

TEXTRONICS CONTACT JUNCTION

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Abstract

The initial part of the paper regards basic textronic applications. The important problem of textronic applications are connection method of electronic system with textile sensors, actuators or power supply system. The special construction of textronic contact junction were purposed. These kind of textronic junction was the form of electroconductive textile velcro. Textile contact junction consist of two electroconductive parts. In this paper will be also described mechatronic construction of automation stand to research of mechanical and electrical properties of textile velcro. On the stand will be recording force, displacement, resistance for different connecting process parameters. The laboratory stand consist of two compact pneumatic actuators, force sensor, displacement sensor, resistance (indirect method) sensors and Pc computer recording system.

Key words: mechatronics, textronic, connection, contact resistance, measurement, pressure force

1. Introduction

The essential task in textronic product is textile connection with electronic and computer technologies [1]. This is regarding especially, textile power supply line. The connectors should be characterized small transmission resistance, flexibility, and wash proof properties. The electronic system have to be disconnected from textronic clothing during (wet) conservation process.

2. The construction of textile junction

To the construction of textile junction use typical textile velcro with chemical electroconductive cover. Junction consist of two elastic and electroconductive parts, figure 1 [2]. The junction conducted current through the miniature linked connectors (hooks and loops). One part of textile electrical junction compound of textile layer with loops cover made from electroconductive fibers - loop (female) connectors.

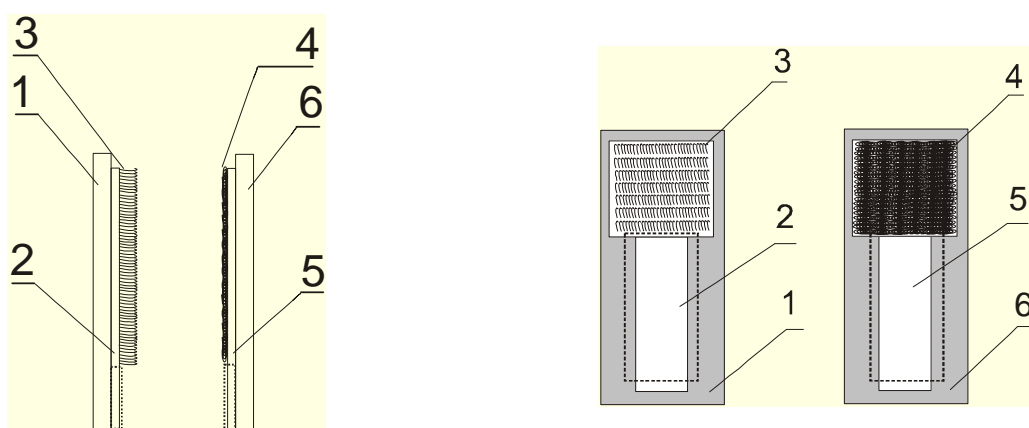


Figure 1. The simplification scheme of textile junction

On the figure 1: 1, 6 – elastic bandage; 2,5 – textile electroconductive materials; 3 - textile electroconductive hooks layer (male pin); 4 - textile electroconductive loops layer (female pin).

This part of textile junction can be linked with supply devices in textronic clothing. Second part of textile electrical junction compound of textile layer with hooks cover made from the same electroconductive fibers - hook (male) connectors. The microscopic photo of each elements present in figure 2.



Figure 2. Microscopic photo of textile junction

3. The research of textile junction

The important parameters of textile junction is transmission resistance. It should be small otherwise in junction will appear thermal power. The junction structures is threedimensional and elastic construction. In the first stage of research was conducted static characteristic of junction. It measured transmission resistance in constant state depends on force pressure of textronic junction. The received result of resistance measurement R , depends on force pressure F , present in figure 3.

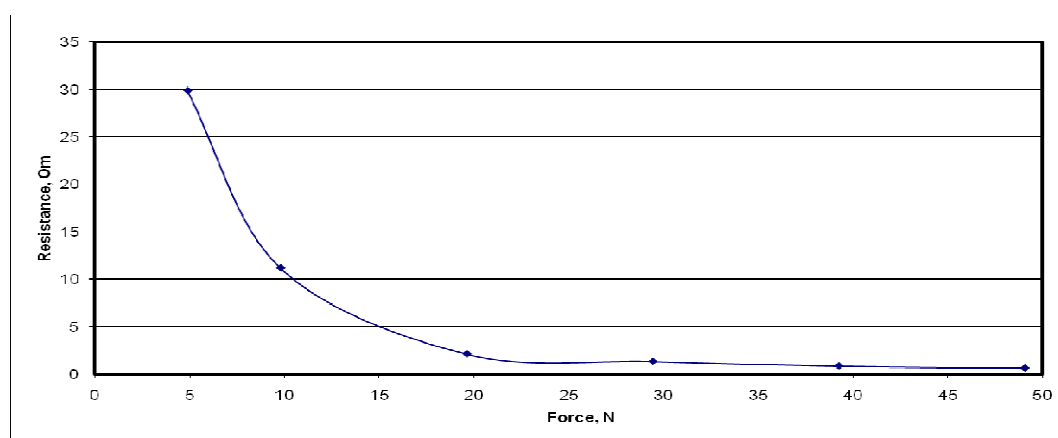


Figure 3. The static characteristic of junction

The power-carrying capacity of the research junction is 400 mA. After 500 mA current value the junction loose the conductive properties. The high temperature which appear on junction, caused micro contacts destruction.

