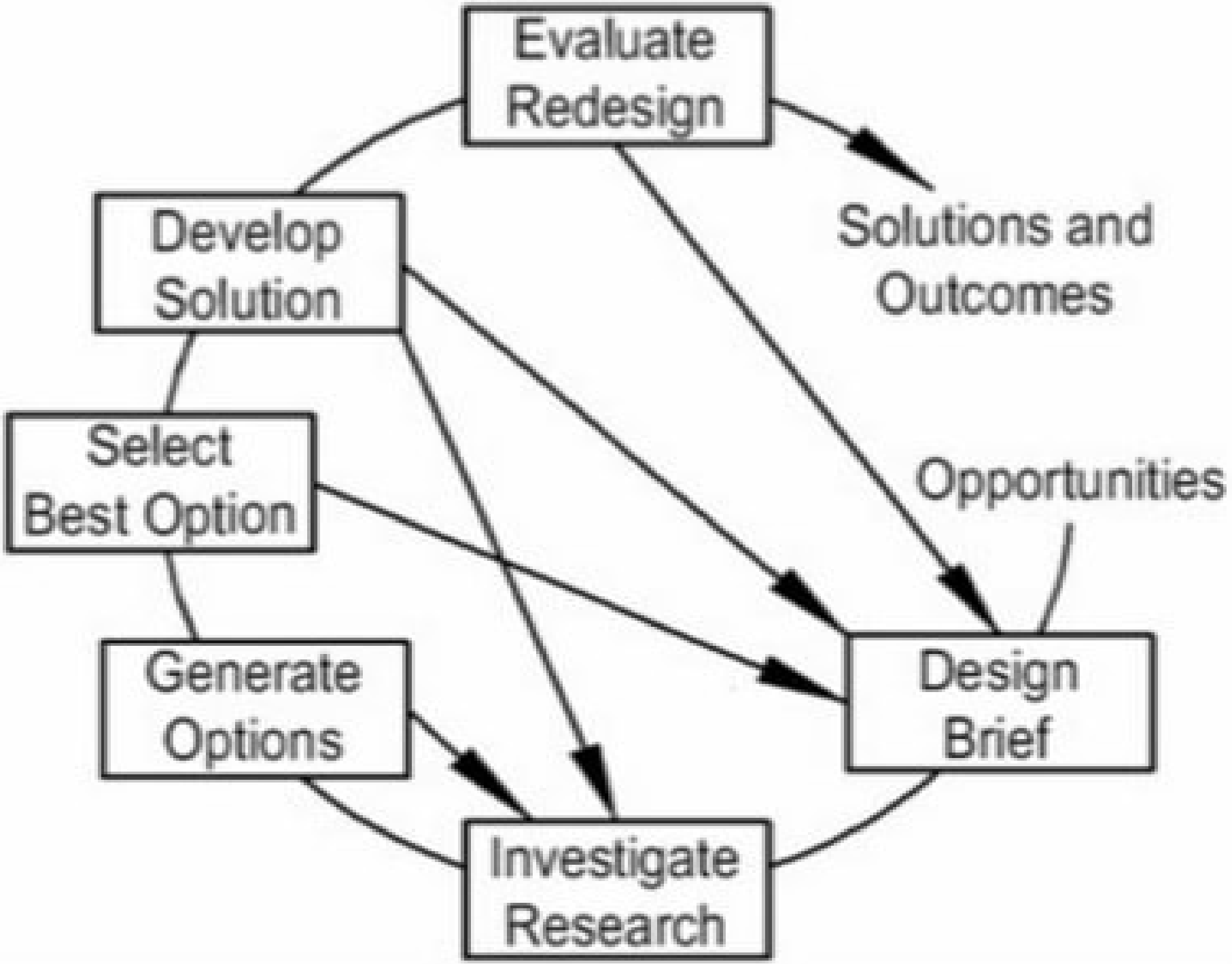
Engineering Design Process


Evaluate Redesign
Develop Solution
Solutions and Outcomes
Select Best Option
Opportunities
Generate Options
Design Brief
Investigate Research

Design Process

- The design process is a methodology that can facilitate technological problem-solving.

- It is an interactive process that begins with an identified need or opportunity and progresses through a series of pre-defined steps to final implemented solution.

Opportunities

- An engineering design activity always occurs in response to a human need.
- Before you can develop a problem definition statement for a design problem, you need to recognise a need for a new product, system, or machine.

Design Brief

- A critical step in design is to identify the problem by identifying the design objectives or goals.
- For each objective, criteria that quantify or qualify that design objective, must be assigned.
- A list of specifications/criteria/requirements and restrictions should be completed.

Investigate/Research

- Before you can go further into the design process, you need to collect all the information available that relates to the problem.

Investigate/Research (continued...)

- Consider the following:
  - Suitable materials for the project
  - Safety factors related to the design problem
  - Write letters to manufacturers/shops
  - Researching using library, internet, professionals, etc.
  - Carry out a survey/questionnaire and present the results as a pictogram/table of results
  - Collect pictures of existing products (photographs, magazine/catalogue images, etc.)

