

ES 115

Design, Innovation and prototyping

4 Project brief + Intro to manufacturing



Manasi Kanetkar
September 2024

PART 1: Project Brief

Making a questionnaire

Cover the following

- **User details** (name, age, gender, education as applicable)
- Questions about **frequency** of task, **time taken**
- Level of human **skill** and engagement
- **Products and tools** used in current scenario

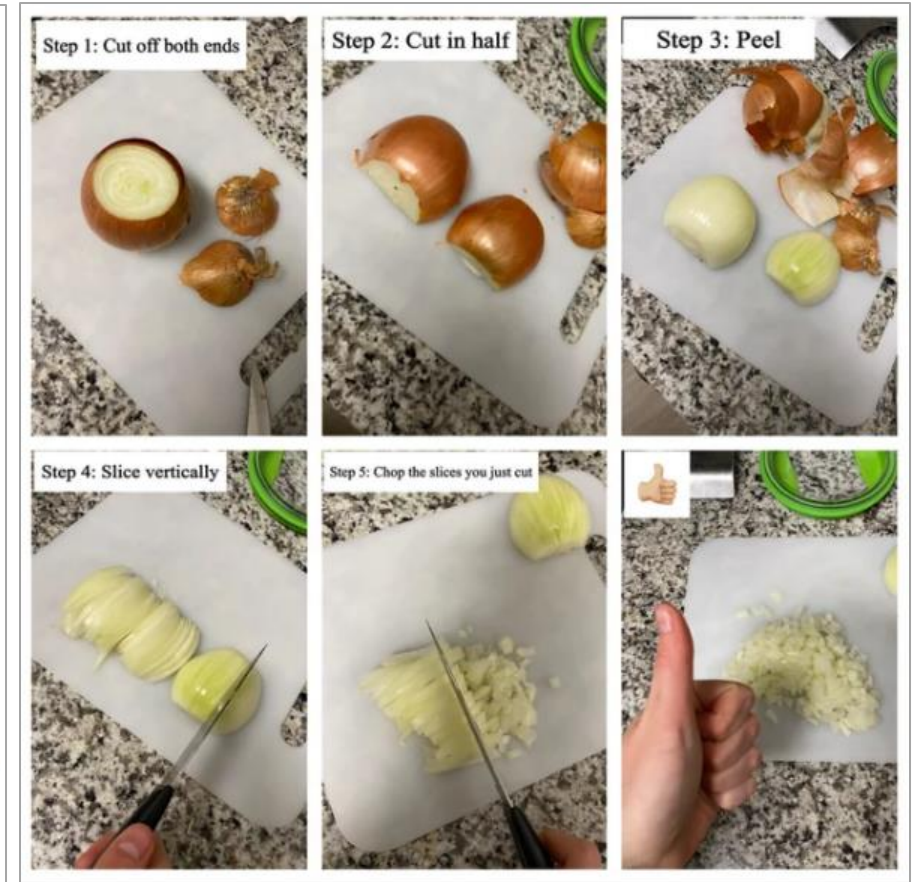
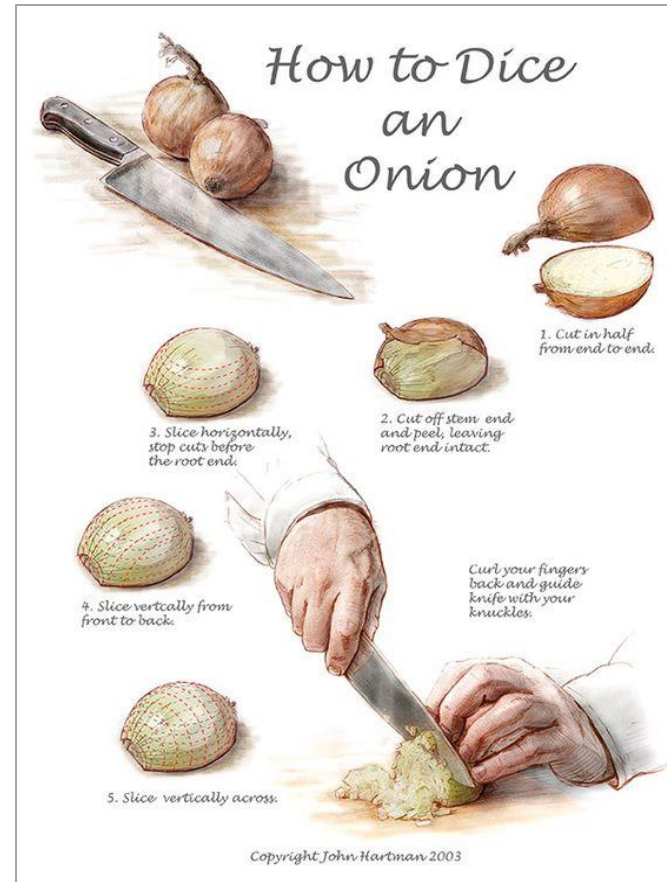
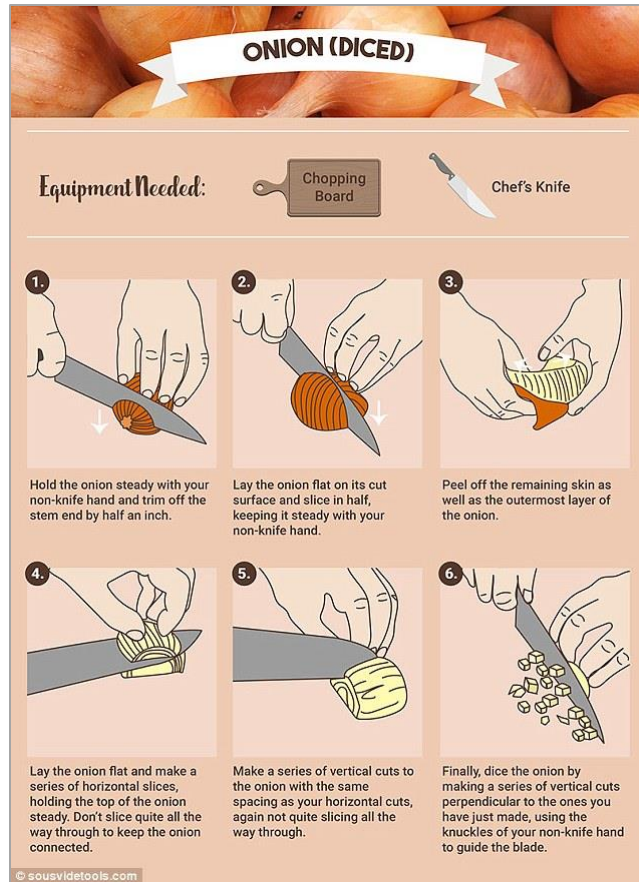
Note: Think of a way to get and record relevant information