In the aim of described electroconductive properties of textile junction, the special mechatronic stand was build, figure 4 and 5. The measurement stand helped to determine the junction properties during the cycles connected and disconnected each part of the junctions. The stand consist of two compact actuators, which pistons have got mechanical clamps to

The chosen characteristic of junctions displacement, extended force and junction current, present in figure 6, 7, 8, 9.

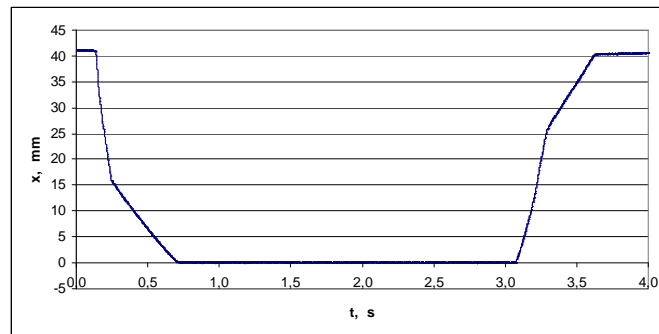


Figure 6. The junction parts displacement during the connecting process

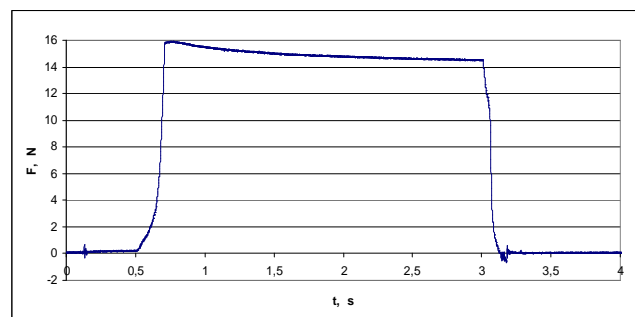


Figure 7. The characteristic of pressure force of textile junction in connection state

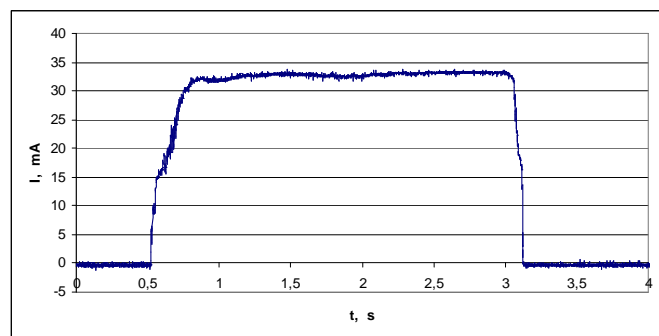


Figure 8. The characteristic of textile junction current in connection state

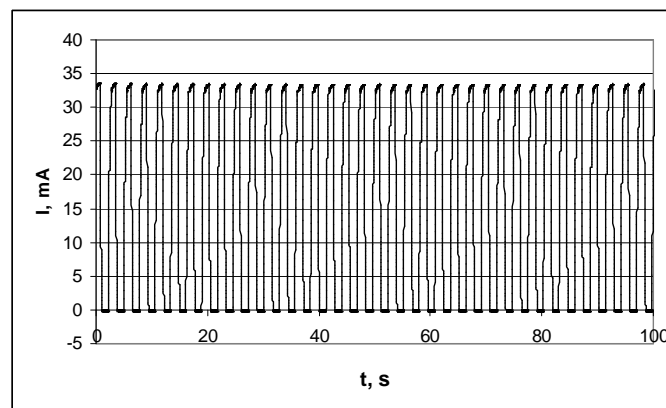


Figure 9. The current characteristic during the connecting cycling process

It was also recording junction temperature. It used K type thermocouples, cooperating with the AMD 90 thermometer, which characterized by a measurement accuracy of 0,1 °C. The example of received characteristic present in figure 10.

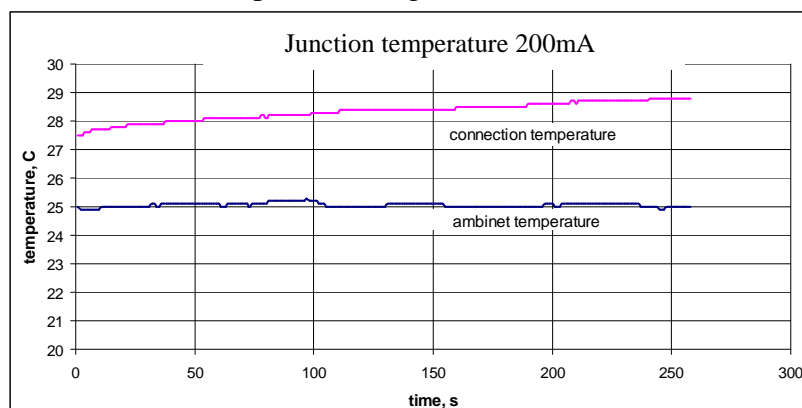


Figure 10. Junction temperature in connection state

4. Conclusion

This work present the research results of textronic junction. This junction has got uniform electroconductive layers obtained by chemical method.

The initial research shows perspective and good prognosis to use junction in many textronic applications.

The main conclusions:

1. The contact resistance of junction depends on pressure force. The resistance value decrease to 0,5 Ω , while pressure force rise.
2. The three-dimensional junction structure caused not synchronous connection of micro connectors in junction. This phenomena caused current commutation but it is not dangerous for textronic element because connection and disconnection process go on without current.
3. The junction temperature change negligible.
4. The textronic junction is flexible and comfortable in normal use. It can be easy connected with clothing structures.
5. The connecting process of junction caused self cleaning of micro connectors which is big advantage.

5. References

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