Steering Roll Connector

1. INTRODUCTION

The Steering Roll Connector (SRC) is a rotatable connector which electrically connects the steering wheel and the column with the vehicle body, and then transmits signals and supplies power from the vehicle body to the various switches within the steering wheel and the column.

The SRC consists of flat cables with high-flexibility as electrical wiring materials and achieves a high rotation durability and quietness.

In the case of a vehicle accident, the SRC transmits a trigger signal to an air-bag inflator (gas generator) within the steering and the column to activate an air-bag, and also transmits signals to the various switches, such as horn switches, which are attached to the steering wheel and the column.

Some vehicles have a steering wheel heater which offers comfortable driving without feeling coldness of the steering on cold days, thus the SRC supplies high current for heating up the steering wheel.

Furukawa Automotive Systems Inc. (Furukawa AS) is the world-leading SRC manufacturer and we use proprietary Multi-Tape U-Turn Method which is the mainstream of our new products in recent years.

2. STRUCTURE OF THE MULTI-TAPE U-TURN TYPE

The feature of this method is that 4 flat cables are wound in spirals with a “u-turn” shape inside the housing (the outer case). The repulsion force of the cables enables the steady rotation without a cable loosening. (Figure 1) (Figure 2)

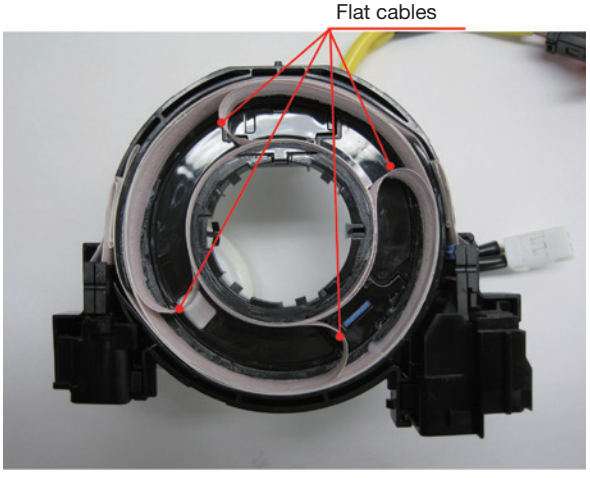

Figure 1 Internal structure of the Multi-Tape U-Turn Type.

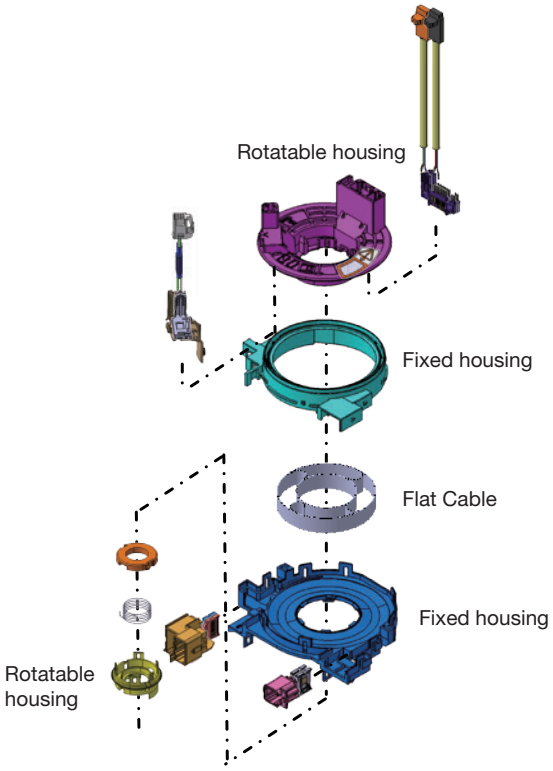

Figure 2 Parts composition of the Multi-Tape U-Turn Type.

3. FEATURE OF THE MULTI-TAPE U-TURN TYPE

By packaging multiple, 4 or more, flat cables within the conventional case, the Multi-Tape U-Turn Type can provide a small and light product without an increase in the product’s height and can be applicable to a multi-circuit and a high current.

Reduction in the part count (light weight, low cost)

· No need for auxiliary parts of rotation for winding/unwinding cables.

· No need for auxiliary parts to keep quietness.

Applied to multi-circuit in thin thickness

· Although the required number of the conductors increases as the number of circuit increases, it can be easily achieved without changing the product’s height by using multiple flat cables internally installed.

Applied to high current in thin thickness

· Although the wider conductor width are required as conducting current increases, it can be easily achieved without changing the product’s height by using multiple flat cables internally installed.

Optimized design for CAN communication circuit application

· Although the characteristic impedance varies as the winding status of the flat cables varies, the cables are closely-located to each other and the winding status is steady in the Multi-Tape U-Turn Type. Therefore, by considering conductor placement, it is possible to optimize the impedance design for CAN communication circuit application.

4. MANUFACTURING AND EVALUATION OF SRC

Furukawa AS has been manufacturing SRC since 1990. At present the company has established global supply system holding 9 plants all over the world. An integrated manufacturing from the flat-cables to SRC assembling is the feature of our manufacturing technology. As the flat-cable and a wire end connection technology, the metal jointing by the ultrasonic welding is applied between both of the flat-cable and a bus bar, the wire and the bus bar, also jointing parameters are monitored and the jointing condition is checked, thus the jointing reliability is ensured.

The company implements the durability evaluation in consideration of the market environment by using the rotation type durability test equipment which can set the various conditions such as rotation pattern, rotational speed, temperature etc. Rotation noise measurement and frequency analysis simulating the equipped environment of the vehicle are available.

5. CONCLUSION

Besides Multi-Tape U-Turn Method, we provide the technologies of Roller U-Turn Method and Spiral Method according to types of winding/unwinding flat cables.

We can propose the optimized methods and put them into production for diversified requirements of customers with mounting space, variation in the number of circuit and conducting current.

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