

CASE STUDY – FORD FUSION 2013 OVERHEAD CONSOLE



The 2013 Ford Fusion features an innovative overhead console which employs capacitive ‘touch switches’ manufactured using ADS’s leading edge IMD technology with integrated active electronic circuitry in a high volume production component for the first time.

IMD (InMold Decoration) allows the panel to be ergonomically styled in three dimensions without complex assembly operations while maintaining a surface free of extensive join lines.

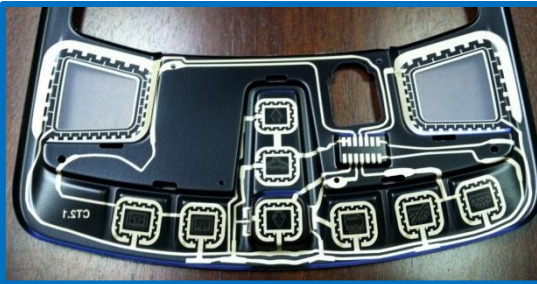
An integrated storage bin behind a dampened spring-loaded door is included in the panel.



Materials

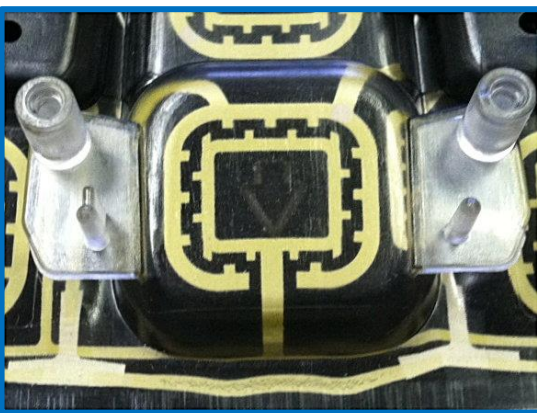
The panel is printed on Bayer’s DE 9-2 Makrofol polycarbonate film to avoid ‘glossing up’ of the texture in the deep draw areas. A unique barrier layer is included to avoid the capacitive switch areas becoming sensitive to changes in humidity.

The InMold process is a multi-shot technique with Bayer’s clear 2207 PC resin featuring alongside their opaque T85XF PC/ABS blend.



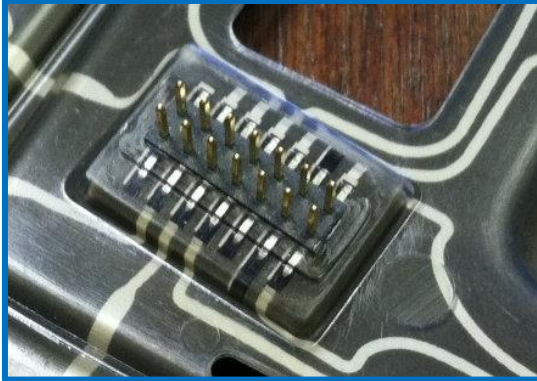
Circuitry

The capacitive sensors and associated wiring are printed in Du Pont’s specially formulated silver-loaded conductive ink which, when combined with ADS’s proprietary decorative inks, allows the circuit to be formed into a complex 3D shape.



Simple (low switch count) versions are printed in single layers with a common bus layout while the more complex (higher switch count) versions are printed in multi-layers using crossover circuits and dielectrics connected in an x-y matrix.

Expensive transparent conductors for illuminated areas can be avoided with careful sensor design.



Connector

Connections to the capacitive sensors on the panel are made via a single-piece, 14 pin dual-in-line connector, with gold plated pins.

In another innovation, the connector is fully integrated into the construction during the multi-shot injection molding process. A unique feature in the mold tool aligns the connector with the matching printed terminals on the rear surface of the printed applique, and uses precision z-axis control to make the connections without the use of solder or conductive adhesives.



The first shot in the injection mold process retains the connector in position while the second shot serves to increase the overall robustness of the arrangement.



Active Map Lamps

The map lamp areas on the console are also touch switches with the ON/OFF action of each lamp controlled by direct operator touch to the illumination area. Once again, the use of expensive transparent conductors in these areas has been avoided by careful design of the conductive silver sensor and associated wiring.

The capacitive effect of both the map lamp and standard switch areas is based on an at-rest (raw) capacitance value which alters when the user touches the sensor areas. The associated electronics measures this delta in capacitance value to initiate the switching action. Sensitivity adjustment is in the associated electronics and can be tuned to allow operation with gloved hands.