
***Activity Resource
Management Document***

Grade 11
TDJ3E Technological Design
(Workplace Destination)

Unit 3, Activity 2:
Investigating the Life Cycle of a Product



*This Activity Resource Management Document (ARMdoc)
was produced by the Ontario Council for Technological Education (OC TE)
to supplement the Ministry of Education's Grade 11 Course Profiles.
It may be used in its entirety, in part, or adapted.*

Activity Resource Management Document



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(Safety sheets to be inserted from separate Safety Resource Pack)

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TDJ3E Technological Design

UNIT 3, ACTIVITY 2:**Investigating the Life Cycle of a Product****Activity Description (from Course Profile)**

Time: 300 minutes (5 hours)

Whereas the previous activity examined the impact of modern inventions on society, [see *TDJ3E Course Profile Unit 3 Page 2*] this activity is designed to teach students how an idea for an invention is developed into a marketable product. Students will select a product or process and identify the major steps in its development – idea generation, design process, patents, research and testing, manufacturing, marketing and advertising and distribution. Students will use and integrate the Catholic faith tradition in selecting a product that clearly supports the development of a just and compassionate society. Students will also investigate the requirement for standards in Canada as well as industry testing for various products. This activity will provide students with the necessary skills to develop their own ideas for completing subsequent activities in the unit and introduce students to a wide variety of career possibilities in the design industry.

Activity Resource Management Doc (ARMdoc) Contents

Teacher Resource Pack (TRP)	Pre-planning Notes, Expectations by Category, Activity Deliverables, Instructional Aid Sheets, Terminology List, Career Information
Student Project Brief (SPB)	Project Brief, Assessment/Evaluation Checklists and Rubrics, Activity Log
Safety Resource Pack (SRP)	Safety Information (list of pages to be inserted from the separate Safety Resource Pack)

This Activity Resource Document (ARMdoc) was produced to supplement the Ontario Ministry of Education's Grade 11 Course Profiles. These profiles can be found at:

<http://www.curriculum.org/occ/profiles/profiles.htm>

ARMdocs for several Technological Education profiles can be found at:

<http://www.octe.on.ca>

The Technological Education policy documents can be found at:

<http://www.edu.gov.on.ca/eng/document/curricul/seccurric.html>

Pre-activity Planning Notes

The focus of this activity is to have students identify a process of designing and bringing a product to market. The end product of this activity as outlined in the *Grade 11 TDJ3E Technological Design Course Profile* is a poster or some form of graphically presenting the steps in developing products. Through this activity, students must also identify types of careers involved in the process.

Please note that the “life cycle” described here is actually the product development cycle, and should not be confused with product life cycles which includes the lifetime of the product when used by the consumer as well as its eventual dismantling or destruction.

This activity is primarily a research activity; therefore teachers should insure that the students have access to a wide variety of resources. This could include library resources, the Internet, local industries or possibly local inventors. Teachers may want to research some local industries and gear the students towards choosing products from those industries. Students can then contact the industry involved and get first hand information on the development of the product, the types of career opportunities available within the company and the qualifications and educational requirements needed for those jobs.

Teachers need to demonstrate the concept of symbolic flow charts, perhaps by leading students through a sample activity (such as making a sandwich). Teachers may elect to have prepared examples of different product development flow charts for reference. This can be done on flip chart paper, as a handout, or presented to the class on overhead or power point.

Sample patent application forms should also be available to the students. These are available from the Canadian Intellectual Property Office (CIPO) at <http://cipo.gc.ca>. Teachers may also want to use information from this website to prepare a lesson on the history of patents and the recording of intellectual property in Canada.

Teachers may also want to prepare a list of careers involved in the product development process to guide students in their research. (See partial list below). Students should be directed to HRDC’s National Occupation Classification (NOC) database as a starter, see Career Information section below.

Please note that each student should keep a time log of his or her tasks for assessment and evaluation at the end of the activity.