Pointers: Task Analysis

- Breakdown of **task into important stages** (remember paper clip?)
- Note specifics of **environment** (where, when is the device needed)
- **Specific habits** / techniques used by skilled users
- Document the task (how to keep a record)



Examples: Task of dicing onions



Chose the stages (subtasks) and observe issues for each stage

Pointers: Desk research + Expert advice

- **Existing products** in the market for the task
- Product reviews ?
- **Articles / research** on the subject
- Any other content that supports the argument

Template for project statement

“To design tool/ device to _____ (task/ action) for _____(users)”

*Add the context, use appropriate adjectives, adverbs as required

Examples of project statement

1. To design a **portable** tool or device to **keep and carry medicines** for **medical staff** in **remote areas**
2. To design a tool or device that can **carry specs and be compact when they are not used**; **for travelers**.
3. To design a tool or a device to **keep bees in apiculture** for **farmers**.

*The students started brainstorming with the task of 'moving/ carrying'

Examples of project statement

4. To design a tool or a device for **the postman** which will **contain parcels of different sizes and shapes**.
5. To design a tool or a device to **carry hot mess food** to the **hostel room** for **hostel students**.

*The students started brainstorming with the task of 'moving/ carrying'

Start investigating >> Defining

1. Purpose (Why)
2. Target user group (Who)
3. Context (When and Where)
4. Project brief as the conclusion of above

Example 1

Project Brief

Need Statement:

To design a tool/device to **carry basketballs** to and fro the basketball court and hostel area **for players**. (~distance: 500m)

Design Opportunities:

1. The device should easily carry 25-30 balls, without any falling off.
2. It should be lightweight yet sturdy.
3. It should have wheels with good shock absorption qualities.
4. The device should be easy to turn.
5. It should be able to catalog various sizes of balls for ease of players.

Submitted by: Group 4, Needles and Threads

**Note: The physical aspects are still not resolved, we want it that way!*

Supporting Data (in gist)

Target Group:

Students and PE facilitators at IITGN

Sizes of Balls (circumference):

Basketball Size 7	29.5 inches
Football Size 5	27-28 inches.

Volleyballs	22.6 - 26.5 inches
Medicine balls	27 inches.

Other Uses:

Organizing and Cataloging balls from multiple sports

Compartments and their Positions:

1. Multiple compartments for balls of various sizes for organization; ease of unloading
2. The compartments should be vertically oriented

PROJECT BRIEF TRANSPORT

To design a device to transport basketballs
to and fro the hostel area & basketball court for players.
(Walking distance: 500m)

TARGET USERS

Students/PE facilitators
who play basketball
at IITGN.

SIZES

- Basketball size 7 of circum-
-ference 29.5 inches.
- Football size 5 of circum-
-ference 27-28 inches.
- Volleyballs of size 22.59
to 26.34 inches.
- Medicine balls of circum-
-ference 27 inches.

IT SHOULD CATER TO THE
USER'S EASE OF:

1. Effort of transporting
the balls.
2. Carrying Multiple Balls
of various sizes.
3. Loading
4. Unloading

PROJECT STATEMENT

- The device should be able to easily carry 25-30 balls, without any risk of them falling off.
- Since the device has to be pushed by a person, it should be lightweight, yet sturdy.
- The wheels of the device should have good shock absorption capacity.
- The device should be easy to turn.
- One should be able to catalogue the different sizes of footballs and basketballs using the device.

COMPARTMENTS AND THEIR POSITIONS:

1. Should have multiple compartments for balls of various sizes for better organisation and ease of loading.
2. Position should be vertically oriented.

OTHER USES:

Organising &
Cataloguing Basketball
Footballs and
Volleyballs of
different sizes.

TASK ANALYSIS



Ball on the court



Carrier to transport



Moving the carrier towards the ball



Loading the ball in the carrier



Moving the carrier



Balls falling off from the carrier



Picking the fallen balls



Moving on

DESK RESEARCH



Metal Carrier with wheels



Storage made with net.



Carrier with additional features.

Products available for storing and transports of Basketball balls.

Support Data

Difficulties faced by the players:
"It is difficulties to push the Carrier."
"The wheels keep getting stuck in the holes on the path."
"It is difficult to turn the Carrier."

