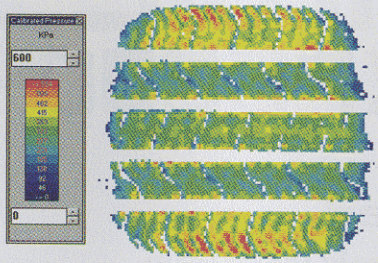
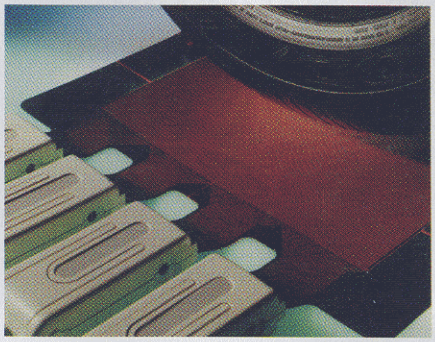
by Charlie Malacaria, **Tekscan**

Making no mark

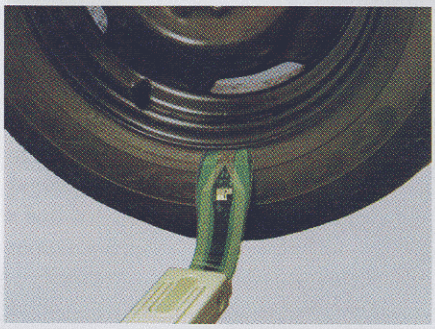
Why fiddle with ink when digital footprints can be accurately recorded?



Typical footprint reading for a passenger car tire



All users need to do to obtain a tire contact footprint reading is drive over the pressure-sensitive mat



Tekscan also offers the I-Scan for tire bead sensing

Even today, measurement of a tire's contact footprint remains a relatively unsophisticated affair. All too often, tire technologists rely on archaic methods: painting a section of a tire with ink and then pressing the tire against a piece of paper mounted on a metal plate.

Another method – very precise but also very time-consuming – uses multiple, miniature load cells or pressure transducers, typically embedded into a metal plate and installed in a line transverse to the direction of tire travel.

Tekscan's TireScan™ takes a different approach. It is a complete tire pressure measurement and analysis system that includes data acquisition electronics, system calibration equipment, data display and analysis software, and thin, pressure-sensitive mats (sensors) of various sizes and spatial resolutions. It combines these components into a robust, easy-to-use, very accurate, PC-based system for taking dynamic tire footprints. Implementation requires no modification to the test environment.

The patented pressure-sensitive mats are the heart of the TireScan system. Using a manufacturing process similar to that for making printed circuit boards, Tekscan prints patented, semi-conductive inks on to a dimensionally stable polyimide substrate as a multi-layered array of thousands of precisely spaced, densely packed rows and columns. The printed sensing mat is very thin (0.1mm) and durable. The intersection of these rows and columns forms the sensing element, or pixel, the resistance of which changes in proportion to the force applied to it. The sensing element's performance is very repeatable. Since the response time of each element is also very fast (ca. 18µs) and the electronics can scan the sensing mat so rapidly (ca. 1,000,000 sensing elements/s), the system can capture multiple, dynamic, high-resolution pressure images of a tire as it rolls across the surface of the mat. The system offers an unmatched ability to deliver instantly to the PC screen a vividly colored, easy-to-understand, dynamic pressure movie of a rolling tire footprint. The TireScan software enables the user to then conduct very sophisticated image analysis of the footprint as well as compare the image to other footprint data.

Clarity and accuracy are hallmarks of the system. Its modular construction and portability also offers great versatility. As no infrastructure preparation is required to begin using the system, TireScan can be used in virtually any environment. The sensors and electronics can be mounted on a tire rolling machine or metal plate in minutes. The system can also be taken to a remote location and the sensors placed on a road surface or garage floor, or even buried. Then, simply drive over to take a pressure measurement.

Originally developed in cooperation with a major tire manufacturer, TireScan is now available to the wider tire, wheel, suspension, transportation and road surface industries. It is rapidly becoming an industry standard tool for measuring and analyzing tire pressure patterns.

The footprint sensors come in various spatial resolutions and sizes. A commonly used sensor for measuring passenger and truck tires is 294x270mm, with 1.5mm sensing element spacing. Another is 406x406mm with 1.3mm sensing element spacing. These sensors contain approximately 34,000 and 100,000 individual sensing elements respectively.

A more 'general-purpose' Tekscan pressure measurement system, I-Scan®, works with dozens of differently shaped sensors, some specifically designed for tire applications. One is the tire bead seat and seal application, for which Tekscan makes several sizes of paper-thin, flexible sensors designed to fit passenger, truck, aircraft, and large off-road tire beads. Sensors are placed between the wheel and the tire. The ultra-thin, flexible nature of the Tekscan sensors enables them to readily conform to curves and bends and their minimal intrusion is a major advantage. The I-Scan system records and plots the resulting contact pressure profile under various dynamic conditions. For more, visit www.tekscan.com. ***tire***