Expectations by Category (from Course Profile)

Knowledge

- TFV.01** demonstrate an understanding of how the design process is used to create products or services for the marketplace;
- TFV.04** describe manufacturing and construction materials and techniques related to their projects;
- TF2.02** describe materials that are appropriate for the manufacture or construction of given projects;
- TF2.03** describe appropriate methods of manufacture or construction for given projects;

Inquiry

- IC1.02** identify design issues, such as production costs, instructional materials for assembly and use, special design needs related to controls and instrumentation, safety issues in handling products, and product durability;
- IC2.01** identify alternative environmentally friendly materials that could be used to produce specific products;
- IC2.02** explain various methods of handling materials and reducing waste;

Communication

- SP1.04** create displays of the finished products using computer graphics, posters, or multimedia productions;

Application

- ICV.04** describe design-related careers and their educational requirements;
- IC3.01** identify a variety of design-related careers;

Assessment/Evaluation

Students will be assessed and evaluated on the following deliverables. See the Student Project Brief for assessment/evaluation instruments.

	Deliverable	Notes	Suggested Time (hr)
1	Research notes & 1 st Draft of Flow Chart	Team	3
2	Final Display of Flow Chart	Team	1
3	Presentation	Team	.25
4	Application for Patent	Individual	.75
5	Time Log	Individual (for assessment)	-

Evaluation is primarily based on quality and evidence of effort in the production of a product development flowchart, patent application and presentation.

Terminology List

Flow Chart:	a diagram or chart showing a process or procedure.
Product Design:	a process of creative planning that determines how a product will look.
Product Engineering:	a process of creative planning that determines how a product will function, withstand excessive use and will be manufactured.
Proto-types:	a full scale, initial model of a design product, generally operational to test functionality, durability, etc.
Mock-up:	a full-scale model of a product usually made of simple and cheap materials such as cardboard or wood. Used in testing scale, ergonomics, mechanisms, etc.
Patent:	a document issued by a governing body ensuring the exclusive rights to an inventor for an invention or innovation.
Trademark:	the legally registered name or symbol of a company or sellable item.
Copyright:	the legal and exclusive right to reproduce a piece of literature, art or music.
Life Cycle:	the duration of time that something is alive, used or available.
Standardization:	an established unit of measure common to a multitude of an item.
Market Research:	techniques used to gather statistics on consumer habits and needs.
Designer:	a person whose job it is to design.
Engineer:	a person who is knowledgeable in the design of items and whose job it is to design the item so it functions properly.

Reference Resources

Books

Fales, James F., et al. **Technology Today and Tomorrow**. New York, New York: Glencoe McGraw-Hill, 1993. ISBN 0-02677103-9

This book has a chapter which outlines the entire process a product will go through in its development. The chapter includes lots of illustrations and pictures of modern products.

Websites

How Things Work

<http://www.howthingswork.com>

This site describes how everyday objects work and provides clues on how things are made.

Canadian Intellectual Property Office

<http://cipo.gc.ca>

Provides information on obtaining patents for newly developed products. Offers an online tutorial for completing a patent application.

Industry Canada

<http://www.ic.gc.ca>

Provides information on employment opportunities in the technology industry. Contains link to the SchoolNet Youth Employment Initiative – a program established by the national government to help students find employment in industry. Offers an online tutorial for completing a resume and submitting it to an employer.

The Learning Partnership

<http://www.tlp.on.ca>

See the section on “We CAN Invent! 10 Practical Steps to Invention”. The Learning Partnership can also be contacted by telephone at 416 204-4478

Career Information Sites:

(See Career information section in this ARMdoc)

Packaging Careers Council Careers of Canada

<http://www.packagingcareers.org>

Free “Careers in a Package” describing career types and opportunities in the packaging industry, (see your guidance department, these were distributed to all schools last year)

