

KAVACH

Automatic Train Protection System to boost safety in train operations; achieve Zero Accidents

(Ministry of Railways)

March 14, 2022

Introduction

KAVACH is a state-of-the-art electronic system which was designed to help the Indian Railways achieve Zero Accidents.¹ It is an Automatic Train Protection (ATP) system which has been indigenously developed by Research Design and Standards Organisation (RDSO) in collaboration with Indian industry with trials facilitated by South Central Railway to achieve the corporate objective of safety in train operations across Indian Railways. It activates the train braking system automatically if the driver fails to control the train as per the speed restrictions. In addition, it prevents collision between two Locomotives equipped with a functional KAVACH system.

It is a Safety Integrity Level 4 (SIL-4) certified technology with the probability of error being one in 10,000 years.² Once

implemented, KAVACH will be the world's cheapest automatic train collision protection system, costing 50 lakh rupees per kilometre to operate compared to about two crore rupees worldwide. It also opens avenues of export of this indigenous technology for Railways.³



[Successful Trial of KAVACH](#)⁴

¹ <https://newsonair.gov.in/News?title=Indigenous-anti-collision-system-%26%2339%3BKavach%26%2339%3B-to-avoid-rail-accidents-successfully-tested-by-Indian-Railways&id=436596>

² <https://pib.gov.in/PressReleaseDetailm.aspx?PRID=1802968#:~:text=KAVACH%20is%20meant%20to%20provide,as%20per%20the%20speed%20restrictions.>

³ <https://newsonair.gov.in/News?title=Indigenous-anti-collision-system-%26%2339%3BKavach%26%2339%3B-to-avoid-rail-accidents-successfully-tested-by-Indian-Railways&id=436596>

⁴ <https://newsonair.gov.in/News?title=Indigenous-anti-collision-system-%26%2339%3BKavach%26%2339%3B-to-avoid-rail-accidents-successfully-tested-by-Indian-Railways&id=436596>

On 4 March 2022, the successful trial of KAVACH was conducted between Gullaguda – Chitgidda Railway stations of South Central Railway. Shri Ashwini Vaishnaw, Union Minister of Railways, Communication and Electronics & Information Technology inspected the trial, during which a Head-on-collision situation was created with two locomotives

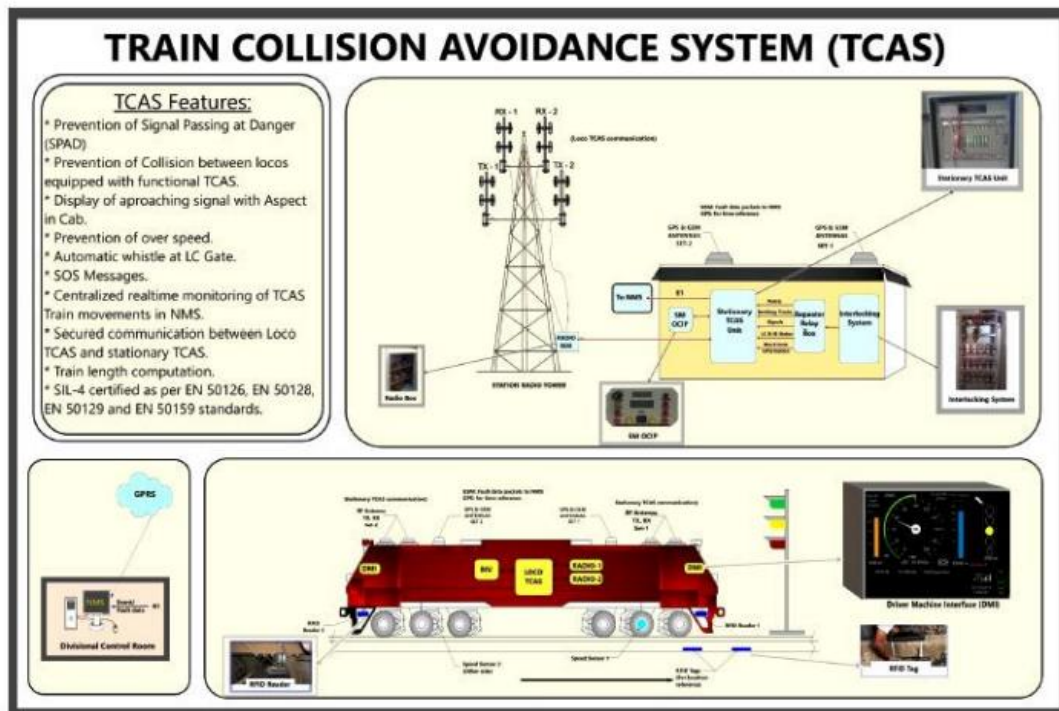


moving towards each other. The KAVACH system initiated the automatic braking system and halted the locomotives 380 metres apart. ⁵Crossing of the red signal was also tested wherein the locomotive did not cross the red signal as KAVACH necessitated the application of brakes automatically. Automatic whistle sound was loud and clear when gate signal approached. Further, KAVACH automatically reduced the speed to 30 Km/h from 60 Km/h as the locomotive entered the loop line.

