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News Story from: **IIC Innovative Imaging Corp**

Edited by the Engineeringtalk Editorial Team on **30 September 2005**

Cross-link density of rubber is measured easily

Using the IIC magnetic resonance cross-link density spectrometer (MR-CDS) 3500-D, measurements of physical and chemical cross-link density for all types of rubbers can be performed automatically.

Note: Readers of the Editor's **free** email newsletter will have read this news the week it was announced.

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Using the IIC magnetic resonance cross-link density spectrometer (MR-CDS) 3500-D, measurements of physical and chemical cross-link density for all types of rubbers can be performed in full automation mode within typically 3 to 15 minutes, with a standard deviation of less than 3%. Cross-link density, and the type of cross-linking, are major parameters that

are used to determine the mechanical and ageing properties of technical rubbers. Imperfect curing of rubber may lead to a cross-link density inhomogeneity and consequently, to variations of the quality of the rubber product, or even makes it unusable.

Additionally, mechanical, thermal or oxidative ageing processes may cause local changes of the cross-link density, and lead in the advanced state to chemical degradation of the network structure.

To improve the constant quality of elastomer products, to support the manufacturer of rubber products in reducing costs caused by loss through waste the recently introduced fully digital low-cost and compact magnetic resonance system with dedicated features for [quality control](#) and [quality assurance](#) in rubber testing is particularly suitable for routine online quality tests, but also for R and D purposes.

When using the system, no chemical sample preparation is required - samples are measured in native state.

Additionally, NMR relaxation parameters such as T1, T2 or T1ρ can be determined and used for a more detailed characterisation of the mobility of the elastomer network, for example, filler-matrix interactions, ageing processes, oils and other organic compounds typically found in rubbers.

Quick and accurate information on curing performance, chemical and physical cross-link density (XLD) and its inhomogeneities can be obtained.

Simultaneous XLD measurements during the vulcanisation process may provide a new insight into rubber curing and will contribute to the optimisation of rubber processing parameters.

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