Others

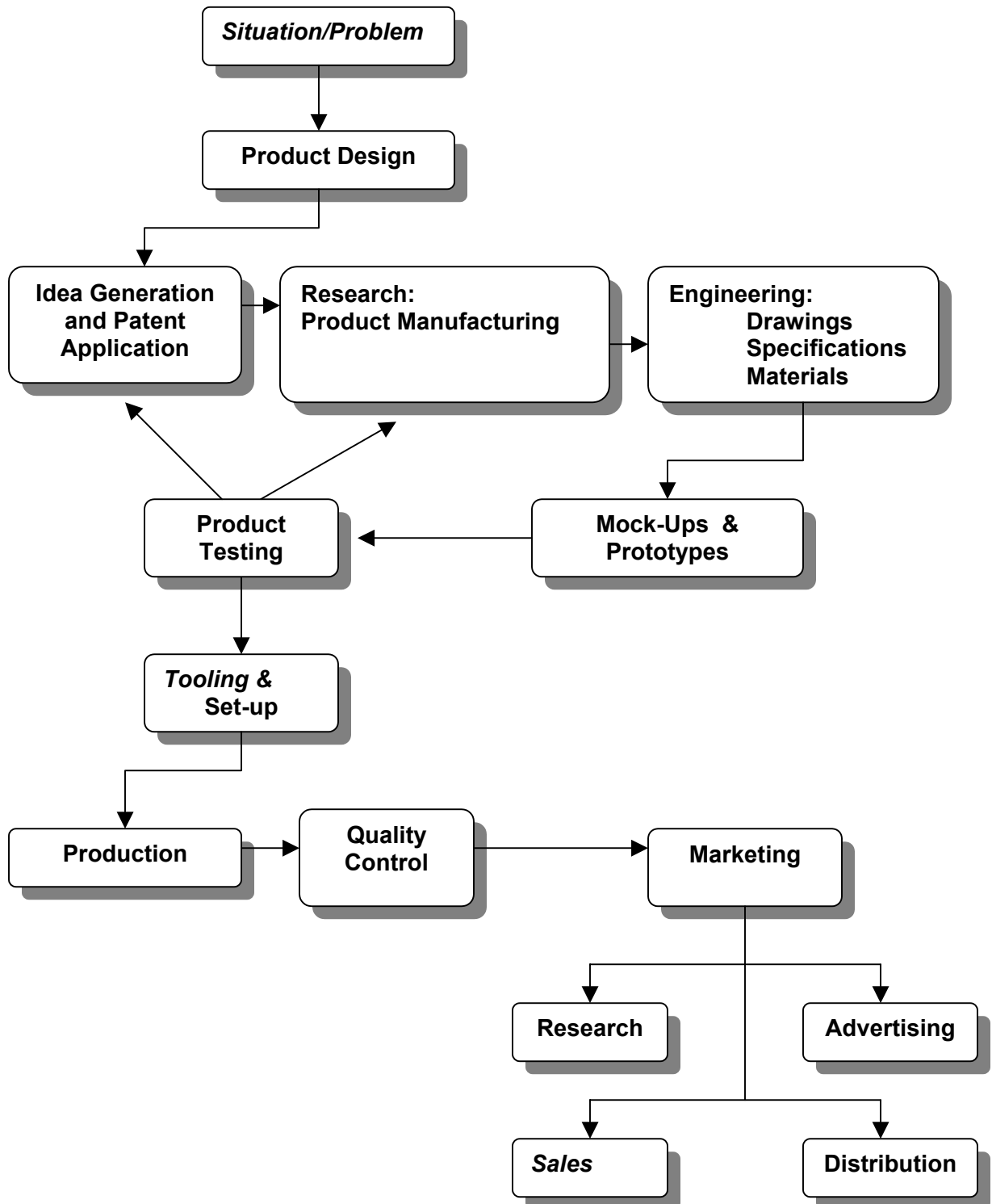
Others resources could include local industries, design/engineering firms, manufacturing companies, or inventors.

Resource Note:

The URLs for the websites were verified by the writers prior to publication. Given the frequency with which these designations change, teachers should always verify the websites prior to assigning them for student use.

ARMdocs make reference to the use of specific texts, magazines, films, videos, and websites. Teachers need to consult their board policies regarding use of any copyrighted materials. Before reproducing materials for student use from printed publications, teachers need to ensure that their board has a Cancopy licence and that this licence covers the resources they wish to use. Before screening videos/films with their students, teachers need to ensure that their board/school has obtained the appropriate public performance videocassette licence from an authorized distributor, e.g., Audio Cine Films Inc. Teachers are reminded that much of the material on the Internet is protected by copyright. The copyright is usually owned by the person or organization that created the work. Reproduction of any work or substantial part of any work on the Internet is not allowed without the permission of the owner.

**Typical Product Development Process:
A Sample Flow Chart**



Partial list of careers involved in product development

- **Industrial designer**
- **CADD technician**
- **Engineer**
- **Manufacturing engineer**
- **Systems design engineer**
- **Test engineer**
- **Engineering technician**
- **Engineering technologist**
- **Plant engineer**
- **Plant manager**
- **Process engineer**
- **Process engineering technician**
- **Quality assurance**
- **Tool and die maker**
- **Mould maker**
- **Precision machinist**
- **CEO, CFO, COO**
- **Patent lawyer**
- **Law clerk**
- **Market researcher**
- **Advertising account executive**
- **Account sales manager**

Career Information

TDJ3M Technological Design

UNIT 3, ACTIVITY 2:

