

■ Axle Suspension Component Assembly: Press Force Verification of Bushing Assemblies

Highlights:

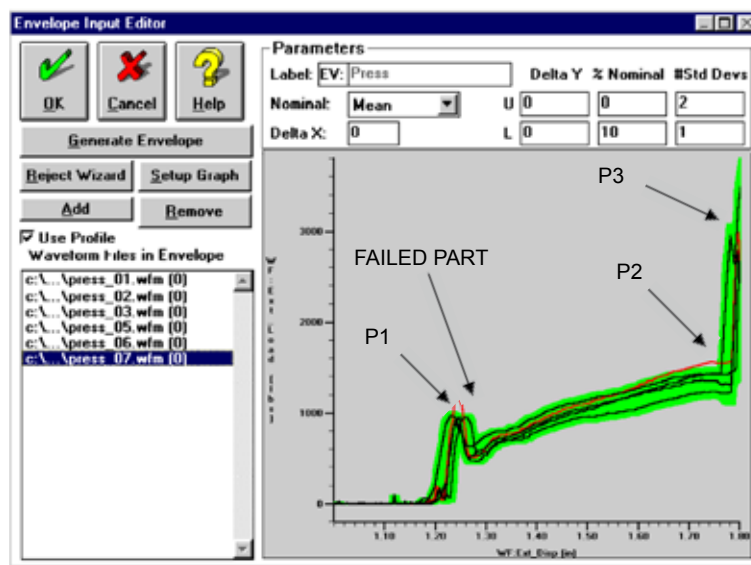
- The load cell and LVDT are monitored simultaneously
- Full waveform Signature Analysis facilitates the display of knee (P1) and cusp (P2) values
- Real-time pass-fail indication to the operator
- PLC interface accommodates assembly system error proofing accessories

The assembly of the front axle bushing into a stamped metal bracket is a critical stage in the automotive manufacturing process, since the part is welded to the front axle assembly. The problem facing the manufacturer is that post-assembly visual and random mechanical inspections are insufficient to provide a 100% guarantee of the integrity of the assembly during the service life of the vehicle.



The SigMETER® solves the problem by monitoring the force required to insert the bushing into the metal bracket. The force is dependent on the interference fit between the parts and is an indicator of the tolerance spread and alignment of the components. The press incorporates an LVDT (Linear Variable Displacement Transducer) to measure ram travel, and a load cell between the ram and the press head. The SigMETER® compares collected waveform signatures to a statistically derived envelope (shown in green in the screen below) obtained from a sample group of known good part press operations, and returns a PASS/FAIL indication to the operator. In the screen shown to the left, P1 shows the press alignment force of the bushing into the metal bracket, P2 shows the seat force required to seat the bushing, and P3 illustrates the ultimate applied force.

The overall relationship between force and distance forms the “signature” for the operation. This is one of many examples of how Signature Analysis can effectively incorporate quality assurance into the assembly process, so that the manufacturer can reap the benefits of increased productivity and enhanced reliability.



SigMETER® Screen showing Bushing Press PASS/FAIL Signatures.