



acer
for education

Durability by Design



Summary: Learners will design a ruggedized laptop, drawing inspiration from Acer's ruggedized models, and simulate durability tests to verify that the laptop can endure drops and impacts.

Key Concepts

Ruggedization
Prototyping

Software

Autodesk Fusion 360

Instructional Objectives

Learners will be able to:

1. Evaluate what goes into designing ruggedized laptops like Acer TravelMate B3 11.
2. Use Autodesk Fusion 360 to design and test the prototype of a ruggedized laptop that can withstand the impacts of a drop test.

Learning Outcomes

- Analyze the key components that contribute to the durability of ruggedized laptops.
- Prototype and test the design of a ruggedized laptop.

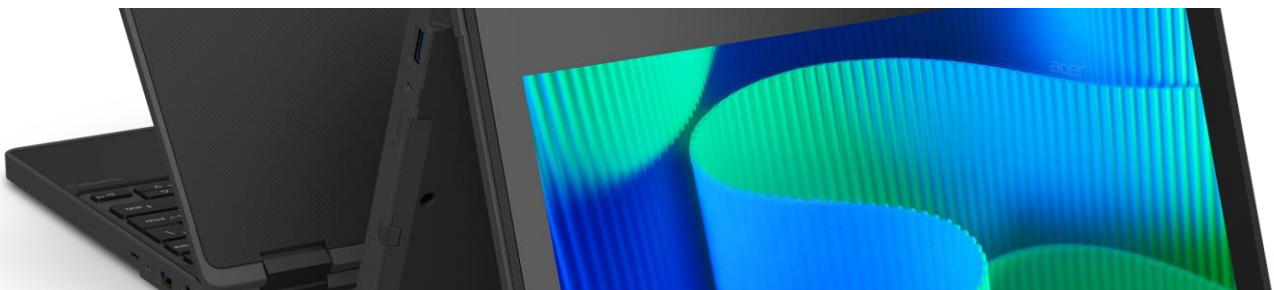
Real World Application

Learners will use design thinking to create a rugged laptop prototype, specifically engineered to handle classroom challenges like accidental drops, spills, and daily wear, ensuring durability and reliability for both learners and educators.

Durability by Design

1. Lesson Overview

	Activity	Innovation Skill
Introduction (20 min)	Introduction to the need for ruggedization.	Design Thinking (Empathize)
Slides 1 – 5	Introduction to the concept of ruggedization.	
Development (90 min)	Explore the features of ruggedization.	
Slides 6-18	Ideate and sketch a ruggedized laptop.	Design Thinking (Ideate)
	Use Autodesk Fusion 360 to create a prototype of a ruggedized laptop.	Simulation & Modeling (Model Development)
Conclusion (10 min)	Use Autodesk Fusion 360 to run the simulation of a ruggedized laptop and share results.	
Slides 19-22		



Durability by Design

2. Session Preparation

Logistics

Items

Laptop, Desktop or Chromebook (Recommended: 1 learner per laptop)

