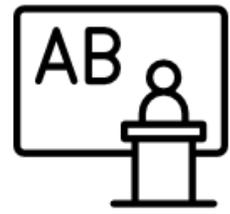


Annual **EGA** Aluminium Design Challenge



Teacher's Support Guide

This support material is designed to act as a guide to support the successful delivery of the EGA Aluminium design challenge. It can either act as a scheme of learning that can be taught in lessons or as part of an extra curricular activity over a number of weeks leading up to the deadline for submission or simply allow you to hand over the control of the project to the students taking part.

It is split into 8 sections:

- The Challenge Aims,
- What's in it for your student and school?,
- What to get student's to focus on?,
- Challenge Checklist,
- Key dates and Entry requirements,
- The Four Challenge Themes,
- Schemes of learning, and
- Theme-based Checklist.



We hope that you and your students enjoy taking part.

The Challenge **Aims**



Encourage greater interest among UAE resident students in STEAM subjects



Contribute to more UAE Resident students to considering STEM careers



Bridge the gap between classroom learning and real-world application of knowledge in industry



Help develop important skills such as teamwork, communication and analytical thinking



Aid improved learning outcomes through hands-on learning activities



Contribute to Emiratisation of STEM professions in the UAE

What's in it for your Student and School?



Prizes awarded in the following categories:

Overall Winners of each category receiving a prize of 10,000 AED
Out of which 5000 AED is for the school.



Runners-up in each category receiving a prize of 5000AED



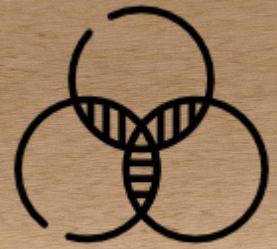
All participating teams receive certificates.

There are two stages for the challenge. In the first stage which is the online challenge, the teams need to submit their project portfolio online which will be judged and 20 teams will be shortlisted.

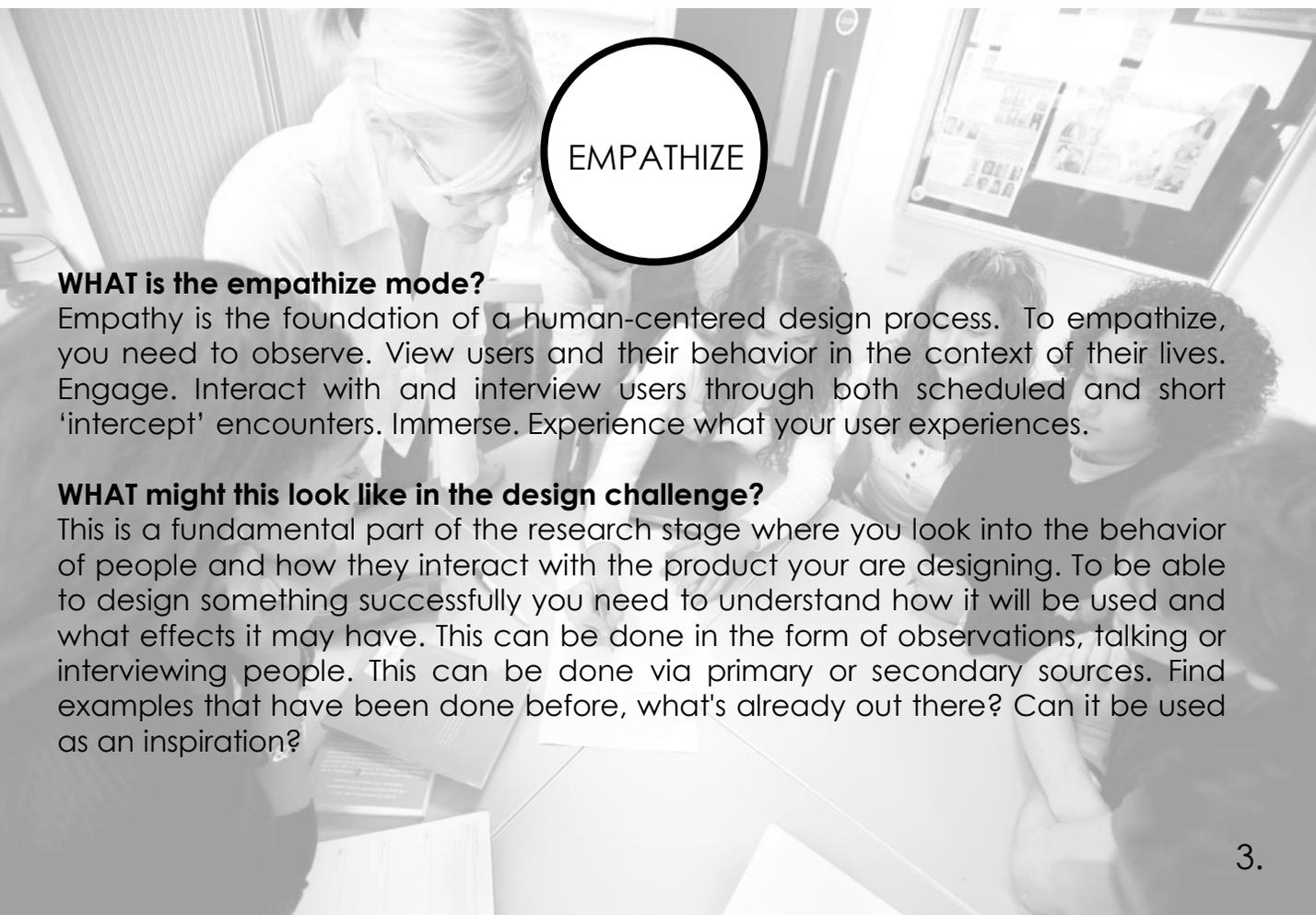
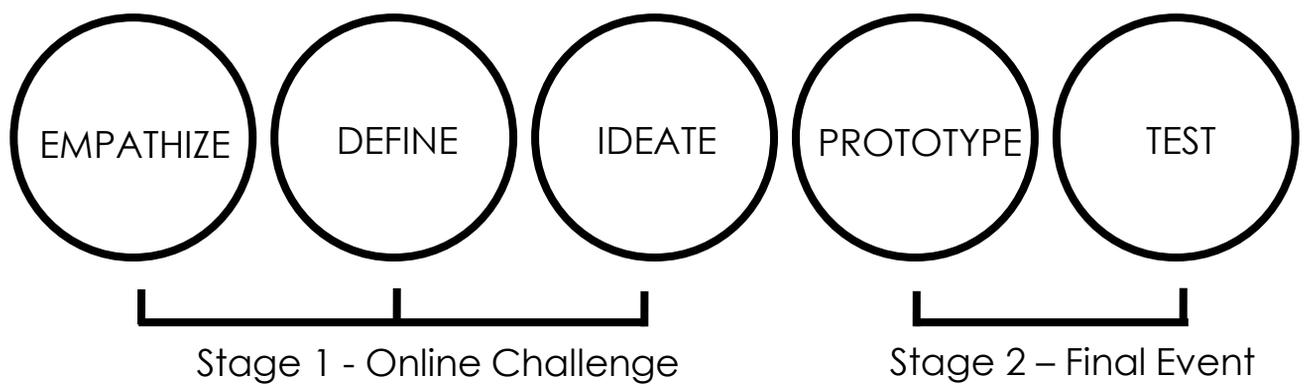
If your team is one of the 20 teams that were successful in the first stage, then they will progress to the final stage. In this final event, they will then be tasked to model their final design with the prototyping kit given to model their design to bring it to life. A winner and runner-up team from each theme is selected based on the model being displayed at the final event.