Features of KAVACH⁶

- Prevention of Signal Passing at Danger (SPAD)
- Continuous update of Movement Authority with display of signal aspects in Driver Machine Interface (DMI) / Loco Pilot operation cum Indication Panel (LPOCIP)
- Automatic Braking for Prevention of Over Speeding
- Auto Whistling while approaching Level Crossing Gates
- Prevention of collision between two Locomotives equipped with functional KAVACH
- SoS Messages during emergency situations
- Centralized live monitoring of Train movements through Network Monitor System.

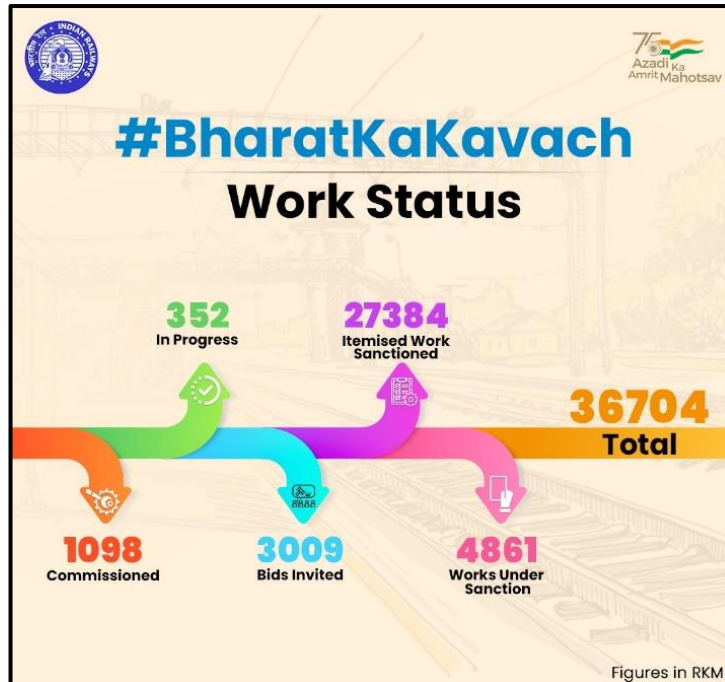
Further details on Train Collision Avoidance System (TCAS) can be found [here](#).



KAVACH Deployment Strategy of Indian Railways:⁷

- As a part of the efforts to strengthen Aatmanirbhar Bharat, Indian Railways is planning to implement KAVACH protection system to an extent of **2000 Kms during 2022-23. Around 34,000 Kms of network will be brought under KAVACH.**
- 96 per cent of railway Traffic is carried on Indian Railway High Density Network and Highly Used Network routes. To transport this traffic safely, KAVACH works are being taken up in a focused manner as per following priority set by the Railway Board.
 - **First Priority:** High Density Routes and on New Delhi - Mumbai & New Delhi - Howrah Sections for 160 Km/h with Automatic Block Signaling & Centralized Traffic Control, since such sections have higher chances of human errors on part of drivers as trains run closer to each other.
 - **Second Priority:** On the Highly Used Networks with Automatic Block Signaling & Centralized Traffic Control.
 - **Third Priority:** On other Passenger High Density Routes with Automatic Block Signaling.
 - **Fourth Priority:** All other routes.
- The system will be further extended to an additional 4,000 to 5,000 Kms from next financial year.
- 4G spectrum has been allocated to Indian Railways which will assist in further improving the reliability of train operations.

⁷ <https://pib.gov.in/PressReleaselframePage.aspx?PRID=1802968>



- During the development phase, KAVACH was implemented for a length of 264 Kms covering 25 stations across Wadi – Vikarabad – Sanath Nagar and Vikarabad – Bidar sections over South Central Railway. Later, the system has been further extended by additional 936 kms, taking the cumulative deployment of Kavach to 1,200 kms.⁸

References

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Twitter

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AG/HP/RC/AR/DG