*Note: Students quantified the distances and sizes of balls. They also made a video demonstrating all the problems faced while carrying the existing trolley

Example 2

*The following slides are presented as they were submitted

ES201: Introduction to Design and Innovation
Fall 2022

Project Brief

Team “Design Redesigned”

Note: Student names have been removed

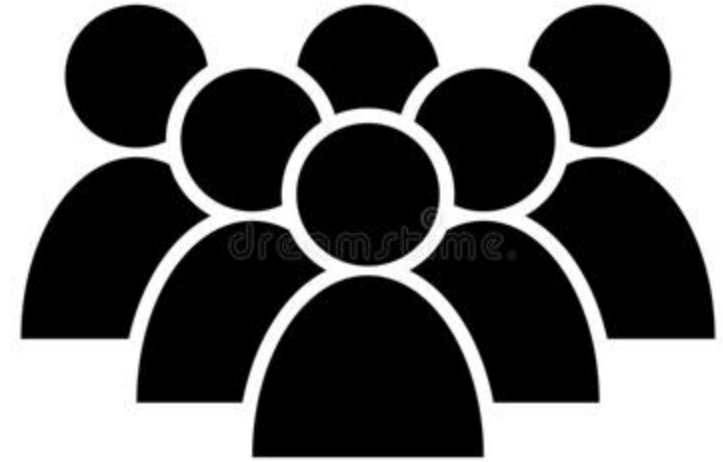
Need Statement

To design a compact device to carry specs
to make it convenient for users.



User Group

- Students
- Employees
- Elderly people
- Reading-specs users
- Farmers



- All spectacle users with a specific need such as travelling
- Or a specific age group e.g. children under 10 / the elderly

Environment

- Travelling
- Rainy-weather
- Sports
- Crowd (market)
- While sleeping



- Choose 1
- Or combine those which make sense together e.g. travelling + market places

Design Opportunities

- Make cases with better grip.
 - We can hang the case (say, on pants/ bags).
 - Easy to open; can be opened using only one hand.
 - Space for specs cleaning liquid.
 - Case is foldable when empty.
- Prioritize
 - Keep it crisp
 - Use good vocabulary

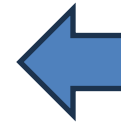
Major Takeaway (from data collection and analysis)

- Difficulties with the current model of specs case:

- No provision to carry lens cleaner.
- Insufficient space to keep the cleaning cloth.
- Not compact enough .

- Coveted Features:

- Adjustable Size.
- Provision to accommodate cleaning cloth and lens cleaner.



Repetition

- Comfort and Aesthetics:

- Fit to pockets.
- Aesthetically appealing.



Why combine?

Prioritize

Keep it clear

Use good vocabulary

Example 3

ES-201

Introduction to Design
A Translation

BREAK

1. The first step is to identify the problem.
 2. The second step is to define the problem.
 3. The third step is to analyze the problem.
 4. The fourth step is to develop a solution.
 5. The fifth step is to implement the solution.
 6. The sixth step is to evaluate the solution.
 7. The seventh step is to monitor the solution.
 8. The eighth step is to maintain the solution.
 9. The ninth step is to improve the solution.
 10. The tenth step is to document the solution.

© 2005 Blackwell Publishing Ltd *Journal of Internal Medicine* 258: 105–112

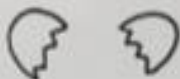
"To Design a Tool that results in breaking eggs
rather than crumple the shell for Smaller Cakes."

🍳 USER-DEMOGRAPHICS

- **Admin Group** - 12 Teams & Admins
- **USER Group** - Amateur Cosplayers

DESIGN OPPORTUNITIES

- Shell crumbles fall into the dish when breaking.
- Egg Whites Spills Out and get the whole food dirty.
- Shell has to be disposed after cooking.
- Some people eat egg whites and Yolk separated.



TASK-ANALYSIS



Arctostaphylos uva-ursi (Bearberry)



2. direct change of log value



Speak on my behalf to the
Said One and return.



April Supply from 2011 Only

SUPPORTING DATA

How do you think they?

2246

U.S. Customs Service

ETN 100-0

How well do you know Type 9?

A horizontal number line with arrows at both ends. It is marked with integers from 0 to 10. A red dot is placed on the line at the number 4.

How changed has our life in 1990?

User demographics:

Age Group: 12 & above

User Group: Amateur Cooks

Design Opportunities

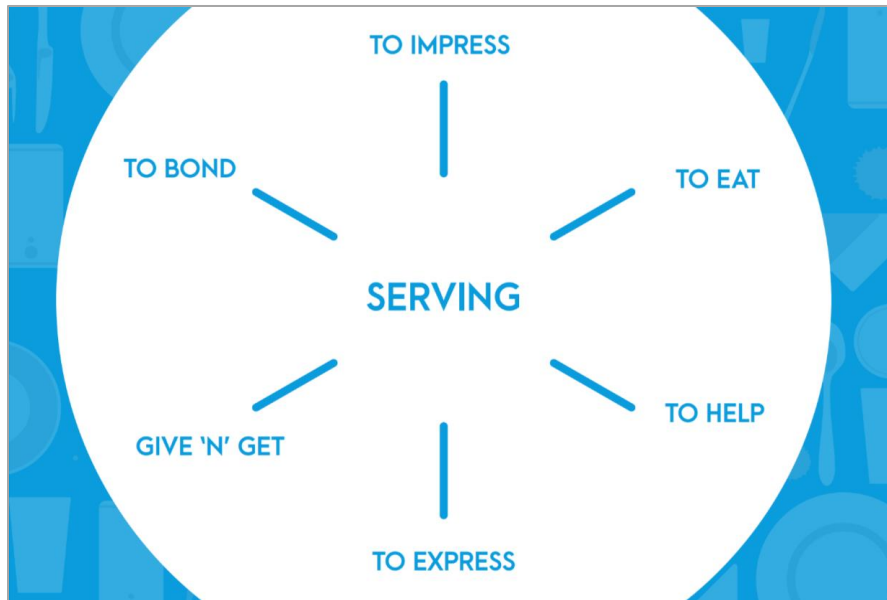
- When cracking the egg, shell pieces might fall into the dish.
- Egg white spills over and gets the user's hand dirty.
- Shells have to be disposed of after cracking.
- Break an egg properly so the yolk does not rupture.
- Some people need egg whites and yolk separated.

