**Antler Lecture 2006**

The Design Challenges Involved in Miniaturization of Electromechanical Relays

Werner Johler, Senior Member IEEE

Tyco Electronics Logistics AG - Werk AXICOM Au Seestr. 295

CH 8804 Au - Waedenswil, Switzerland

werner. ohlerQtvcoelectronics.com

Electromechanical relays have been extremely successful on the market in the past years. They are reliable, robust, cost efficient and easy to use devices. This is astonishing as it has been told since semiconductor devices appeared on the market almost 50 years ago that electromechanical relays will disappear. Reasons for this success are mainly the innovations the relay industry was able to introduce into new designs and to meet the needs of the electronic industry, telecommunication and automotive industry. The major challenges have been the miniaturization of the relays, increasing the switching capability and reducing cost and make the products environmentally friendly at the same time. When electromechanical relays are miniaturized following topics are of special interest and those are discussed: Contact reliability at reduced contact forces and contact breaking forces

- Prevention of internal and external contaminations - protection of relays

- Handling material transfer and contact erosion at reduced contact gaps

- Improving dielectric and isolation characteristics, while reducing creepage and clearance distances

- Thermal characteristics caused by heat dissipation and increased ambient temperatures

- Extended lifetime and switching capability

- Increased reliability expectations from users

- Limitations given by manufacturing

Introducing new technologies and new approaches to relay design will enable innovations in relay technology also in the future