Generate Options

- The next step in the design process begins with creativity in generating new ideas that might solve the problem.
- Start with existing solutions and then tear them apart. Find out what's wrong with those solutions and find out how to improve on their weaknesses.
- Draw at least 3 different ideas with notes.

Select Best Option

- Once you've thought of alternate solutions to your design problem, you need to analyse those solutions and then decide which solution is best suited for implementation.

- Use a table or design matrix to indicate whether or not each of your alternative solutions meets the solution objectives by writing yes or no in the space provided.

Develop Solution

- The best solution option is developed in detail at this stage.
- This often involves various engineering calculations and the development of detail and assembly drawings.

Develop Solution *(continued...)*

- You would need to develop both **isometric drawings/plans** (3-dimensional view), and **orthographic drawings/plans** (detailed views of each individual side).

- Following this, a physical or virtual prototype is usually produced and tested to ensure functional compliance.

Evaluate/Redesign

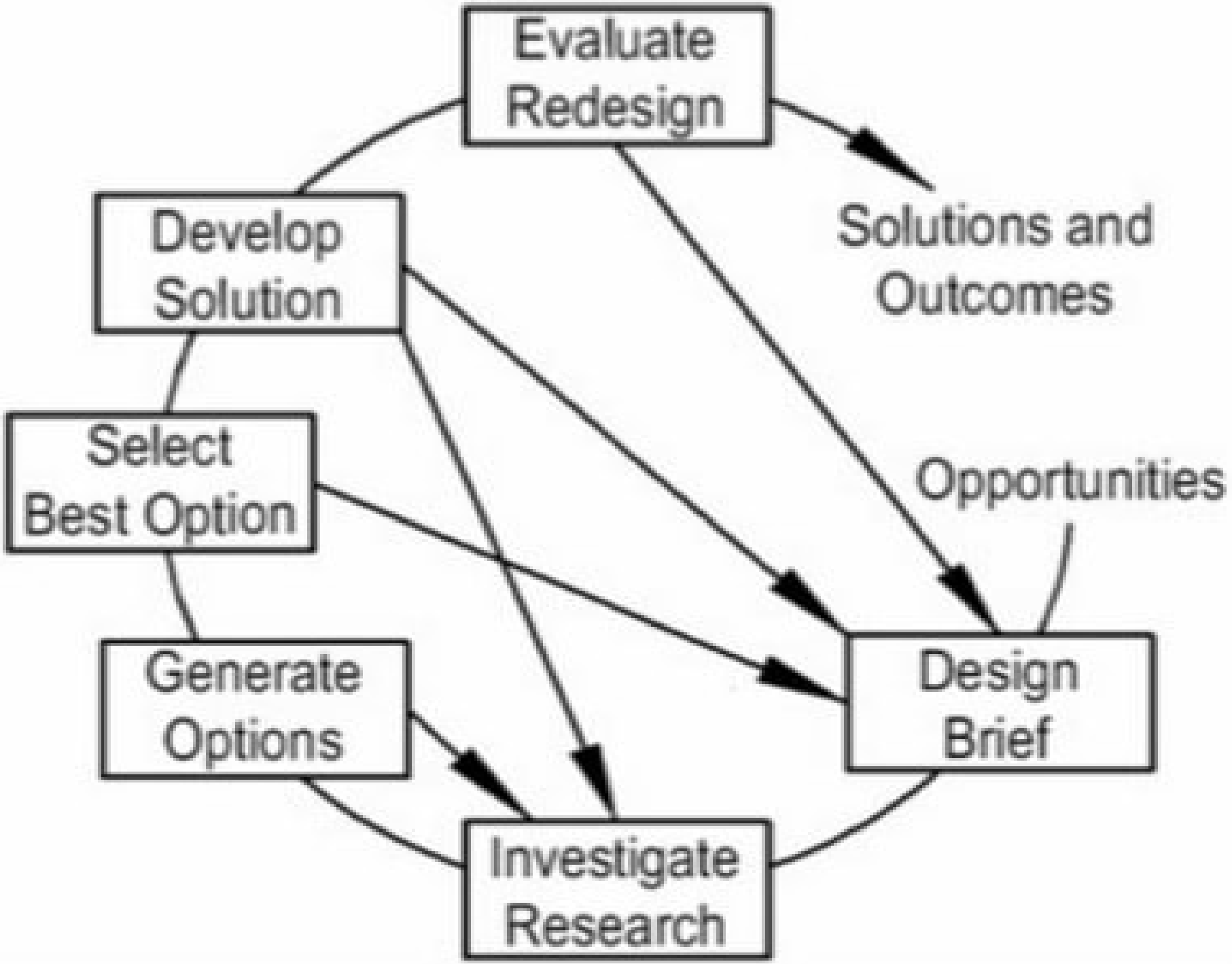
- Evaluate your product.
- State the good and bad points of the design.
  - Does the solution answer the design brief?

Evaluate/Redesign (continued...)

- Prototype testing will often reveal the need for improvement in a number of areas.
  - The need to minimise weight and reduce production costs, for example, are sometimes identified at this stage.
- The design process essentially repeats at this stage in an effort to optimise the design. Hence, it becomes a cyclic process.

Solutions/Outcomes

- After the prototype is evaluated and redesigned (if necessary) production of final drawings/plans would be made and the final product would be created.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