

BIG IDEAS

Design for the life cycle includes consideration of social and **environmental impacts**.

Personal design interests require the evaluation and refinement of skills.

Tools and **technologies** can be adapted for specific purposes.

Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p>Applied Design</p> <p><i>Understanding context</i></p> <ul style="list-style-type: none"> Engage in a period of user-centred research and empathetic observation to understand design opportunities <p><i>Defining</i></p> <ul style="list-style-type: none"> Establish a point of view for a chosen design opportunity Identify potential users, intended impacts, and possible unintended negative consequences Make decisions about premises and constraints that define the design space, and identify criteria for success Determine whether activity is collaborative or self-directed <p><i>Ideating</i></p> <ul style="list-style-type: none"> Critically analyze how competing social, ethical, and sustainability considerations impact creation and development of solutions Generate ideas to create a range of possibilities and add to others' ideas in ways that create additional possibilities Choose an idea to pursue based on success criteria and maintain an open mind about potentially viable ideas 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> design for the life cycle history of manufacturing and production product development and manufacturing processes manufacturing to meet the needs of the end user sustainable production, upcycling, and product life cycle mathematics in engineering projects measurement techniques in engineering projects physics in engineering projects static analysis of structures use of hand tools and power tools programming languages for robotics and computer numerical control (CNC) methods of implementing computer control technical communications approaches to innovative engineering projects fundamentals of robotics and robotic manufacturing modelling and simulation

Learning Standards (continued)

Curricular Competencies	Content
<p>Prototyping</p> <ul style="list-style-type: none"> Choose a form for prototyping and develop a plan that includes key stages and resources Analyze the design for the life cycle and evaluate its impacts Visualize and construct prototypes, making changes to tools, materials, and procedures as needed Record iterations of prototyping <p>Testing</p> <ul style="list-style-type: none"> Identify and communicate with sources of feedback Develop an appropriate test of the prototype, conduct the test, and collect and compile data Apply information from critiques, testing results, and success criteria to make changes <p>Making</p> <ul style="list-style-type: none"> Identify appropriate tools, technologies, materials, processes, cost implications, and time needed Create design, incorporating feedback from self, others, and results from testing of the prototype Use materials in ways that minimize waste <p>Sharing</p> <ul style="list-style-type: none"> Decide how and with whom to share creativity, or share and promote design and processes Share the product with users to evaluate its success Critically reflect on plans, products and processes, and identify new design goals Identify and analyze new possibilities for plans, products and processes, including how they or others might build on them <p>Applied Skills</p> <ul style="list-style-type: none"> Apply safety procedures for themselves, co-workers, and users in both physical and digital environments 	

Learning Standards (continued)

Curricular Competencies	Content
<ul style="list-style-type: none"> • Individually or collaboratively identify and assess skills needed for design interests • Demonstrate competency and proficiency in skills at various levels involving manual dexterity • Develop specific plans to learn or refine identified skills over time <p>Applied Technologies</p> <ul style="list-style-type: none"> • Explore existing, new, and emerging tools, technologies, and systems to evaluate suitability for design interests • Evaluate impacts, including unintended negative consequences, of choices made about technology use • Examine the role that advancing technologies play in multiple engineering contexts 	