



Durability by Design



Engineering Design



120 min



Intel® Core™ processors

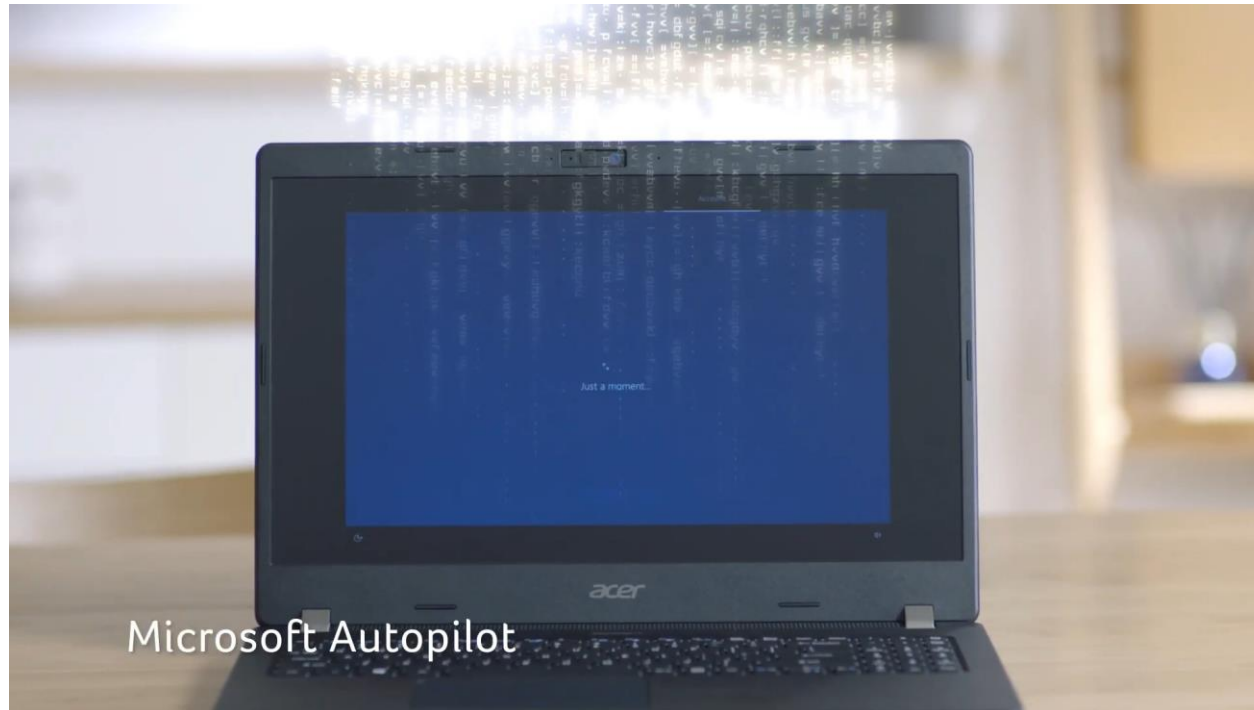
Overview

- Study the Acer TravelMate B3 11 to understand ruggedized laptop design and its materials.
- Create a 3D model of a ruggedized laptop in Autodesk Fusion 360, incorporating the appropriate materials and features.
- Perform a virtual drop test in Fusion 360 to evaluate how well your laptop model withstands impacts and other challenges.

How often have you accidentally dropped your laptop or cell phone, or seen someone else drop theirs? What kinds of damages have occurred, and how can we prevent it?

Which parts of a laptop do you think are most likely to get damaged when it is dropped?

Analyze



Microsoft Autopilot

Now that you have watched the drop test video, which parts of the laptop do you think incur the most damage?

To the Rescue: Ruggedized Design

Ruggedization in design focuses on making products that can handle tough conditions like drops, impacts, and spills.

Reinforced structures help strengthen the product, making it more resistant to breakage.



Durable materials are used to protect against physical damage.

Innovative features protect sensitive components to ensure reliable performance.

