TOUCHSCREEN ENCLOSURE DESIGN

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OBJECTIVES

The client wishes to update their multi-residential unit security system using a new in-suite touch panel.

The ultimate goal of the project is to develop a final design for a touchscreen enclosure for the clients new in-suite intercom/multimedia unit.

Key features for inclusion in design:

- 7” and 10” screen options
- Several multimedia ports
- User defined buttons
- Two way audio/video
- High aesthetic appeal

PROCESS

An iterative design process was used:

1. Market and consumer research
2. Develop Product design spec.
3. Concept development
4. Quantitative selection - ranking
5. Qualitative selection- Surveys
6. Final design development
   - Material selection and embodiment design calculation
   - 3D CAD Model generation
   - Material Flow design
   - FEA and FMEA for stress and quality

CONCLUSION

The final design fully meets the design specifications and the constraints set by the client.

Design modifications may be required once the internal electronic layout is finalized by the client.

Consumer surveys will be completed in order to make recommendations for further design development.

STRUCTURAL DESIGN

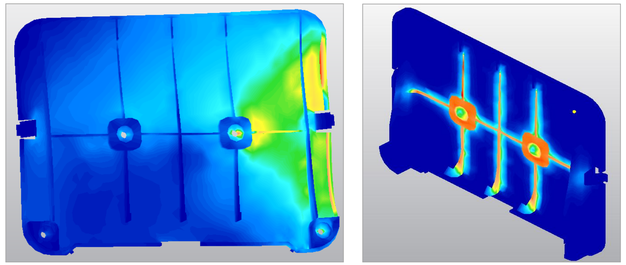

Figure 1: FEA on Anchored Base

- Design has been structurally optimized for occasional side impact and cyclic screen/button use by transferring loads to the base.
- The aesthetic shape serves to additionally relieve areas of possible stress concentration around edges.
- Structural ribbing provides ample support for face plate and electrical components.
- FEA (pictured left) demonstrates design ability distribute stress to the supporting base.

INSTALLATION

- The device has to securely fix to the wall with minimal disruption to the user with respect to time.
- The base is attached to the wall using hidden screws.
- Plastic clips are built into the case halves such that the front quickly clips into place.
- Time to install: <30 minutes.

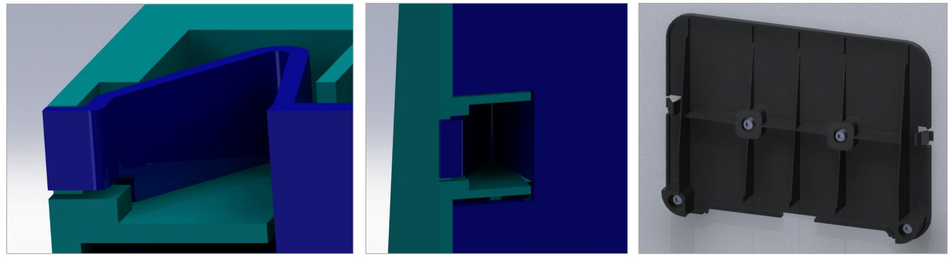

Figure 2: Built in Clips Connect the two case sections

MANUFACTURING

- Components can be injection moulded allowing multiple unit colour choices.
- The design minimises the total part count. At least 50% parts are universal across both unit sizes.
- Designed for fast assembly using clips.
- 5s fill time resulting in ~0.5% shrinkage.

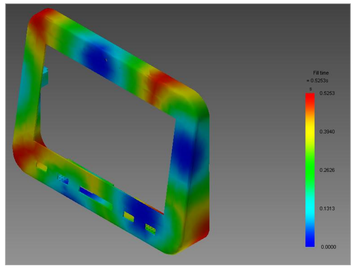

Figure 4: Mold Fill-Time Analysis

BUTTONS

- For ease of use physical buttons are favoured by users.
- Function correlates to on-screen options
- Surveys showed 86.7% of users prefer buttons along the screen base opposed to the side.
- Illumination of the middle button indicates incoming or in-progress calls.
- The number and size of buttons balances functionality and overall aesthetics.

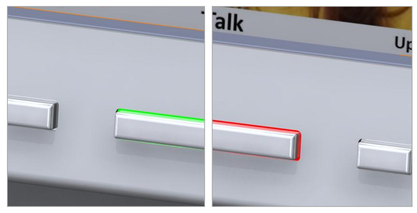

Figure 3: Function Dependant Button Illumination

PORTS AND SPEAKERS

- The inclusion of media ports elevates the device from pure intercom to multimedia.
- The ports and speakers are hidden on the bottom to improve aesthetics, while remaining accessible.
- A FlatWire® cable was chosen. This sticks to the wall, can be painted and avoids trailing cables.

Figure 5: Port and Speaker Layout

CAMERA & MICROPHONE

- The camera is included for 2-way video.
- It can be turned on/off by users for privacy.
- The positioning at the top gives the best picture and sound quality.

Figure 6: Camera and Microphone Placement

Figure 7: CAD Model of Final Design

SHAPE

- Screen needs tilting for visibility at different heights.
- The ideal tilt is 30-45^0 but depth is increased
- Compromise reached at 1.5” depth and 9^0 screen tilt.
- Two separate cases were designed for the 10 inch and 7 inch screens.

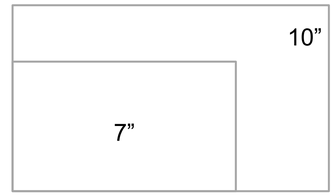

Figure 8: (Above) Screen size comparison

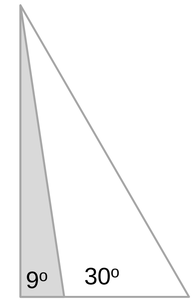

Figure 9: (Right) Ideal Angle verse Compromised