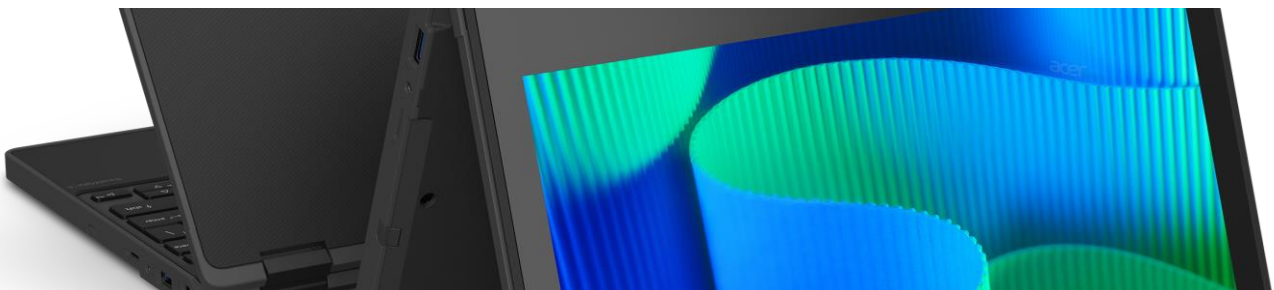
Worksheet

Installation

1. Install Autodesk Fusion 360.
2. Other things to note:
 - For hardware requirements, please refer to the minimum hardware requirements from the software provider.
 - Autodesk Fusion 360 is available for both, free and paid use.
 - To access the free version, learners can access the Fusion 360 for personal use.

Working files contain:

- Ideation Worksheet
- Creation Worksheet
- Laptop Assembly Autodesk File (.f3d)
- Beginner's Guide

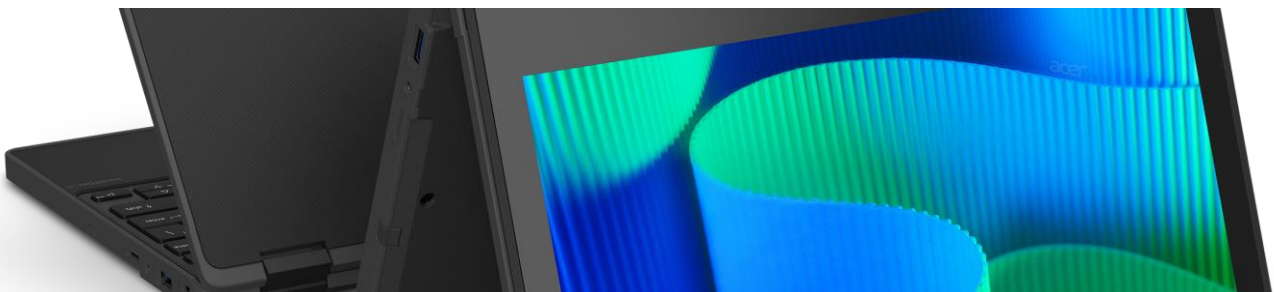


Durability by Design

3. Activity Guide

Introduction (slides 1 – 5)

Duration	Slide	Activity
20 min	1	Introduction to lesson.
	2	Educator goes through the overview of the lesson.
	3	Educator presents the learners with an essential question, which encourages them to think about the durability of their devices, such as laptops and phones.
	4	Learners are faced with a follow-up question to explore the different parts of laptops that are most likely to get damaged when it is dropped.
	5	Learners watches a video to analyze the impact on devices when they are dropped. Source: https://www.youtube.com/watch?v=fq0yx8WIDQw

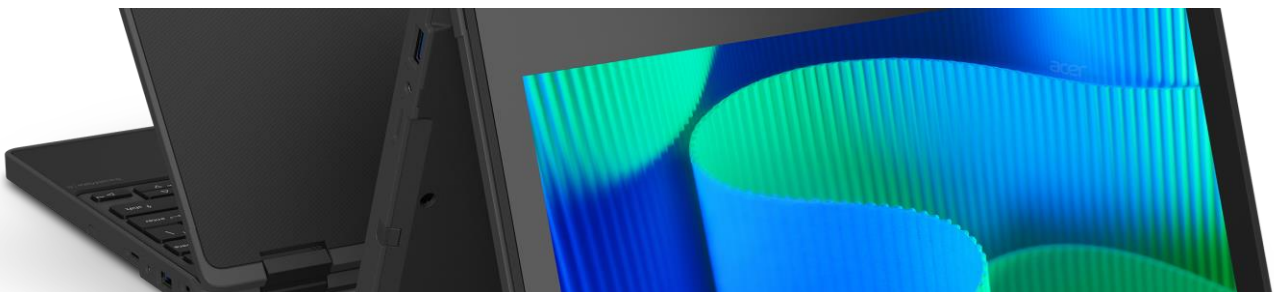


Durability by Design

3. Activity Guide

Development (slides 6 - 18)