"To design a tool that assists amateur cooks in breaking eggs,

having a neat crack and without creating a mess"

Original statement : To design a tool that assists in breaking eggs neatly and creates no mess for amateur cooks

Example 4 : USER STUDY



AN INDIAN NUCLEAR FAMILY

Young child helps the mother to serve, like taking the plates to the table.

Child finds the kitchen tools to be oversized.

Serving is a dining etiquette that the child picks up from the mother.



KOREAN NUCLEAR FAMILY

Side dishes are kept in the refrigerator until the need to serve.

Containers are always of the same type and colors.

Difficult to recognize the dish even by looking at the food color, as most Korean side dishes are of similar colors.



A WELL OFF FAMILY OF 5 WITH A HELPER

Each dish is brought in separately, served to each member and then the meal begins, according to the dining etiquettes.

Self serving is hard because of a big table.

Large table is harder to walk around and manage.

Helper has a hard time arranging the food on the table and serving everyone.

Awkward moments between the helper and the person eating.



A STUDENT LIVING AS A PAYING GUEST

He lives with 2 roommates, works late at night and eats food at these odd hours.

Eats food in the same vessel used to prepare it.

Sharing becomes an arduous task.




Theme : Serving (food)


To create a product/range of products
that enhances the experience in the process of serving.



Problem validation



Dr. Mufaddal Yusuf Zakir
General Physician
Family doctor




Dr. Sherline Pimenta K
Ph.D in Storytelling

*" Using smartphones and television
as a distraction for feeding
creates a wrong impact on kids. "*

*" Storytelling is a great way to bond
with either parents or guardians "*

*" Children have a great sense of imagination,
they love to explore their minds and end up
creating stories. "*

" Parents need reassurance. "



Expert advice

Theme : Serving (food)

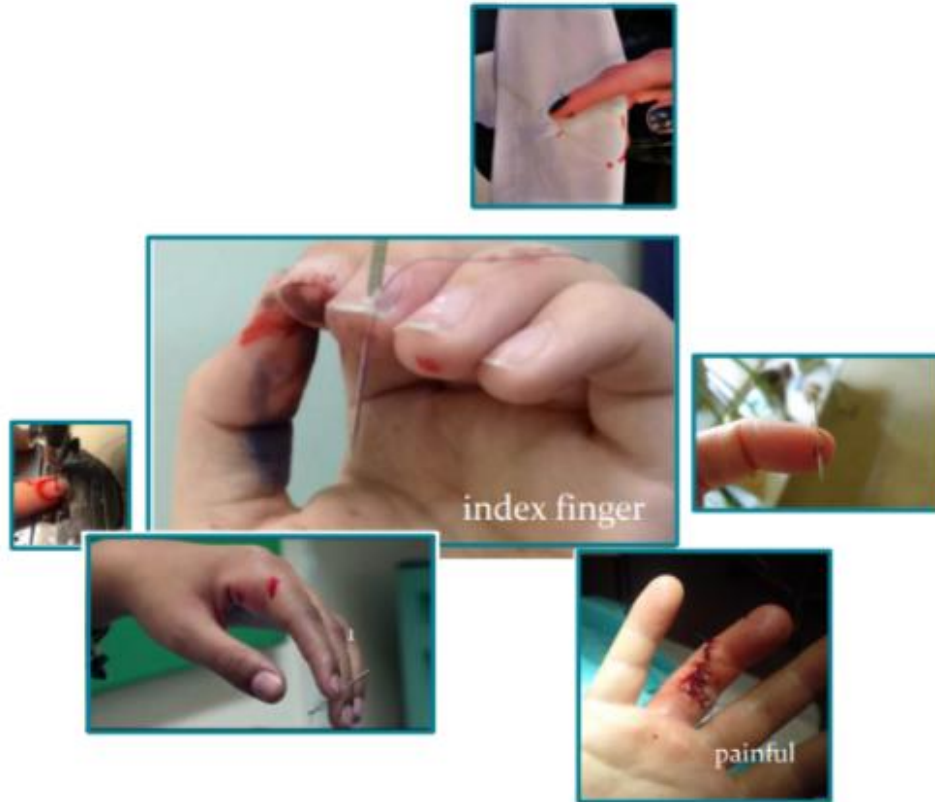
Project statement :

To design a device to serve food to
toddlers

Design opportunities

- Interaction between the toddlers and
their caregivers
- Avoid dependency on the mobile
phones
- Integrate storytelling/ play

Example 4 : Defining brief



'Protecting' finger while using the sewing machine

Finger guard



This guard is design by juki company. Its a kind of wire not exactly the product. its placed over the presser foot hold by the presser foot holder.

Protective ring



Its work as extra layer on the finger. Made up of steel and we have to wear it in our finger.

