Metal, Air, Rail, and Transportation Workers – Transportation Division (SMART-TD);⁴ and the Transportation Trades Department, AFL-CIO (TTD).⁵ For information on those comments, and FRA’s response, please review the **Section-by-Section Analysis** below.

II. Section-by-Section Analysis

Section 232.203 Training Requirements

¹ <https://www.regulations.gov/comment/FRA-2025-0127-0006>.

² <https://www.regulations.gov/comment/FRA-2025-0127-0003>.

³ <https://www.regulations.gov/comment/FRA-2025-0127-0004>.

⁴ <https://www.regulations.gov/comment/FRA-2025-0127-0002>.

⁵ <https://www.regulations.gov/comment/FRA-2025-0127-0005>.

FRA is amending paragraph (b)(8) of this section to permit railroads to use instructor-led, computer-based 3D simulation⁶ to meet the hands-on portion of the periodic refresher training requirement. Such a simulation alone would not be considered sufficient for initial training required by the remainder of this section, which generally requires railroads to adopt and comply with a training, qualification, and designation program for employees who perform brake system inspections, tests, or maintenance. Currently, paragraph (b)(8) of this section specifies, in part, that a railroad's program must require periodic refresher training that includes classroom and hands-on training. Paragraph (b)(8) further provides that observation and evaluation of actual performance of duties may be used to meet the hands-on training requirement.

In the NPRM, FRA proposed amending paragraph (b)(8) specifically to include “three-dimensional virtual simulation” as another way to meet the hands-on refresher training requirement, in addition to observation and evaluation of actual performance of duties.

Generally, BLET, BRC, SMART-TD, and TTD oppose the rule as proposed, with many of them asserting that computer-based training cannot replace real-world, hands-on training and does not support environmental exposure to unpredictable elements, such as weather or physical and sensory inputs.

BLET asserts that even if the proposal promotes consistent training, it does not assure an equivalent level of quality or educational benefit. BLET also expresses a concern that computer-based training may be rushed, either with completion deadlines or under the threat of discipline, which could lead to a lack of understanding and retention. BLET notes that one Class I railroad did not continually provide feedback during the

⁶ FRA is transitioning from the use of “3D *virtual* simulation” to “*computer-based* 3D simulation” in this final rule. “Virtual” may be perceived to mean only the higher fidelity immersive virtual reality simulations that require use of head mounted displays and hand controllers, and may exclude the lower fidelity 3D simulations traditionally administered via desktop, laptop, or tablet form. Whereas “computer-based” would be generic enough to include of all 3D simulation types.

computer-based refresher training, but only a final score was generated at the end of the training. When discussing its members' previous experience with computer-based refresher training, BLET underscores the importance of an instructor's involvement throughout the training to ensure, for example, interaction with the instructor and transfer of expertise.

In the final rule, FRA adopts its proposal from the NPRM but clarifies that an instructor qualified under 49 CFR part 232 must lead any three-dimensional simulation under paragraph (b)(8). This approach is generally consistent with waivers FRA has previously granted to several Class I railroads,⁷ and FRA alluded in the NPRM to the fact that an instructor would lead the three-dimensional simulation training. For example, in the NPRM, FRA indicated that one of the benefits of three-dimensional simulation training is it facilitates real-time feedback on an employee's performance of duties. 90 FR 28667-68 (July 1, 2025). FRA agrees with BLET's position that an instructor's active involvement is essential to any computer-based training. In addition, in this final rule, FRA is adding the phrase "computer-based" to reflect better the current simulated training being used in accordance with the referenced waivers.

BLET and BRC state that computer-based training should only complement, not replace, hands-on training. According to BRC, brake system work is inherently physical, and a keyboard and mouse cannot provide the same experience as manipulating and inspecting equipment in person. Moreover, BRC notes that virtual training often generalizes brake system features, thus failing to reflect differences between railroads, and does not usually keep up with updated rail car designs. BRC expresses concerns about new hires with no prior field experience being especially vulnerable and about experienced carmen facing "skill atrophy" through primarily virtual training.