Duration	Slide	Activity
80 min	6	Educators introduces learners to the definition and concept of ruggedization.
	7	Learners watch a video of the Acer TravelMate B3 Spin 11 to get an example of what a rugged laptop looks like. Source: https://www.youtube.com/watch?v=la6mo9ZAHxQ
	8	Learners explore features of the Acer TravelMate B3 Spin 11 to understand how it incorporates features of ruggedization.
	9	Educator introduces learners to their mission, which is to design a rugged laptop using Autodesk Fusion 360. Throughout the process, learners will explore materials, structure, and features of a rugged laptop.
	10	Educator walks the learners through the steps of the mission.

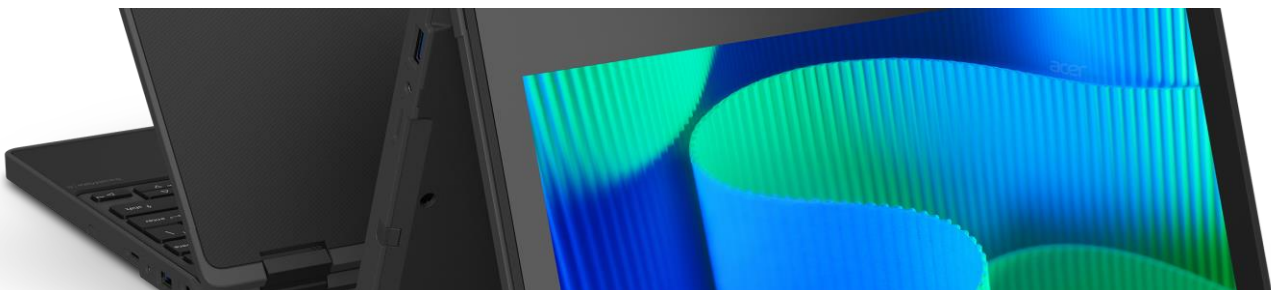


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3. Activity Guide

Development (slides 6 -18)

Duration	Slide	Activity
90 min	11	Educator will walk the learners through the first step of the mission, which is ideating the rugged design.
	12-13	Educators encourages learners to broaden their perspective to think of smart phones and the need for rugged smartphone cases. Learners also explore the different features of already available rugged phone cases to take inspiration.
	14	Learners explore the different features of already available rugged phone cases, such as raised edges, multi-layer construction, and reinforced corners. The idea is to take inspiration before ideating a ruggedized laptop.
	15	Educator introduces learners to the process of ideating a rugged laptop, and guides them to refer to the ideation worksheet.
		 <p>Mindset: Design Thinking Ideate Learners think creatively and build on other's ideas to generate a wide variety of possible solutions to problems.</p>
	16	Next, learners explore the next step of the mission, which is creating the design for the rugged laptop in Fusion 360.
	17	Learners watch a video to explore Fusion 360. Source: https://youtu.be/WKb3mRkqTwg
	18	Learners use Fusion 360 to design a prototype of the rugged laptop that they ideated. Educator guides learners to refer to the creation worksheet.
		 <p>Skillset: Simulation & Modeling Model Development Learners create, test, and refine models into better representations of the system of interest.</p>