Eye guard



This devise is mainly protect the eye if needle breaks. It placed above part of needle.



finger guard

- vision problem
- Issue in putting threads
- Not much effective



protective ring

- un comfortable
- handling issue

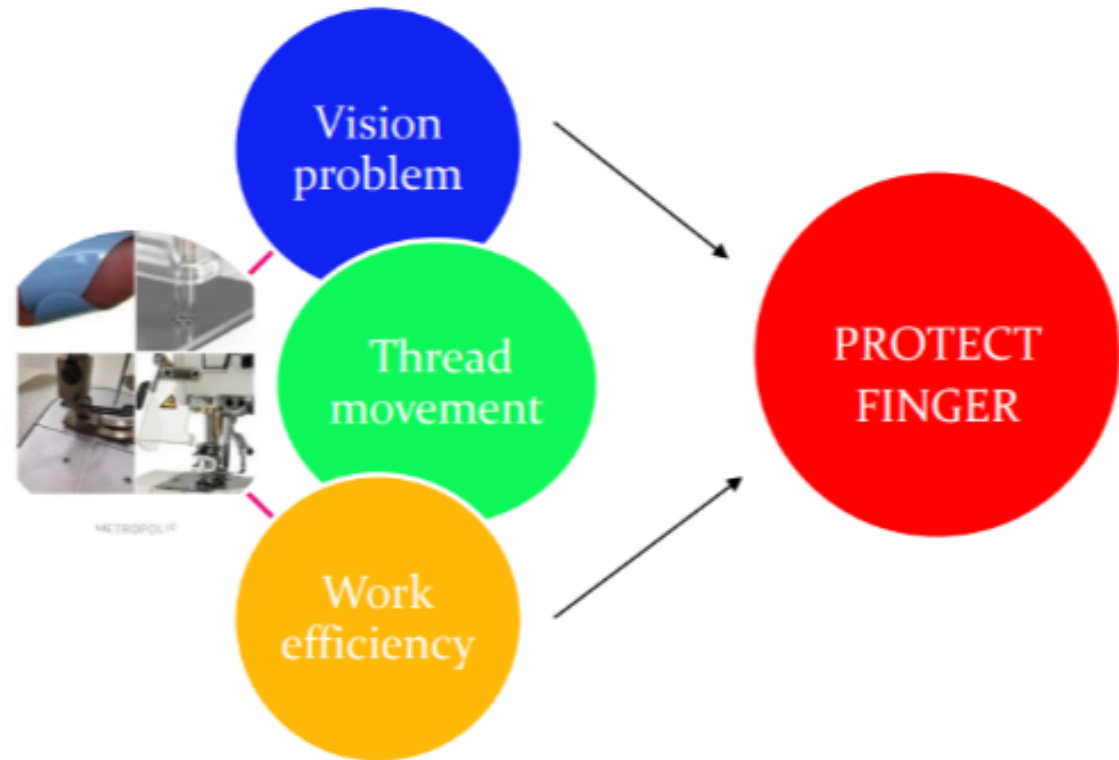
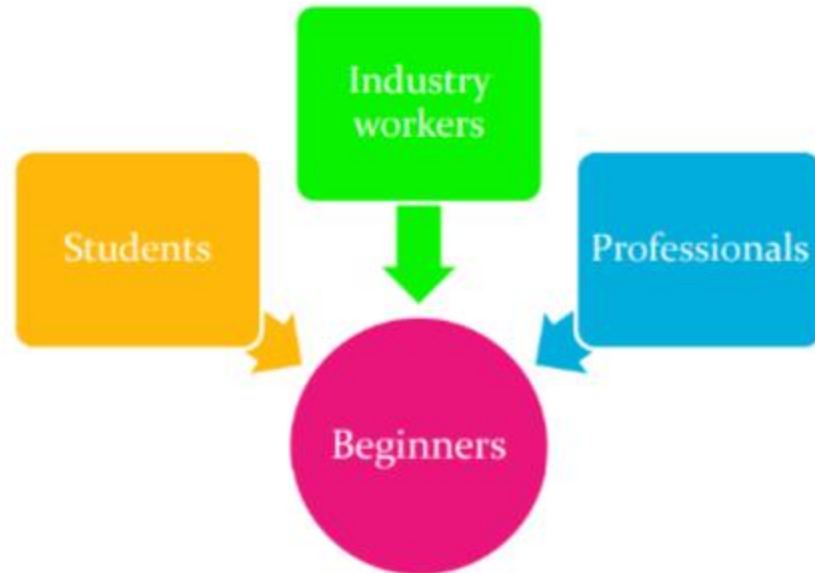


eye guard

- reduce work efficiency
- very much un convenient

ANALYSIS USERS:

All user have one common issue/problem which they faced at the beginning stage of stitching



**'Protecting' finger while
using the sewing machine**

Submission : Project brief / value proposition

1. Project statement

2. Details about the following

- Profile of the target user (age/ gender /skill level etc.)
- Environment/ context in which the proposed product is to be used
- Design opportunities

3. Major understanding from data collection and task analysis (as a supporting document)

***No solutions to be proposed** (only opportunities of improvement)

Breather...

Important announcements

- Next class 18th September (Wednesday): Human Factors

- Project brief / value proposition
- Techno-aesthetic detailing



22nd September

Plan the activities well, last minute job will not work for both.

Complete the data collection for project brief by 16th.

