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FLOATING TYPE-C CONNECTOR INTEGRATION WITH NOTEBOOK SYSTEM DESIGN

HP INC

Floating Type-C Connector integration with notebook system Design

The USB Type-C is widely being used in mobile electric product design today, such as in application of phone, notebook computer as a data, imagine and power supplier I/O Port. Due to the heavily usage of plugin and unplugging, the reliability is becoming a big concern, such as Wiggle, deformation and crack.

Current design of type C connector is easily lost the function because of weakness of mechanical structural design, the connection of pins is lost or mismatch due to the tolerance/gap between the insert cable and receptacle is increased during un-normal usage, such like when user accidently pushing the type-c cable or pull out the cable with twist like force.

The simulation study shows that the main part like housing or skeleton structure both plugin cable and receptacle have a permanent deformation, which cause the gap becoming larger and larger and the pins connection is not functional very well.

The new design is proposed through floating concept which can be isolate any force from the plugin cable to connector, the connector has a free rotation moving capability and the force and stress/strain on any key part can be released.

This design both benefitable for connector and plugin, therefore the connector reliability is improved.

In this innovation, floating connection integrated into system for special type-C design is proposed to solve the Type C wiggle issue. Floating receptacle with help of Porous rubber material, flexible PCB, fastener bolt and its bracket plate are used for this innovation.

Fig.1 is a simulation result showing that the weakness of the current type-C connector/receptacle and plugin cable design, there is permeant deformation due to the yield stress is over material strength.

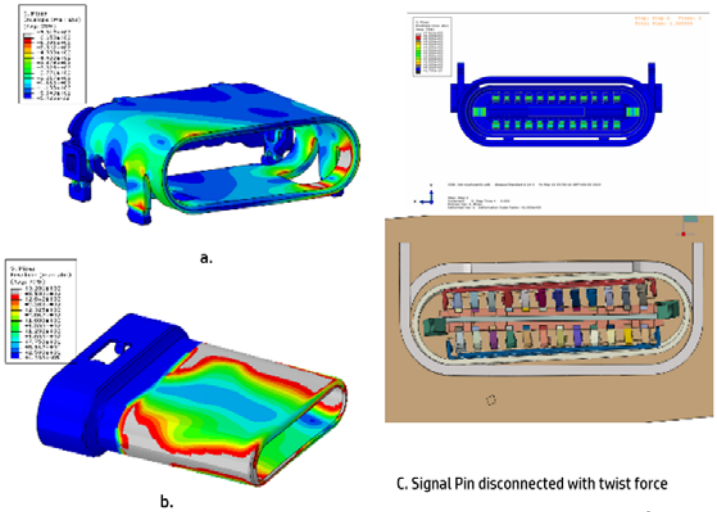

Fig.1 Simulation result showing that weakness of the current type-C connector/receptacle and plugin cable

Fig.2 is showing the new concept of floating type-c connection design with free rotation freedom.

The receptacle can be routed or up and down when force coming from Plugin cable, therefor the stress/strain are released, there is no permanent deformation on any key parts. The Porous rubber material can be deformed in any shape like floating water to dynamic support the connector. The porous rubber material is bonded through insert mold, mechanical join, adhesive. The movement in X direction is fixed through the fastener Bolt mounted on the Case Wall.

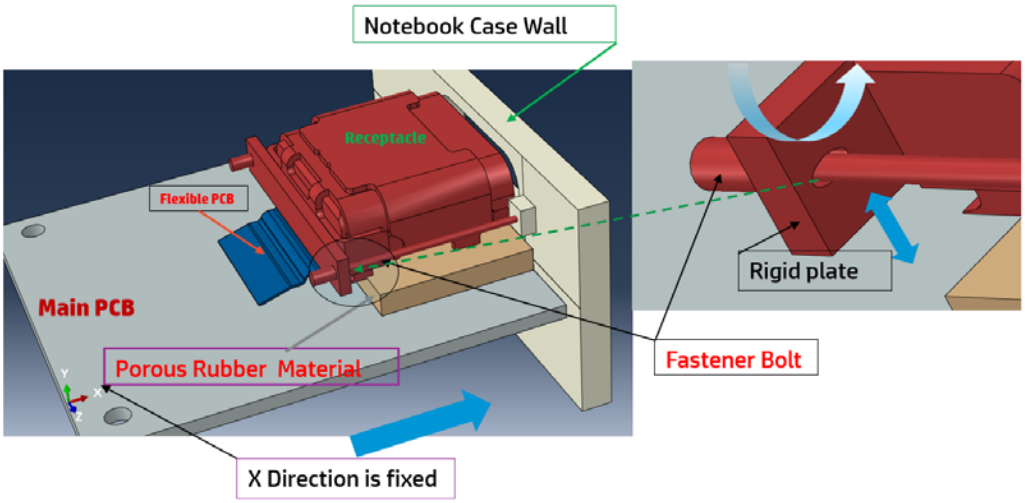

Fig.2 New floating type-c connection design with free rotation freedom

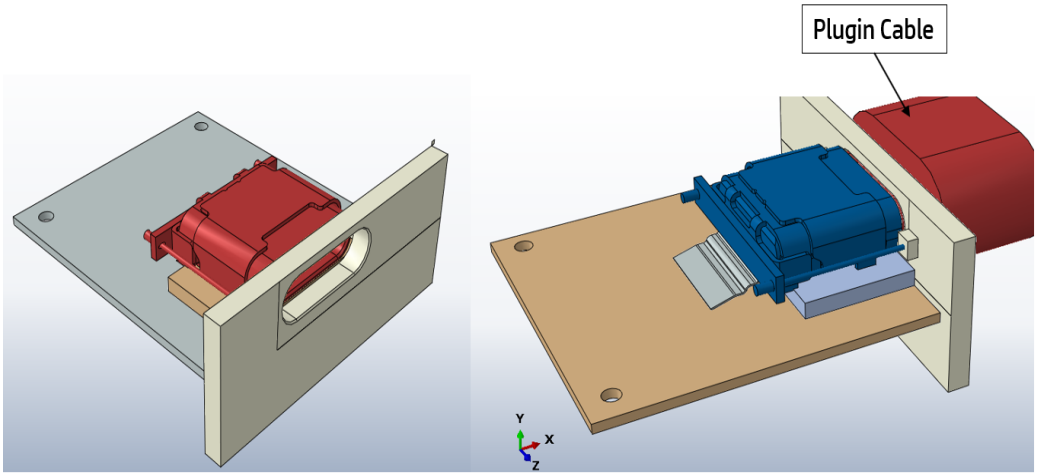

Fig.3 Implementation with Plugin Type -C

The advantage of the design are:

- The life cycle is increased to meet customer expectation.
- Reliability of type-c connector and type-c cable both are improved.

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