⁷ See Docket Nos. FRA-2011-0074 (BNSF Railway (BNSF)); FRA-2018-0100 (Norfolk Southern Railway (NS)); FRA-2020-0001 (Canadian Pacific Railway (CP)); FRA-2020-0008 (CSX Transportation, Inc. (CSX)); and FRA-2020-0087 (Canadian National Railway (CN)) on <https://www.regulations.gov>.

SMART-TD and TTD also oppose the NPRM and urge that it be rescinded, as railroading is a physical craft, not a virtual exercise. SMART-TD contends that hands-on training is important because the consequences of incorrect brake inspections or maintenance are catastrophic. According to SMART-TD, virtual tools can serve as supplements, not as adequate substitutes. Similarly, TTD asserts that virtual training cannot replicate hands-on training, including factors like weather conditions or physical and sensory inputs, and brake system inspections, tests, and maintenance involve physical work by nature. TTD contends that once virtual training becomes a regulatory standard, the burden will fall on workers to prove why real-world training remains necessary.

In their joint comments on the NPRM, AAR and ASLRRA cite to CSX's 2025 petition to renew its waiver, wherein CSX asserted that "attendees have reiterated their approval of exposing students to scenarios and conditions not easily [] replicated in the real world. . . . To date, there have been zero employees who have elected to opt-out of the detailed air brake simulation."⁸ FRA clarifies that computer-based 3D simulation training under paragraph (b)(8) must be as effective as other "hands-on" training methods under paragraph (b)(8). If any employee fails to demonstrate the requisite knowledge or abilities during any simulation method of refresher training, FRA expects that the railroad will supplement the simulation training with other refresher training that, for example, involves "manipulating and inspecting equipment in person,"⁹ as the labor organizations stated may be necessary for certain employees. FRA expects this approach will help ensure a railroad is providing sufficient, effective refresher training under paragraph (b)(8).

⁸ <https://www.regulations.gov/comment/FRA-2025-0127-0006> (quoting <https://www.regulations.gov/document/FRA-2020-0008-0007>).

⁹ See, e.g., <https://www.regulations.gov/comment/FRA-2025-0127-0004>.

AAR and ASLRRA, on behalf of themselves and their member railroads, submitted comments, supporting the rule as proposed and stating that the use of simulation for refresher training is in the public interest and consistent with railroad safety, based on the waivers FRA has granted to date. AAR and ASLRRA assert that such training allows railroads to provide consistent, step-by-step, and content-based tools that can evaluate knowledge regarding a variety of rail cars and situations. AAR and ASLRRA note that virtual training provides opportunities to include situations in a low-stress environment that cannot be easily replicated in a physical environment without exposing employees to potential injuries in an active work setting.

AAR and ASLRRA assert that simulation training is not new to FRA, which has permitted railroads to use locomotive simulators to test knowledge, examine skills, and monitor locomotive engineer performance for purposes of engineer certification since 1991.¹⁰ Also, they flag that virtual simulation training is not unique to railroading, as it is widely used in the aviation, marine, and trucking sectors.¹¹

AAR and ASLRRA contend that the feedback for railroads' virtual simulation training programs has been "almost uniformly positive across the railroads," evidenced by the experience of some employees expressing more comfort in asking questions and by the receipt of positive feedback, including via exit surveys. Specifically, employee trainees have reported in their exit surveys to railroads, following such training, that they viewed the simulation experience favorably over the traditional means of demonstrating proficiency. Those survey results also indicate that the current and incoming generation

¹⁰ See 56 FR 28254 (June 19, 1991).

¹¹ See, e.g., Federal Aviation Administration, *FAA Continues Rollout of Tower Simulation Systems to Improve Controller Training* (May 13, 2025), available at <https://www.faa.gov/newsroom/faa-continues-rollout-tower-simulation-systems-improve-controller-training> (The Tower Simulation Systems "allow controllers to train for complex airport configurations, develop scenarios that address safety trends, practice runway crossing coordination and rehearse phraseology").

of railroad employees connect easily with digital technology and willingly embrace simulations to reinforce existing skills.