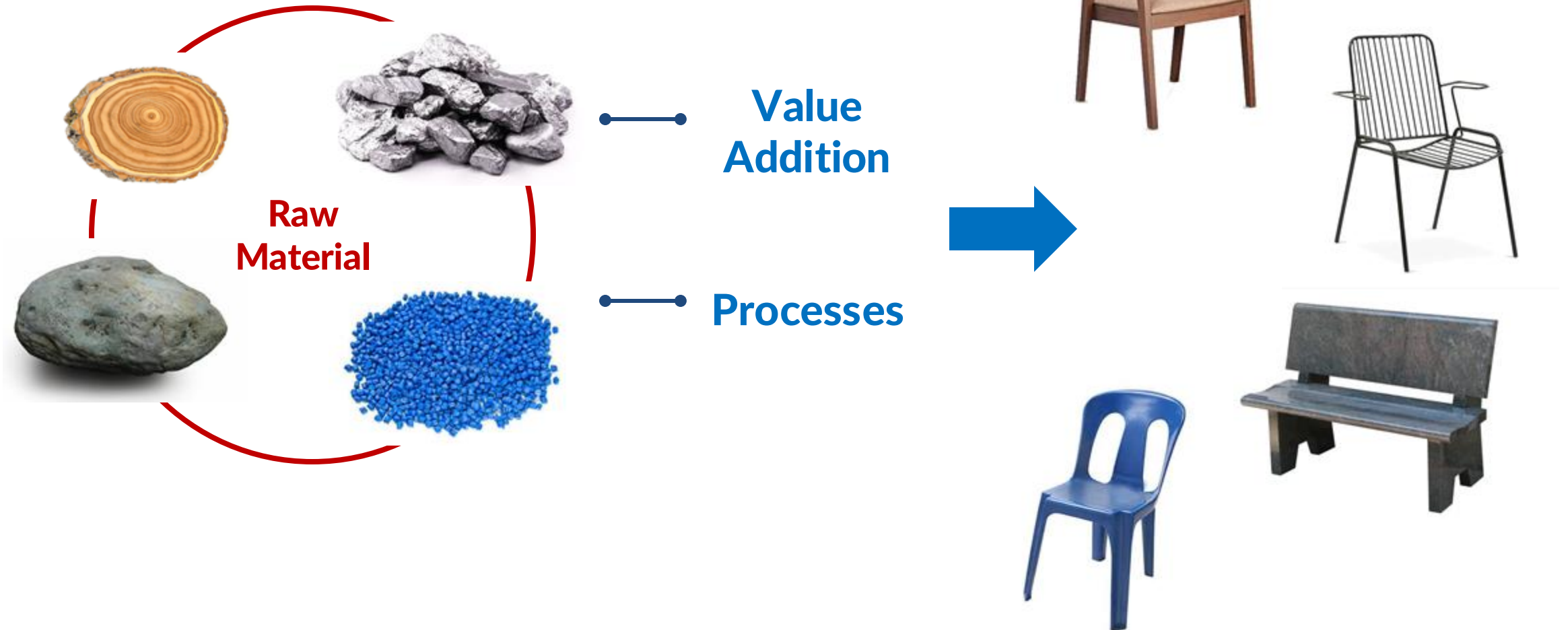
Feedback on statements will be provided ASAP.