In the competitive aspect of the challenge, the students will get their work judged and win prizes. Students get an opportunity to develop links with industry, find out valuable information about how materials are. STEM subjects have a variety of opportunities to develop students problem solving skills and allow creativity. Students have to work in groups where they will develop design and making skills.

What to get the Student's to focus on?



You will need to instruct the students to focus on the design process. The four tailored portfolios will assist you in doing this. There are five main aspects that you will need to make sure are completed and these are broken up as shown below for easy understandability.



WHAT is the empathize mode?

Empathy is the foundation of a human-centered design process. To empathize, you need to observe. View users and their behavior in the context of their lives. Engage. Interact with and interview users through both scheduled and short 'intercept' encounters. Immerse. Experience what your user experiences.

WHAT might this look like in the design challenge?

This is a fundamental part of the research stage where you look into the behavior of people and how they interact with the product your are designing. To be able to design something successfully you need to understand how it will be used and what effects it may have. This can be done in the form of observations, talking or interviewing people. This can be done via primary or secondary sources. Find examples that have been done before, what's already out there? Can it be used as an inspiration?

DEFINE

WHAT is the define mode

The define mode is when you unpack and synthesize your empathy findings into compelling needs and insights. Then, scope a specific and meaningful challenge. It is a mode of “focus” rather than “flaring.” Two goals of the define mode are to develop a deep understanding of your users and the design space. Then based on that understanding, to come up with an actionable problem statement: **your point of view**. Your point of view should be a guiding statement that focuses on specific users, insights and needs that you uncovered during the empathize mode.

More than simply defining the problem to work on, your point of view is your unique design vision that you crafted based on your discoveries during your empathy work. Understanding that this challenge is to provide meaningful and innovative insights into the themes, can leverage your design work to create a successful solution

WHAT might this look like in the design challenge?

During this stage, you will set out the parameters of the design of your product. This may have started in the form of a design brief. But after the empathy stage, you should be able to clearly set out the products requirements from what you have researched and observed. Some things you may want to consider are: Who the product is designed for?, Why there is a requirement for it?, What specific materials and construction methods will be used?

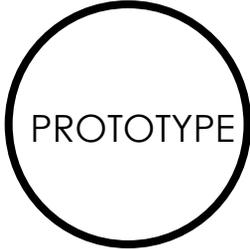
IDEATE

WHAT is the Ideate mode

Ideate is the mode of your design process in which you aim to generate radical design alternatives. Mentally it represents a process of “going wide” in terms of concepts and outcomes—it is a mode of “flaring” rather than “focus.” The goal of ideation is to explore a wide solution space – both a large quantity of ideas and a diversity among those ideas. From this vast depository of ideas you can build prototypes to test with users.

