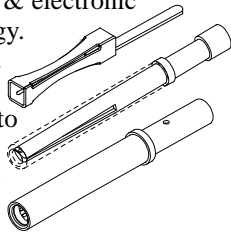


Solid pins and spring sockets for electrical & electronic connectors are a widely accepted technology.

Round pins are traditionally plugged into a variety of spring socket designs ranging from stamped and formed "box" contacts, to machined/bifurcated "slit & crimp" military style contacts, to sockets comprising a machined tubular body with a stamped spring insert.



Hyperboloid wire cage sockets have been around for over 50 years, and are recognized as having superior performance to traditional stamped or machined spring sockets.

QA has re-invented the hyperboloid contact design, resulting in the potential to double the pin density of a connector.



QA Technology Company, based in Hampton, NH, is well known as the premier manufacturer of spring loaded test probes that are used by the printed circuit and electronics industries world-wide. After 27 years of experience in the design and automated assembly of long-life electronic intercon-

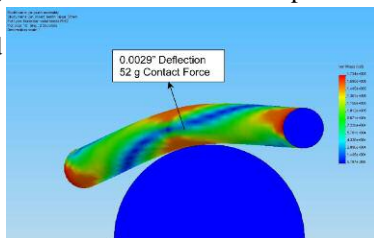
nects, QA has leveraged these skills to develop a family of hyperboloid socket contacts using a novel method of capturing 6 or 12 contact wires inside a thin wall tubular sleeve. QA's integraMate<sup>®</sup> family of contacts accept pin diameters of 0.45, 0.5, 0.6, 1.3 & 1.5mm. More sizes are to be introduced shortly. QA's flexible production equipment permits the automatic assembly of contacts with a wide variety of termination options for each contact size.

### Benefits of the integraMate hyperboloid wire cage design over traditional pin and socket contacts:

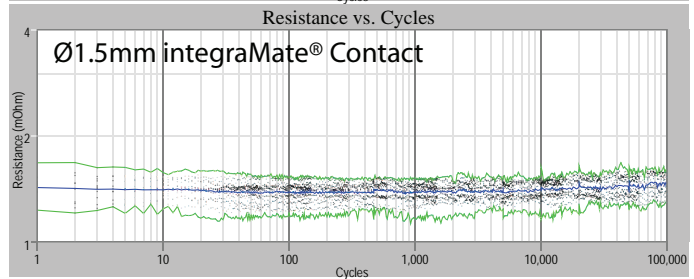
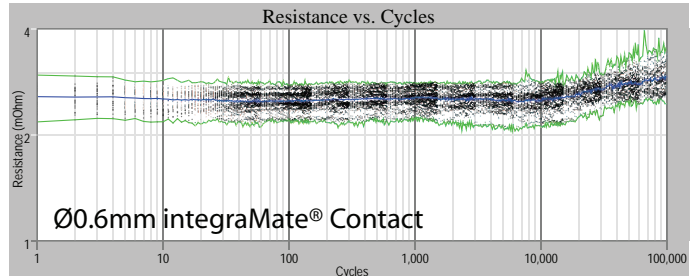
**Closed entry:** The unique construction using a thin wall tubular sleeve enables the smallest possible contact diameter, ideal for higher density applications. The entrance of the tubular sleeve also protects the contact wires from damage and excludes over-size mating pins.

**Low and uniform insertion and extraction forces:** Enables high pin count connectors to be plugged together by hand without the need for additional hardware. The hyperboloid wire cage geometry exhibits unilateral forces: insertion force is the same as extraction force. Typically these forces are 2 ounces per contact.

**Self cleaning:** Smooth wiping action of the wires on the pin removes any surface contaminants and oxides which would appear as high or irregular contact resistance. Normal contact force of each wire to the mating pin is maintained at a minimum of 30 grams, typically 52 grams per wire.

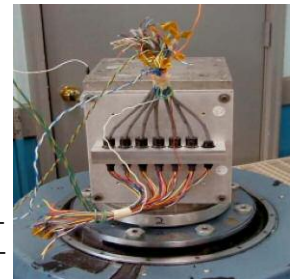


**Long cycle life (Durability):** Smooth tangential mating of the pin with the contact wires shows minimal wear of the gold plated surfaces. integraMate contacts have been tested to 100,000 cycles with less than 1 milliohm increase in contact resistance.



**Minimal power loss (Current Rating):** Low electrical resistance due to the six or twelve wires in contact with the circumference of the mating pin. This increases the current carrying capacity relative to the size of the mating pin. Typically 4 amps for 6 wires contacting a Ø0.6mm pin and more than 12 amps for 12 wires in contact with a Ø1.5mm pin.

**Resistance to shock and vibration:** Low inertia of the contact wires in contact with the mating pin prevents circuit discontinuities under the stress of mechanical shock and vibration. Tested to 50Gs shock (3 bi-directional shocks in each of 3 axes, 18 shocks total) and 19.64Grms random vibration (1½ hours in each of 3 axes) with no discontinuities greater than 1 microsecond. The most severe form of mechanical stress is random vibration as experienced in vehicular applications.



**Resistance to fretting corrosion:** In addition to circuit discontinuities, random vibration can induce several million cycles of micro-motion which can rapidly wear the plating at the contact points (fretting corrosion). Temperature cycling and differential thermal expansion can also produce micro-motion and induce fretting. Fretting corrosion is the microscopic wear of the gold plating, even through the nickel underplate and down to base metal. The localized heat generated by friction during random vibration will often oxidize the metal substrate followed by an increase in contact resistance and even contact failure (open circuit). integraMate contacts have endured 19.64Grms random vibration and 250 thermal cycles (0°C to 100°C) with no change in contact resistance greater than 2 milliohms.

### Applications:

For use in high reliability connectors where there is a need for low mating forces, high cycle life and resistance to shock and vibration. Typical applications are medical and dental equipment, scientific and portable instruments, industrial equipment, transportation, ATE interfaces, military and aerospace electronics, telecommunications.