PART 2: Introduction to manufacturing

Processing as value addition



Processing as value addition



Stages of manufacturing

Raw materials



Pre-processing



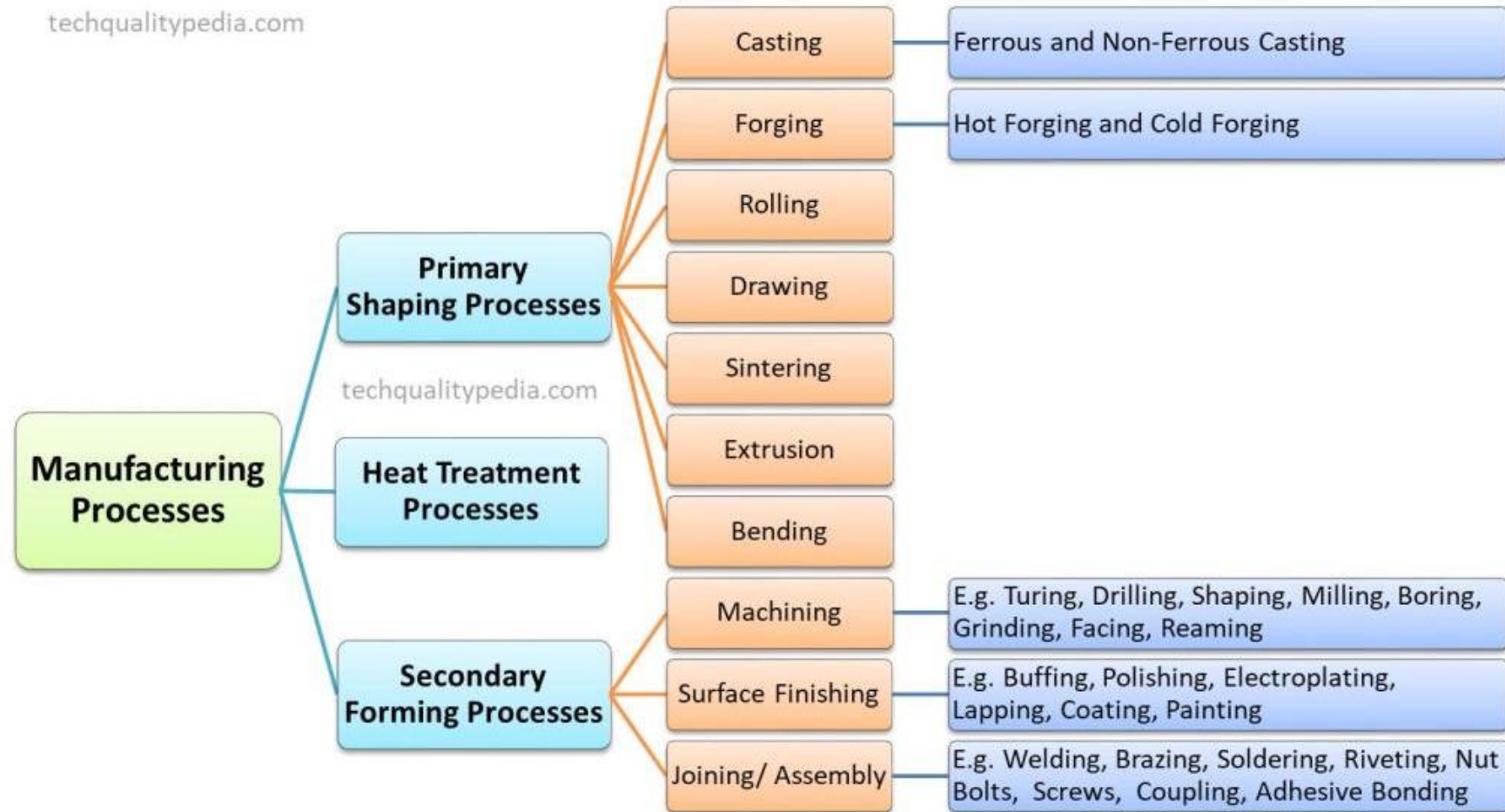
Processing



Post processing



Classification of manufacturing processes



Boring?

Let us make it very simple

Rocket science/ household kitchen??



Still from a Hindi motion picture Mission Mangal (2019)

Stages of manufacturing



Raw materials



Pre-process



Tools / machinery



Process



Post- process



Storage

Aspects of manufacturing



Common manufacturing processes

- Fabrication (bending /punching) : Sheet metal / pipes
- Heat treatments : Metals, glass
- Molding / Casting : Plastics, metals, ceramics
- Forming (extrusion, drawing) : metals, few plastics
- Joinery – fasteners, welding, fusing, adhesives, stitching

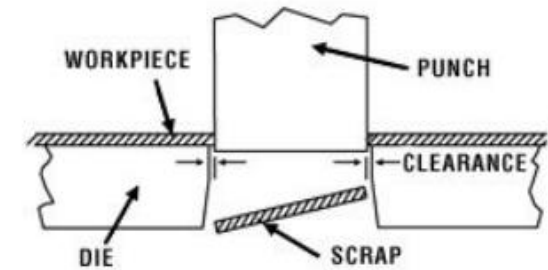
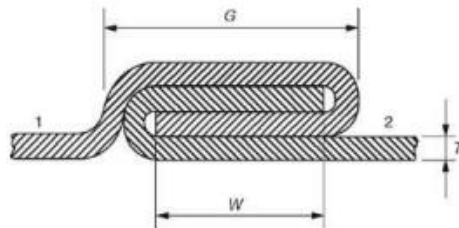
Many other natural materials and specially designed materials will require specialized manufacturing processes