Investigating the Life Cycle of a Product

Career Information Sites:

Human Resources Development Canada: National Occupational Classification Database-

<http://www.hrdc-drhc.gc.ca/noc>

HRDC NOC Search Engine-

<http://www.worklogic.com:81/noc/Query.htm?lang=e>

Ontario Prospects: geared to young people and students

<http://www.edu.gov.on.ca/eng/general/elemsec/job/prospect/eng/index.html>

Job Futures 2000: what's hot, what's not

<http://www.hrdc-drhc.gc.ca/JobFutures>

Job Profiles: real people profile their jobs

<http://www.jobprofiles.org/index.htm>

Canada WorkInfoNet: national and regional market info

<http://www.workinfonet.ca>

The following activity related careers are described in the Human Resources Development Canada (HRDC) National Occupational Classification (NOC) database. Use the search engine link above to learn the main duties performed by practitioners of each trade, the education requirements for the position, and related occupations.

4112 Lawyers and Quebec Notaries

2151 Architects

2232 Mechanical Engineering Technicians and Technologists

2252 Industrial Designers

2253 Drafting Technicians and Technologists

7381 Printing Press Operators

4163 Economic Development Officers and Market Researchers and Consultant

0611 Sales, Marketing and Advertising Managers

Student Project Brief

TDJ3E Technological Design

UNIT 3, ACTIVITY 2:

Investigating the Life Cycle of a Product

Contents:

1. Project Brief Handout
2. Design Scenario Handout
3. Design Scenario
4. Flowchart checklist
5. Flowchart and Presentation Evaluation Rubric
6. Activity Log

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Student Project Brief

Title:	Investigating the Life Cycle of a Product		
Activity:	Develop a flow chart to outline the process a product goes through from its initial idea to marketing, and the careers involved in this process	Course:	TDJ3E Technological Design
Time Req'd:	5 hours	Date:	
RATIONALE:			
<p>Understanding the entire process involved in the life cycle of a product is important in the development of design skills. We need to see where ideas come from in industry, how they are developed into a product, and what that product goes through before it makes it to a shelf in a store. While studying this entire process, you will also become exposed to the many career opportunities that exist in developing a product and the qualifications and educational requirements needed to get the jobs. This activity also provides an opportunity to further develop research, graphic communication and presentation skills.</p>			
THE ASSIGNMENT			
<p>You will research the process a product goes through to develop an idea into a marketable product, and the types of careers involved in this process. This information will be presented graphically in the form of a flowchart. A sample application for patent will also be completed for this activity.</p>			
KEY CONCEPTS: You will:			
<ol style="list-style-type: none"> 1. Research the development of a product and the career options involved 2. Develop a flowchart that represents this process as well as include a list of careers that correspond to each step of the processes. 3. Prepare a display of the flowchart and other appropriate visual aids that can be used as part of an oral presentation 4. Present the information and flowchart to the class. 5. Complete a patent application form for an idea for a new invention. 			
TOOLS AND MATERIALS			
<p>The materials needed for this activity includes poster board and/or a display backboard, drawing/ illustration tools such as pencils, markers, pencil crayons, computer graphics software, scissors, glue stick, tape, paper, etc., and audio/visual presentation equipment if required.</p>			

Evaluation				
No.	Deliverables	Time Limit (Periods)	% Weight	Notes
1	Research notes & 1 st Draft of Flow Chart	3	15	Research Skills & Content
2	Final Display of Flow Chart	1	20	Organization & Diagrams
3	Presentation	0.25	10	15 minute time limit for presentation.
4	Application for Patent	0.75	5	Rubric
	TOTALS	5	50%	
NOTES				
<p>All sketches, design process documentation and logs to be saved for presentation and assessment. Marks based on effort, initiative, creativity, quality of work and documentation of work accomplished. See your facilitator for approvals at all stages.</p> <p>Keep a log of all your tasks and time for project evaluation.</p>				
PROJECT PROCEDURE				
Step	Procedure			
1	<p>Introduction to the Activity Seminar on Flowcharts and the development of a typical product. Select a product to research, obtain teacher approval.</p>			
2	<p>Research and First Draft Identify the major steps in the development of your product. Identify the many career opportunities presented throughout this process. Develop a flowchart to reflect your research.</p>			
3	<p>Final Display and Sample Application Prepare a large display board with your flowchart. Prepare any other visual aids needed for your presentation Complete a patent application for the product you selected</p>			
4	<p>Presentation Present your data and flowchart to the class. Hand in your materials for marking</p>			

Design Scenario: Product Development Flowchart

The local high school is holding a career day and has approached your design firm to set-up a booth exhibiting the many exciting career opportunities that exist in the design and marketing industries. The exhibit also includes a 15 minutes presentation. Management has decided that the best approach is to outline the entire process a product will go through in its development and highlight the career opportunities involved at each step of the process. You and your team have been assigned the task of developing the display and presenting on behalf of the firm.