FRA's final rule is generally consistent with waivers FRA has granted to several Class I freight railroads to use computer-based 3D simulation to meet the hands-on refresher training requirement.¹² FRA first granted this relief in 2012 in a waiver allowing BNSF to use web- and desktop-based three-dimensional virtual simulation software, called the Air Brake System Virtual Training Environment (ABSVTE), to satisfy the hands-on portion of the periodic refresher training requirement for train, yard, and engine service employees.¹³ Since that time, BNSF reports having provided such virtual refresher training using ABSVTE in over 72,000 training events, representing training provided to over 25,000 employees.

The data collected from that experience, and recent FRA research and analysis, show that the relief as proposed would be consistent with railroad safety and benefit the public interest.¹⁴ FRA has found that web-based or low-fidelity simulated brake system refresher training effectively encourages knowledge retention, skill transfers, and performance outcomes. Computer-based 3D training also provides students with randomized scenarios that may not be readily available for hands-on training, as well as real-time performance feedback. Computer-based 3D training may also be more consistently applied to all employees and help reduce the risk of hazards or potential injury that may happen in a field training setting. FRA believes that, while the labor organizations raise worthy concerns, this final rule's limitation to refresher training provides adequate mitigation.

¹² See Docket Nos. FRA-2011-0074, FRA-2018-0100, FRA-2020-0001, FRA-2020-0008, and FRA-2020-0087 on <https://www.regulations.gov>.

¹³ See Letter from FRA to BNSF (Jan. 20, 2012), available at <https://www.regulations.gov/document/FRA-2011-0074-0011>.

¹⁴ See, e.g., Federal Railroad Administration, *Web-based Simulator Training and Skill Transfer: Literature Review* (April 2025), available at https://railroads.dot.gov/sites/fra.dot.gov/files/2025-04/Literature%20Review%20-%20Web%20Simulator%20and%20Training_0.pdf.

Different types of freight equipment move across the nation's rail network, freely interchangeable between railroads. As a result, FRA has found that instructor-led, computer-based 3D simulation provides employees with randomized scenarios on equipment types that may not otherwise be readily available for hands-on training, as well as allows for real-time feedback on employee performance of duties. Computer-based 3D simulation training may also provide for more consistent training across employees and reduce the risk of hazards or potential injury that may occur in a field training setting.

FRA notes that the existing data, including those under a more expanded inclusion of accident cause codes, show a downward trend across most critical safety metrics, including air brake-related accidents and incidents. For instance, operational test data provided by BNSF is consistent with the smaller sample size of data to which FRA had access. Notwithstanding the fact that BNSF used a narrower scope of search criteria that resulted in a slightly more positive accident outcome, FRA finds that the data still indicate safety improvement. Moreover, FRA's accident analysis shows significant improvement when compared to pre-waiver statistics.

In their joint comments, AAR and ASLRRA explain that since the railroads have implemented their simulation training programs, at least one Class I railroad has noted a reduction in certification revocations and brake testing failures. More specifically, AAR and ASLRRA claim the last decade was the safest on record, with virtual simulation being one tool driving accident and employee injury rates down.¹⁵

Accordingly, FRA amends § 232.203(b)(8) as proposed to provide railroads the flexibility to use instructor-led, computer-based 3D simulation to meet the hands-on refresher training requirement.

¹⁵ <https://www.regulations.gov/comment/FRA-2025-0127-0006>.

