

# **Experimental and Theoretical Investigations on Connector Insertion Phase**

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**Abstract – Inside a connector, an interface with low insertion force and contact resistance is required for low cost materials and coating such as copper alloys with tin coating. In addition, related to the application, the operating parameters have a wide range of values of currents, forces and materials.**

**In this paper, we present a new experimental method based on nonintrusive probing of the deflection of the spring terminal, using a laser technique. The main feature is that the reflection of the Laser beam on the spring allows the determination of the contact force of the lamella-spring inside the female part. The technique acquires the following insertion parameters during the insertion stroke: contact deflection  $\delta$ , which allows contact force  $F_c$ , insertion force  $F_i$  and contact resistance  $R_c$ .**

**It was found that the insertion force takes a maximum value and decreases to the stable value, which depends on the size and the material of the pin. However contact resistance decreases sharply on first insertion and tends towards stable values on completing the insertion process, which are less sensitive to the pin diameter.**

**Finally, discrepancies were observed between the experimental and calculated data with simple numerical models. More complex models are in progress, which should improve the convergence of the theoretical approach to experimental results and proceed to the optimization of the connector parameters.**