

“All the countermeasures to the major noise sources have been taken so to further lowering *Shinkansen* noise will require comprehensive measures involving the entire trainset,” says Takeshi Kurita, Manager at the Advanced Railway System Development Center. Some of the major sources of *Shinkansen* noise include the overhead pantograph, a device that conducts electricity from the overhead electric line to power a train, and the front part of the train. The vastly simplified design of the current pantograph is the result of a series of development efforts. In the future it will be necessary to develop comprehensive countermeasures including the pantograph with even better noise-reduction property.

The objective of achieving speeds of 360 km/h and making the “world’s fastest train” is to shorten travel time and enhance its competitiveness against airlines. Noise is, however, a major obstacle in the road ahead. Raising speeds of the current *Shinkansen* trains to 360 km/h will raise the noise level by 6 decibels, which means quadrupling of the sound energy.

As a first step, sophisticated measuring equipment has been specially developed to identify noise sources. One of these devices is the Spiral Array Microphone. Consisting of 114 microphones placed in a spiral arrangement on a 4-meter diameter circular frame, it can measure and map out on a sound source map how much noise the specific train components generate.

Measuring results have yielded a number of countermeasures, such as the use of a sound insulating board on the pantograph contact surface. Other measures include reducing the number of pantographs from two to one per trainset and covering the lower railcar sections with noise-absorbing panels to prevent noise reflected off the soundproof walls from bouncing back.

Results of the test runs conducted between March to

▶ Setting up a Spiral Array Microphone and other preparations to enable noise measurements during test runs.



▶ Single pantograph trainsets require the technology to ensure constant contact between the overhead line and pantographs.

For a Faster Yet Quieter *Shinkansen*

JR East is now in the process of developing a *Shinkansen* train with the speed of 360 km per hour. But higher speeds entailing greater noise are not an option. The efforts of the project team continue.



Takeshi Kurita

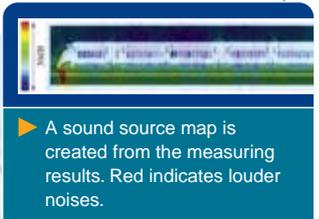
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“Environmental conservation along railway lines is the key to higher *Shinkansen* speeds. It is a complex technical issue but one that is worth the challenge.”

April 2003 showed that we were able to meet the targeted noise levels. Kurita says with quiet confidence that JR East is steadily approaching its goal. By 2005, a prototype train capable of commercial operation at 360 km/h will be ready. This will be another step towards the world’s fastest, but quiet, *Shinkansen* train.



▶ A Spiral Array Microphone developed for precisely measuring noise sources; it received The Technology Development Award for 2004 from the Acoustical Society of Japan.



▶ A sound source map is created from the measuring results. Red indicates louder noises.

▶ Development of a 360 km/h *Shinkansen*, the world’s fastest train, is underway.