III. Regulatory Impact and Notices

A. Executive Order 12866 (Regulatory Planning and Review) and DOT Regulatory Policies and Procedures

FRA has considered the impact of this final rule under E.O. 12866 (58 FR 51735, Oct. 4, 1993), *Regulatory Planning and Review*, and DOT Regulatory Policies and Procedures.¹⁶ The Office of Information and Regulatory Affairs within Office of Management and Budget (OMB) determined that this final rule is not a significant regulatory action under section 3(f) of E.O. 12866. FRA is amending section 232.203(b)(8) to permit railroads to use computer-based 3D simulation to meet the hands-on refresher training requirement for employees who perform brake system inspections, tests, or maintenance.

FRA analyzed the costs and benefits of this final rule, which allows railroads to use computer-based 3D simulation to satisfy the hands-on portion of periodic refresher training for employees who perform brake system inspections, tests, or maintenance. This final rule provides some qualitative benefits as it enables training to become more consistent across employees, provides an alternative method to satisfy the hands-on portion of the periodic refresher training requirement, reduces the risk of potential hazards or injury that may occur in a field training environment, and facilitates real-time feedback on performance of duties. This final rule will result in cost savings for both the railroads and the Government. Through the elimination of submitting waiver requests, railroads will no longer have to allocate time to complete and submit such requests. Railroads will no longer be required to submit waiver requests to be able to use computer-based 3D simulation for hands-on training under section 232.203(b)(8). In

¹⁶ 49 CFR part 5; *see also* DOT Order 2100.6B, Policies and Procedures for Rulemakings, available at <https://www.transportation.gov/regulations/dot-order-21006b-policies-and-procedures-rulemakings>; DOT Order 2100.7, Ensuring Reliance Upon Sound Economic Analysis in Department of Transportation Policies, Programs, and Activities, available at <https://www.transportation.gov/mission/ensuring-reliance-upon-sound-economic-analysis-department-transportation-policies-programs>.

addition, the Government will no longer have to allocate the resources to process these waivers. Moreover, all railroads, not just those granted a waiver, will have the flexibility to use computer-based 3D simulation to satisfy the hands-on portion of the periodic refresher training requirement.

B. E.O. 14192 (Unleashing Prosperity Through Deregulation)

E.O. 14192, *Unleashing Prosperity Through Deregulation*, requires that for “each new [E.O. 14192 regulatory action] issued, at least ten prior regulations be identified for elimination.”¹⁷ Implementation guidance for E.O. 14192 issued by OMB (Memorandum M-25-20, March 26, 2025) defines two different types of E.O. 14192 actions: an E.O. 14192 deregulatory action, and an E.O. 14192 regulatory action.¹⁸

An E.O. 14192 deregulatory action is defined as “an action that has been finalized and has total costs less than zero.” This final rule is expected to have total costs less than zero, and therefore, it is considered an E.O. 14192 deregulatory action upon issuance of this final rule.

C. Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601, *et seq.*) as amended by the Small Business Regulatory Enforcement Fairness Act of 1996,¹⁹ requires Federal agencies to consider the effects of the regulatory action on small businesses and other small entities and to minimize any significant economic impact. Accordingly, DOT policy requires an analysis of the impact of all regulations on small entities, and mandates that agencies strive to lessen any adverse effects on these businesses. The term “small entities” comprises small businesses and not-for-profit organizations that are independently owned

¹⁷ Executive Office of the President, *Executive Order 14192 of January 31, 2025, Unleashing Prosperity Through Deregulation* 90 FR 9065–9067 (Feb. 6, 2025).

¹⁸ Executive Office of the President, Office of Management and Budget. Guidance Implementing Section 3 of Executive Order 14192, Titled “Unleashing Prosperity Through Deregulation,” Memorandum M-25-20 (Mar. 26, 2025).

¹⁹ Pub. L. No. 104–121, 110 Stat. 857 (Mar. 29, 1996).

and operated and are not dominant in their fields, and governmental jurisdictions with populations of less than 50,000 (5 U.S.C. 601(6)). No regulatory flexibility analysis is required, however, if the head of an Agency or an appropriate designee certifies that the rule will not have a significant economic impact on a substantial number of small entities. The regulatory relief provided by this rule will result in cost savings for many regulated entities, including small entities. Consequently, FRA certifies that this final rule will not have a significant economic impact on a substantial number of small entities.