Design Statement

A product development flow chart is required to illustrate the process that a product goes through from idea generation to consumer's hands.

Design Considerations

Your final product must be clear and concise enough to understand without explanation, but be large enough to be seen by an audience when doing a presentation.

Select a product that has readily available information. You may want to consider a product manufactured by a local industry that you can contact for information.

Make sure that you include the major steps in the development of a product – idea generation, design process, patent, research, product engineering and testing, manufacturing, marketing, advertising and distribution. Also included any additional steps your selected product may have go through.

Deliverables

The following is required:

Your research notes and a rough draft of your flowchart to show your work.

A final copy of the product development flowchart on a display board and a chart with links from each step to a list of career opportunities involved in that stage of the process.

A completed patent application for your selected product.

A 15-minute presentation to the class explaining your flowchart and the qualifications required for the careers listed.

Product Life Cycle Flowchart Checklist

ITEM	YES	NEEDS WORK
Describes the cycle of a product development in graphical form		
Has rough drafts and research notes to show work		
Describes the steps in manufacturing		
Describes the materials used in constructing product		
Describes the appropriateness of the product materials		
Identifies issues in production costs		
Identifies safety issues in product use		
Identifies issues in product durability		
Describes product materials in terms of “environmentally friendly”		
Explains methods of handling different materials		
Explains issues in reducing waste		
Completes clean and informative graphical flow chart		
Uses flowchart symbols effectively		
Presents information clearly		
Demonstrates strong research skills		
Identifies several career options related to product development		
Identifies educational requirements of careers		
Describes the process of patents applications		

Flow Chart and Presentation Rubric

Criteria	Level 1 (50% – 59%)	Level 2 (60% - 69%)	Level 3 (70% - 79%)	Level 4 (80% - 100%)
Knowledge/ Understanding Knowledge of product development. TFV.01, TFV.04, TF2.02, TF2.03	- display and presentation demonstrate limited knowledge of the product and its development.	- display and presentation demonstrate some knowledge of the product and its development.	- display and presentation demonstrates a considerable amount of knowledge of the product and its development.	- display and presentation demonstrates a thorough knowledge of the product and its development.
Thinking/Inquiry Identify design issues and environmental considerations ICV.04, IC1.02, IC2.01, IC2.02	- describes in limited detail product issues of costs, safety, durability, environmental issues	- describes in adequate detail product issues of costs, safety, durability, environmental issues	- describes in considerable detail product issues of costs, safety, durability, environmental issues	- describes in exceptional detail product issues of costs, safety, durability, environmental issues
Communication Create a display of the finished product and present the information. SP1.04	- chart indicates more attention to quality and greater effort required - presentation shows more effort required	- chart shows some attention to quality -presentation shows adequate effort and research quality	-uses graphic design wisely, chart shows attention to quality -presentation shows considerable effort and research quality	-uses graphic design wisely and creatively, chart shows attention to quality and detailed research -presentation shows exceptional effort and research quality
Application Relates product development to career descriptions ICV.04, IC3.01	- makes limited links between process and design related career opportunities and their educational requirements	- makes some links between process and design related career opportunities and their educational requirements	- makes links between process and design related career opportunities and their educational requirements	- links the process and a considerable amount of design related career opportunities and their educational requirements

Safety Resource Pack

TDJ3E Technological Design

UNIT 3, ACTIVITY 2:

Investigating the Life Cycle of a Product

Contents:

1. Safety Data Sheets:
(General lab safety)
2. Safety Passport (if required in display creation)
3. Safety Test (if applicable)

NOTE:

All personnel in a shop environment must be wearing approved safety eyewear at all times.

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INSERT THE FOLLOWING SHEETS FROM THE SAFETY RESOURCE PACK:

1. Safety Data Sheets:
(General lab safety)
2. Safety Passport (if required in display creation)
3. Safety Test (if applicable)