Application for Measurement & Analysis of Hose Crimp Pressures During Manufacture and Assembly

This brief highlights a method of testing the quality of a hose clamp or crimping operation during the assembly process.

Hose failures or leaks often occur at the "crimped" or clamped end of a hose where the metal tube is sealed against the hose. Insufficient pressure in a small region of the "crimp" creates a weakness in the seal and provides an opportunity for a leak to develop. The thin profile of the I-Scan sensor and the vibrant images of the I-Scan software enable hose manufacturers to actually see what is happening in the seal during and after the crimping or clamping process, without interfering with the process. This data can be used to evaluate the seal quality and ultimately improve the product and the process.

This test was conducted to capture the dynamic pressure distribution data between a rubber hose and a metal tube during and after the crimping operation. A paper-thin (0.1 mm), 2000 element sensing array was placed between a rubber hose and a metallic connector piece. The "crimping" process was then initiated. *Figures 1 - 3* correspond to a circumferential measurement of the normal pressure distribution applied to the hose during crimping.

The sequence of two-dimensional images shown in (*Figs. 1-3)*, describe the crimp pressure distribution between the rubber hose and a crimped metal end connector. *(Fig. 1)* shows the initial or peak clamping pressure distribution (*at time = 0.7 sec.*) on the hose and metal tube applied by the crimping machine. *(Fig. 2)* shows the pressure (*at time = 5.5 sec.*) just before the machine releases the hose and connector. *(Fig. 3)* shows the pressure distribution (*at time = 6.0 sec.*) just after the crimping fixture releases the crimped hose. The relaxation of the seal and the development of possible leak paths are evident and can be seen as the blue channels running from top to bottom in *(Fig. 3)*. The graph *(Fig. 4)* represents the total pressure versus time history of the event. Notice that the residual pressure in the "crimp" (after being released) is significantly less than the final crimping pressure while in the tool. Since the sensor is located in the seal, this hose could be subjected to various conditions and additional measurements could be taken to examine the impact on the quality of the seal.

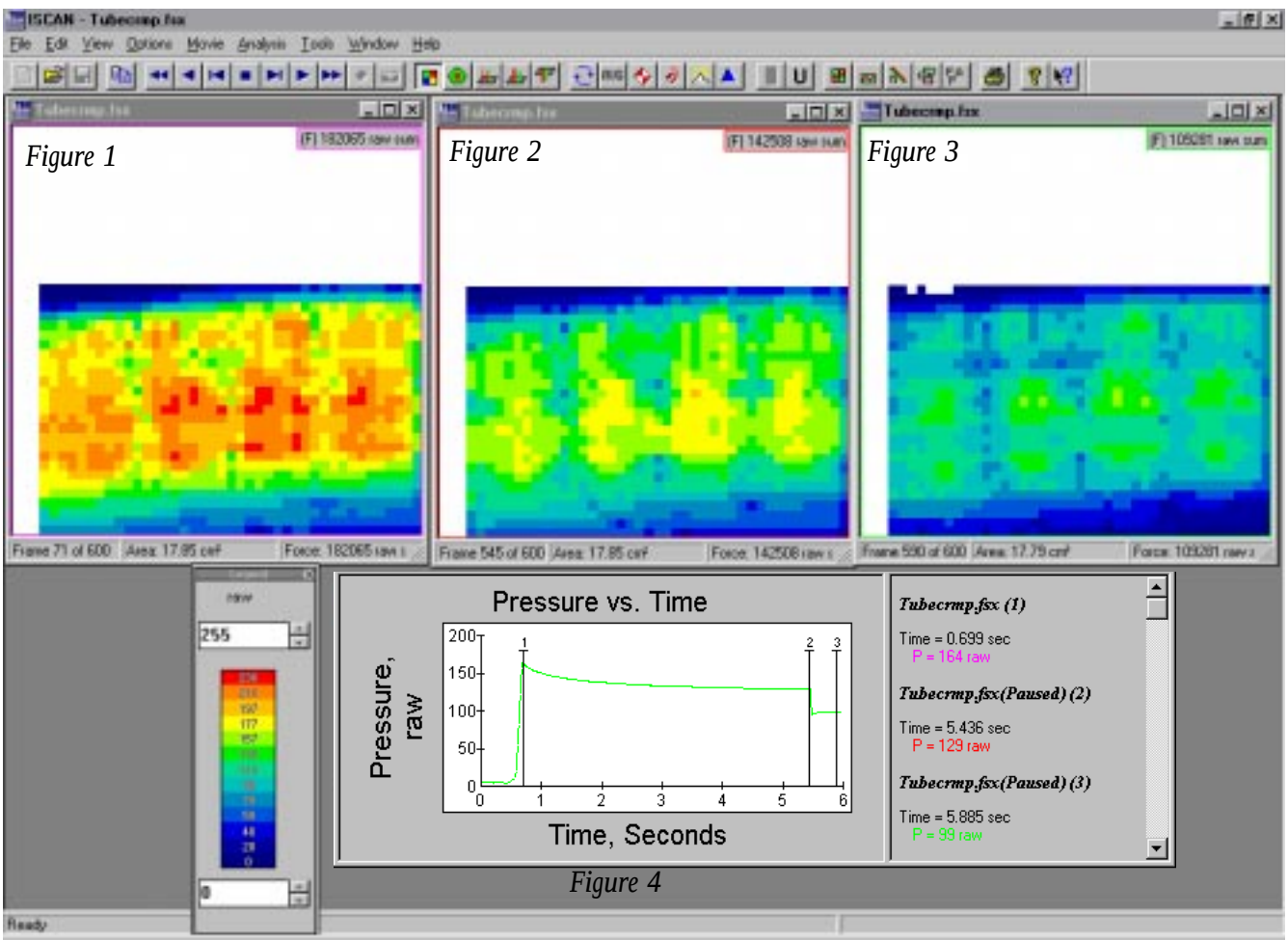

Figure 4

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