D. Paperwork Reduction Act

This final rule offers regulatory flexibilities, and it does not impose any new information collection requirements or modify any existing information collection requirements. Therefore, an information collection submission to OMB is not required under the Paperwork Reduction Act of 1995, 44 U.S.C. 3501, *et seq.*

E. Environmental Assessment

FRA has analyzed this rule for the purposes of the National Environmental Policy Act of 1969 (NEPA). In accordance with 42 U.S.C. 4336 and DOT NEPA Order 5610.1D, FRA has determined that this rule is categorically excluded pursuant to 23 CFR 771.116(c)(15). This rulemaking is not anticipated to result in any environmental impacts, and there are no unusual or extraordinary circumstances present in connection with this rulemaking.

F. Federalism Implications

This final rule will not have a substantial effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Thus, in accordance with E.O. 13132, *Federalism* (64 FR 43255, Aug. 10, 1999), preparation of a Federalism Assessment is not warranted.

G. Unfunded Mandates Reform Act of 1995

This final rule will not result in the expenditure, in the aggregate, of \$100,000,000 or more, adjusted for inflation, in any one year by State, local, or Indian Tribal Governments, or the private sector. Thus, consistent with section 202 of the Unfunded Mandates Reform Act of 1995 (Pub. L. No. 104–4, 2 U.S.C. 1532), FRA is not required to prepare a written statement detailing the effect of such an expenditure.

H. Energy Impact

E.O. 13211, *Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use* (66 FR 28355, May 22, 2001), requires Federal agencies to prepare a Statement of Energy Effects for any “significant energy action.”²⁰ FRA has evaluated this final rule in accordance with E.O. 13211 and determined that this final rule is not a “significant energy action” within the meaning of E.O. 13211.

I. E.O. 13175 (Tribal Consultation)

FRA has evaluated this final rule in accordance with the principles and criteria contained in E.O. 13175, *Consultation and Coordination with Indian Tribal Governments* (65 FR 67249, Nov. 6, 2000). The final rule will not have a substantial direct effect on one or more Indian tribes, will not impose substantial direct compliance costs on Indian Tribal Governments, and will not preempt tribal laws. Therefore, the funding and consultation requirements of E.O. 13175 do not apply, and a tribal summary impact statement is not required.

J. International Trade Impact Assessment

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international

²⁰ 66 FR 28355 (May 22, 2001).

standards and, where appropriate, that they be the basis for U.S. standards. This final rule is purely domestic in nature and is not expected to affect trade opportunities for U.S. firms doing business overseas or for foreign firms doing business in the United States.

List of Subjects in 49 CFR Part 232

Penalties, Railroad safety, Reporting and recordkeeping requirements.

The Final Rule

For the reasons discussed in the preamble, FRA amends part 232 of chapter II, subtitle B of title 49, Code of Federal Regulations as follows:

PART 232—BRAKE SYSTEM SAFETY STANDARDS FOR FREIGHT AND OTHER NON-PASSENGER TRAINS AND EQUIPMENT; END-OF-TRAIN DEVICES

1. The authority citation for part 232 continues to read as follows:

Authority: 49 U.S.C. 20102-20103, 20107, 20133, 20141, 20301-20303, 20306, 21301-20302, 21304; 28 U.S.C. 2461 note; and 49 CFR 1.89.

2. Amend § 232.203 by revising the second sentence of paragraph (b)(8) to read as follows:

§ 232.203 Training requirements.

* * * * *

(b) * * *

(8) * * * Observation and evaluation of actual performance of duties, or a simulation that is instructor-led, computer-based, and three-dimensional, may be used to meet the “hands-on” portion of this requirement, provided that such testing or training is documented as required in paragraph (e) of this section; and

* * * * *

Issued in Washington, D.C., under authority delegated in 49 CFR 1.89.

David A. Fink,

Administrator.

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