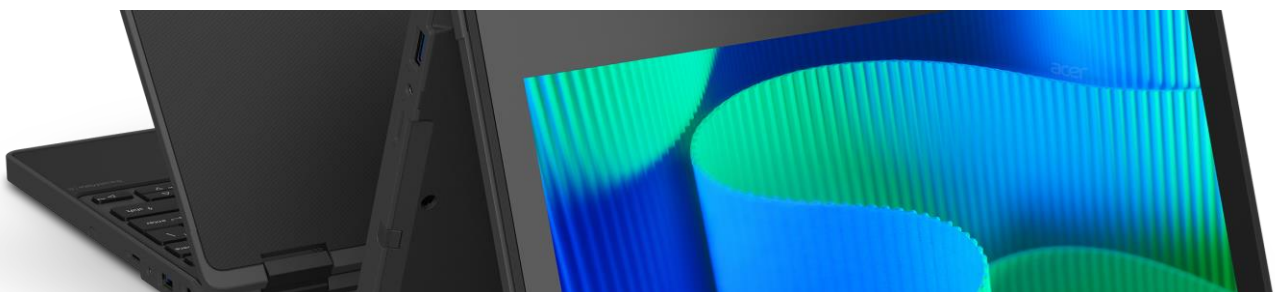


Durability by Design

3. Activity Guide

Conclusion (slides 19-22)

Duration	Slide	Activity
20 min	19	Learners will go through the next step of the mission, which is to test their rugged design by performing a drop test.
	20	Learners will pair up and share the results of their drop test, highlight the features, and receive feedback on their design.
	21	Educator summarizes what was covered during the lesson.
	22	End of lesson.

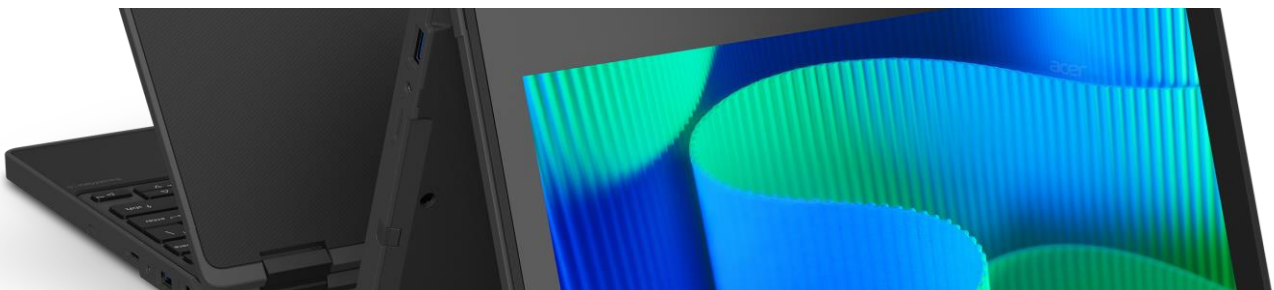


Durability by Design

4. Troubleshooting Tips



Common Mistakes & Issues

	Issue	Possible Reasons	Resolution
1	Installation Errors	<ul style="list-style-type: none">▪ Corrupted download▪ System compatibility	<ul style="list-style-type: none">▪ Redownload installer▪ Check system requirements
2	Import Errors	<ul style="list-style-type: none">▪ Incorrect file format or settings	<ul style="list-style-type: none">▪ Verify import settings and file format
3	Slow Performance	<ul style="list-style-type: none">▪ High graphics settings or outdated drivers	<ul style="list-style-type: none">▪ Lower graphics settings▪ Update drivers



Durability by Design

5. Assessment Rubric

Focus	Learning Outcome	Approaching Expectation	Meeting Expectation	Exceeding Expectation
 <p>Design Thinking (Prototype)</p>	Ideate a prototype of a ruggedized laptop that is durable for classroom use.	Understands the concept of ruggedization, but finds it difficult to ideate the features of a ruggedized laptop.	Understands the concept of ruggedization, and is able to ideate the features of a ruggedized laptop.	Understands the concept of ruggedization, ideates the features of a ruggedized laptop. The ideas solve the common problems of learners within a classroom.
 <p>Simulation & Modeling (Model Development)</p>	Use Fusion 360 to create a prototype of a ruggedized laptop and simulate a drop test to verify the durability of their design.	Creates components and parts that can help with ruggedization, but finds it difficult to decide how to attach/place them.	Creates and attaches components and parts that contribute to the ruggedness of the laptop model, and the laptop withstands a drop test with some impact on its parts.	Creates and attaches components and parts that contribute to the ruggedness of the laptop model, and the laptop withstands a drop test with minimal impact on its parts, showcasing the true impact of ruggedization.

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