Testing the spring force of hose-bands used in the car industry

by Martyn Young

Japanese car makers have long since realized the benefits of using spring-type hose-bands instead of the screw-clamp versions for hose connections. The main advantages in using the spring-type hose-bands are:

- spring hose-bands are cheaper to produce than the screw types,
- spring types are easier and therefore less expensive to fit,
- due to the spring formation, spring types provide more even distribution of force and are less likely to lead to leaks in the hose joint,
- the spring type maintains its clamping force over time as the hose ages and relaxes.

To gain acceptance among European manufacturers it is important that the correct measurements are made in the development and quality testing of the hose-bands. **Figure 1a** shows the spring-type hose-band which is to be tested. The band relies on simple spring pressure to give a leak-proof seal on the hose joint. The special shape of the component provides a near uniform spring pressure around its complete circumference. A comparison of the clamping forces for the normal screw-type hose-band and the spring type is shown in **Fig. 1b.It** can be seen that the spring type produces a much more uniform distribution of clamping force.

The rig consists of a three-jaw chuck with a U2A Force Transducer and a spigot mounted on each jaw. The force transducers are connected to a UPM 100 Multipoint Measuring Unit which in turn is connected on-line to an Apple Macintosh computer running the BEAM Evaluation Software. This system is shown in **Fig. 2.**

The test procedure is very simple in that the appropriate setting ring is used to set the initial nominal diameter

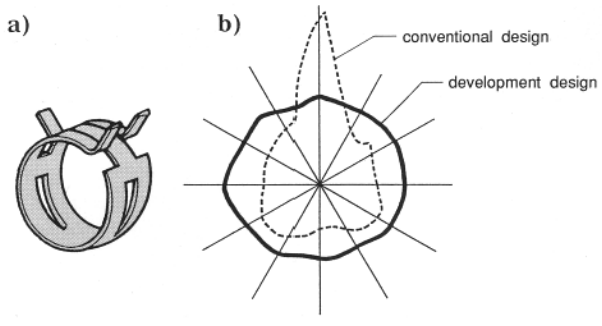

Fig. 1: The special shape of the hose-band produces an almost uniform force distribution

a) formed hose-band
b) force distribution compared with a screw-type hoseband.

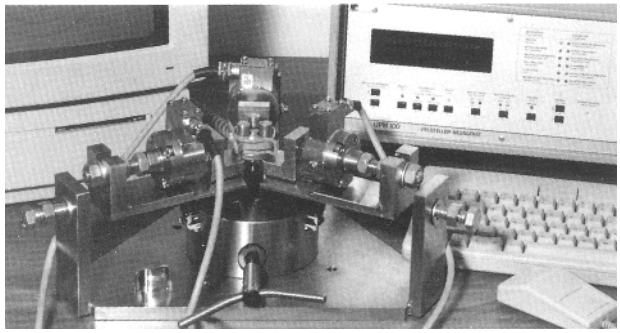

Fig. 2: The complete measuring system showing the lathe chuck with mounted U2A Force Transducers, the UPM100 Multipoint Measuring Unit and the Apple Macintosh computer.

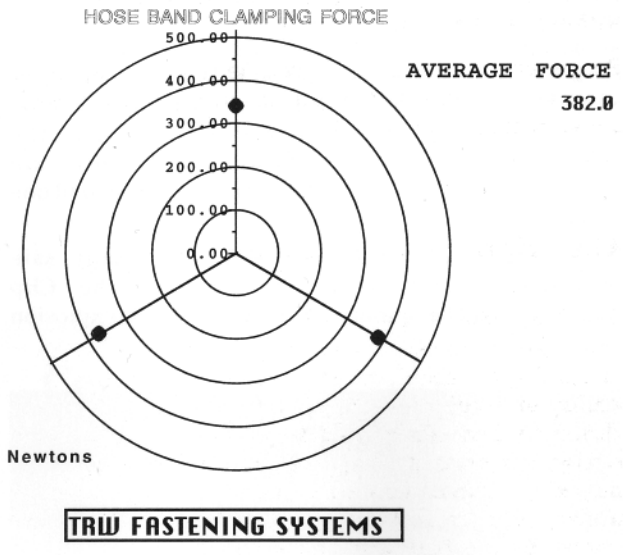

Fig. 3: Typical radial plot of the forces as displayed using the BEAM Evaluation Software.

and the hose-band is mounted in the rig. The seating of the hose-band is checked by manual adjustment and then the diameter of the band is increased using the chuck until the specified diameter of 42.8 mm (1.7 in) is reached, as measured with vernier calipers. A reading is then taken from the three force transducers and plotted out on the computer monitor. A typical set of results is shown in **Fig. 3**. This very simple test is a method of providing easy quick checking of the component during development which can also be used later for random quality inspection.

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