Acer TravelMate B3 Spin 11



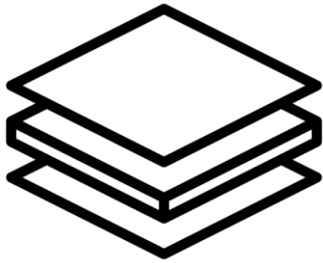
Features

- The laptop meets military standards, meaning it can handle drops, bumps, and shocks – perfect for use in a bustling classroom.
- The keyboard can withstand accidental spills of up to 330 ml, keeping internal parts safe from liquids.

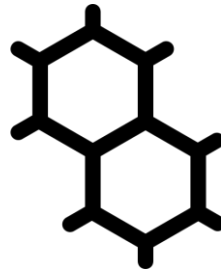


Your Mission: Design a Rugged Laptop

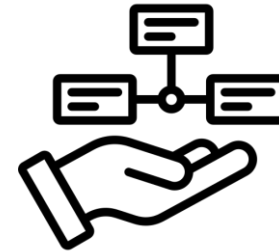
Research rugged laptop features for classroom use, and sketch a design that can endure drops, impacts, and everyday challenges like spills.



Materials: What materials can you use to ensure maximum stability?



Structure: How will you strengthen the laptop's body and protect its internal components?



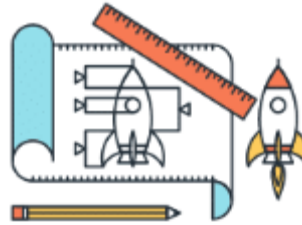
Features: What design elements will safeguard the screen, keyboard, and other sensitive parts?

Stages to Create a Rugged Laptop



Ideate

Research rugged laptop features and create a sketch of your design as a blueprint for model.



Prototype

Use Autodesk Fusion 360 to create a 3D model and prototype of your rugged laptop design.



Test

Assign material properties to the laptop model and run simulations to test its durability.



Ideating the Rugged Design.

Now that we have explored rugged features of laptops, let's broaden our perspective. Smartphones face similar challenges – frequent drops, rough handling, and exposure to liquids.

Examples of Rugged Cases for Smartphones



Ergonomic
grip for
support



Reinforced
corners with
rubber bumpers



Shock
absorbing
material

Features

Raised Edges: Bezels around the screen and camera are raised to prevent direct contact with surfaces when dropped, safeguarding these vulnerable areas.



Multi-Layer Construction: Many rugged cases combine an outer shell with an inner shock absorbing layer for added protection.

Reinforced Corners: Corners are strengthened with extra material to better absorb impact, as they are often the most affected during fall.



Ideate

Refer to Ideation Worksheet



5 min

- Research the various ruggedization features used in mobile phones.
- Think about how you can combine your research and observations to design a ruggedized laptop suitable for classroom use.
- Create a sketch for your ruggedized laptop case.



Creating the rugged laptop in Fusion 360.

Introduction to the Interface





Prototype

Refer to Creation Worksheet

- Now that you have a clear idea of how your laptop should look, use Autodesk Fusion 360 to create a prototype of your sketched design.
- Refer to the worksheet for guidance on using Fusion 360 to create your ruggedized laptop.



Testing the rugged laptop in Fusion 360.



Pair & Share

- Share your simulated drop test results with your partner, highlighting the features you added to improve the laptop's durability.
- Discuss what worked well and what could be improved based on your test outcomes.
- Reflect on the feedback and share any one key revision you plan to implement to enhance your design.

Summary

- Investigated rugged design principles by reviewing key factors for creating a durable laptop.
- Designed a laptop model in Autodesk Fusion 360 that can be used in a bustling classroom environment.
- Performed a simulated drop test to assess the strength and durability of the final design.



intel.com/education

intel®

Intel technologies may require enabled hardware, software or service activation.

No product or component can be absolutely secure.

Your costs and results may vary.

The Intel® Skills for Innovation Program Content was developed by Intel Corporation. All rights reserved.

© Intel Corporation. Intel, the Intel logo, and other Intel marks are trademarks of Intel Corporation or its subsidiaries. Other names and brands may be claimed as the property of others.