



# JRI news release

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To all concerned,

SUMITOMO RUBBER INDUSTRIES, LTD.  
The Japan Research Institute, Limited.

Simplified FEM Tire model, 'Virtual Digitire', born from Digitire technology  
~ Jointly developed by SUMITOMO RUBBER INDUSTRIES, LTD. and The Japan

Research Institute, Ltd. ~

SUMITOMO RUBBER INDUSTRIES, LTD. (Head Office: 3-6-9 Wakahama-cho, Chuo-ku, Kobe, Hyogo Prefecture, President: Mitsuaki Asai, hereinafter referred to as Sumitomo Rubber) and The Japan Research Institute, Ltd. (Head Office: 16 Ichiban-cho, Chiyoda-ku, Tokyo, President: Masahiko Koido, hereinafter referred to as Japan Research Institute) have jointly developed FEM (finite element method) tire model that could be used in car running durability analysis and released the software through Japan Research Institute. Due to its association with Sumitomo Rubber's tire design base technology (simulation technology), 'Digitire', this new FEM tire model has been named 'Virtual Digitire'.

## 1. Virtual Digitire development details

The automobile running durability analysis and fatigue longevity analysis require an accurate input of road load and a high-precision tire model is necessary. However, tires are composed from several composite materials and an FEM model that considers all tire design factors will have tens to hundreds of thousands of elements making it a very big model. To apply this to the entire automobile would necessitate an enormous calculation, which was not practical in the past.

Sumitomo Rubber and Japan Research Institute have succeeded in developing an FEM tire model (patent currently applied for) that has the required precision by combining the tire model that was simplified in 1999 with various test data. Using that as a base, this time the 'Virtual Digitire' has been developed as a simplified FEM tire model.

## 2. Features of Virtual Digitire

1. This tire model works on finite element method general-purpose software 'LS-DYNA' (LSTC, USA), which is generally used for vehicle crash analysis etc.
2. With an assumption of passenger cars in the 1500cc to 4000cc class, it has a separate individual software line-up for tires of 25 sizes, from 165/80R13 to 245/70R16. The reason why so many sizes were prepared for is that with difference in tire sizes the interior structure varies, and strength and response performance also vary. So, it is necessary to prepare a model for each different size.
3. Automobile manufacturers and chassis parts manufacturers, who are tire users, previously relied on tests and measurements to input road load. It will now become possible for them to input directly by incorporating 'Virtual Digitire' into the full car body model and suspension-parts models during CAE (computer aided

engineering). As a result of the expansion in application areas for CAE, due to introduction of 'Virtual Digitire', it is expected that automobile related product design speed will accelerate and precision will improve.

### **3. Future developments**

Sumitomo Rubber and Japan Research Institute have plans for positive enterprise development to ensure popularization of the 'Virtual Digitire' series. In future they would develop it into a tire model capable of predicting the automobile's movement performance, vibrations, ride comfort etc. also.

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