Important resource: <https://www.manufacturingguide.com/en/search/process>

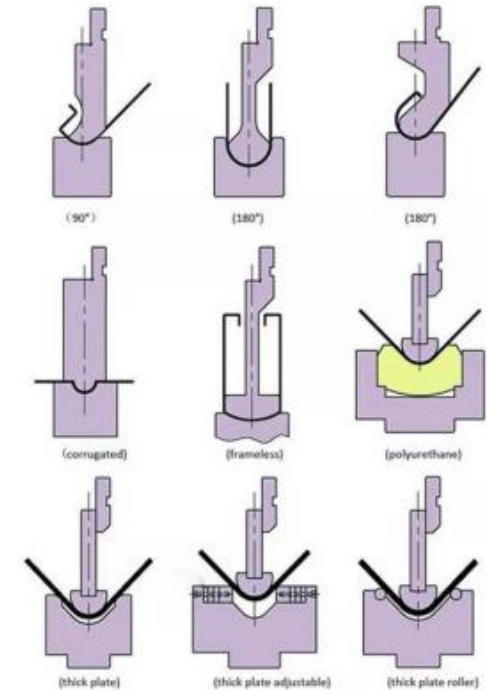
Fabrication



Fabrication



PUNCHING PROCESS



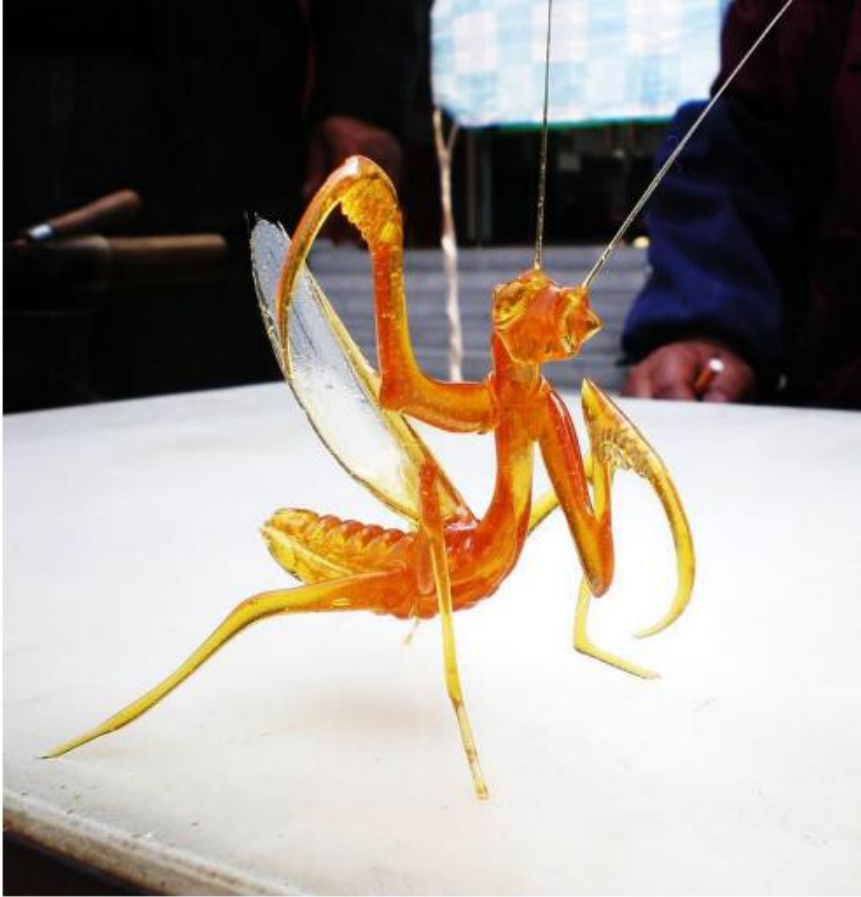
Heat treatment : Rapid cooling



Heat treatment: Tempering



Heat treatment: Glass transition



Sugar



Silica glass

Extrusion



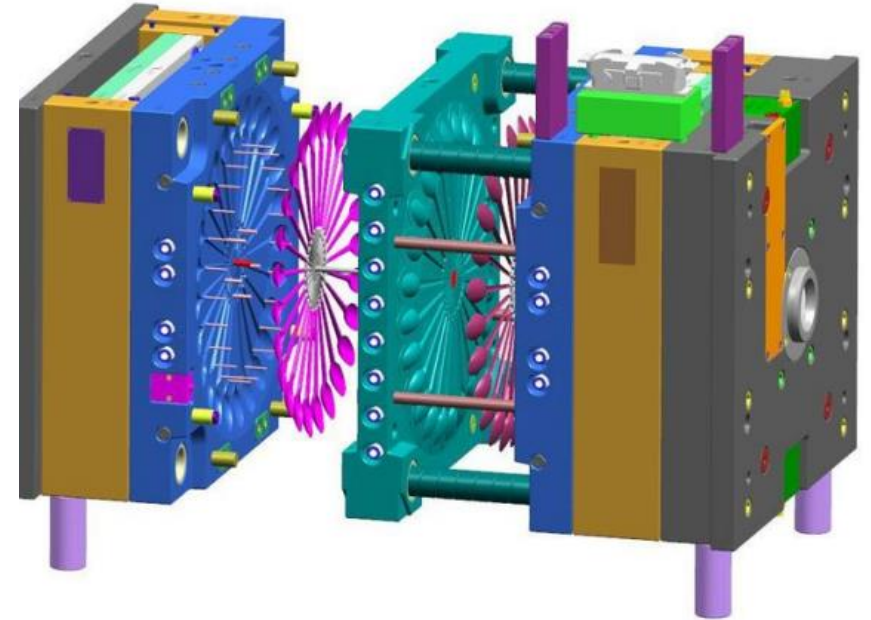
Extrusion



Die casting / moulding



Die casting / moulding

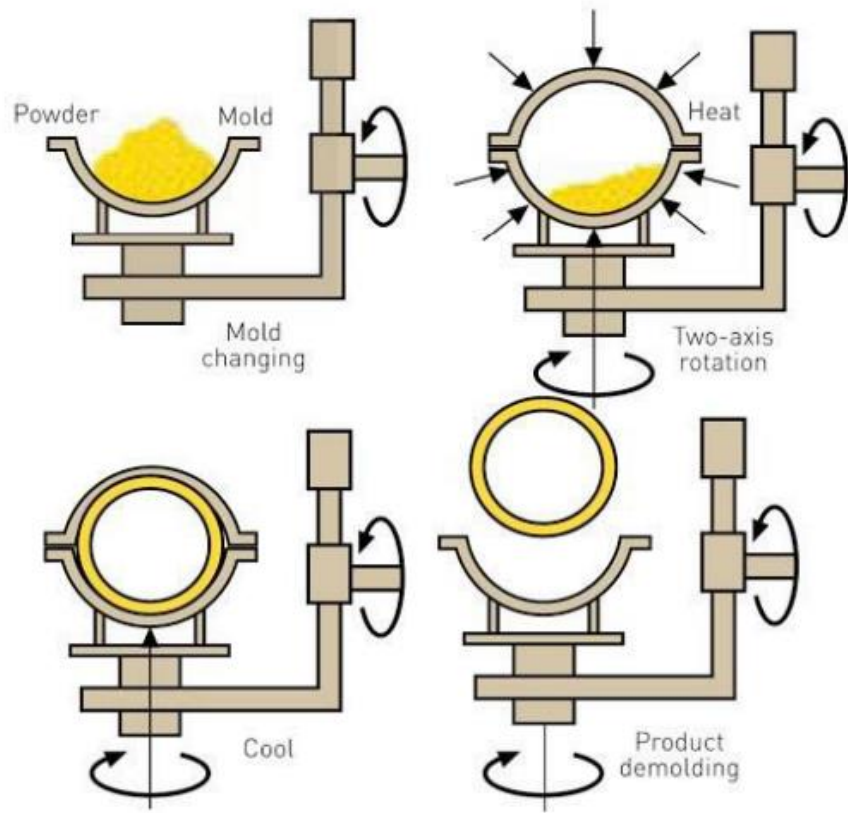


Important resource: <https://www.bpf.co.uk/plastipedia/processes/Default.aspx>

Rotational moulding (roto-molding)



Rotational moulding (roto-molding)



Glazing



Finishing treatments

Dip technique



Hydrographics



To summarize: manufacturing means

PLAN

PROCURE

PRPARE the raw materials, set the machines

SHAPE the parts

FINISH

ASSEMBLE

STORE

ES 115

Design, Innovation and prototyping

4 Project brief

Next class ... 'Human factors' (18th September)