WHAT might this look like in the design challenge?

After having a clear understanding of the requirements it is now time to generate a range of different solutions to the problem. This will be done initial on paper but then could stem into quick models or the use of CAD to learn more about the designs and if they will be fit for purpose. At this stage it is important that you generate many ideas which can then be worked upon later. It is not important that all the ideas will work at this stage.



PROTOTYPE

WHAT is the prototyping mode

Prototyping is getting ideas and explorations out of your head and into the physical world. A prototype can be *anything* that takes a physical form – be it a wall of post-it notes, a role-playing activity, an object, an interface, or even a storyboard. The resolution of your prototype should be commensurate with your progress in your project. In early explorations keep your prototypes rough and rapid to allow yourself to learn quickly and investigate a lot of different possibilities. Prototypes are most successful when people (the design team, the user, and others) can experience and interact with them. What you learn from those interactions can help drive deeper empathy, as well as shape successful solutions.

WHAT might this look like in the design challenge?

This part of the challenge will involve you bringing your design to life in the form of a final model. You will be given a prototyping kit with materials to use and this model will form the focus of what is judged in the second stage of the design challenge. You should try and make the model function as intended where possible. The aesthetics are more important and the fact that the judges should be able to get a clear impression of what the final outcome will look like.



TEST

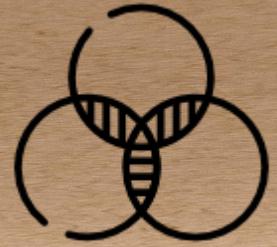
WHAT is the testing mode

Testing is the chance to get feedback on your solutions, refine solutions to make them better, and continue to learn about your users. The test mode is an iterative mode in which you place your low-resolution artifacts in the appropriate context of the user's life. Prototype as if you know you're right, but test as if you know you're wrong.

WHAT might this look like in the design challenge?

This is something that is done throughout the process if your final outcome is going to be successful then it is vital that you check and test it at various stages as well as at the end of the project. Don't look at this as something negative if there are things that you would like to improve after your final outcome is made then highlight them and suggest improvements.

What to get the students to focus on continued.



Remember the focus of this project is to make Aluminium the core component of your design. You will be judged based on how well the metal has been used.

The sponsor of the Aluminium Design Challenge is Emirates Global Aluminium (EGA). Edutech is implementing the design challenge under the patronage of Ministry of Education with KHDA as the approving body.

Aluminium is a versatile and readily available material that is used for many reasons. At all stages of the competition the students will need to show they understand how it is manufactured and why it has been used as the primary material in their final outcome. To help with this some links have been provided below to point the students in the right direction to find out the information they require, however please feel free to use any means possible to find out more information.

<https://www.hulamin.com/about/aluminiums-lifecycle>

<http://www.world-aluminium.org/statistics/>

<https://www.guggenheim.org/artwork/745>

<https://nerdist.com/giant-kinetic-sculptures-beautiful-and-hypnotizing/>

<https://www.kickstarter.com/projects/1199521315/sisyphus-the-kinetic-art-table>

<http://www.shapesbyhydro.com/>

<https://www.ega.ae/>

<http://www.gulfaluminiumdubai.com>

<http://www.world-aluminium.org>

Challenge checklist

Stage one – Online Challenge



To allow the students to do their best in the design challenge, there is a project portfolio template specifically designed for each of the four themes. They can choose use this check list along side to keep a track on progress and make sure everything is completed.

Portfolio

- Team work and time management
- Empathy pages
- Specification
- Ideation pages
- Development pages
- Final Concept Pages
- Evaluation pages
- Supporting images submitted

Team Video

- Maximum 2 minutes long
- All team members included.
- Explains the project and how you went about it.

Challenge checklist



Stage Two – Final Event

In stage two of the design challenge, the students will be asked to come to the final event to show the judges how their final design looks like as a prototype made using the specially designed prototyping kit. The team members will need to present their prototype to the judges in the form of a verbal presentation and should display their work in the designated presentation stand.

Final model

- Is the model completed to a high standard?
- Is Aluminium the main material used?

Verbal Presentation in final stage

- Are all the team members contributing?
- Is it no longer than 10 minutes?
- Is the content relevant to the challenge?
- Is it both informative and engaging?

Presentation stand

- Does the stand reflect the team and the work content?
- Is the information clear?
- Does it fit within the given size stated by the competition?

Key dates and Entry requirements for initial stage



There are two key parts to the design challenge, where the work will be judged. It is essential that you keep up to these dates and make sure the students are on top of what needs to be completed and the deadlines. For the initial stage, you will need to follow the challenge checklist provided for the initial stage of the design challenge and make sure that the students complete and hand in these aspects on time. Also, make sure the theme based check list is met before submitting online.

Please note that any work handed in after the deadline can not be marked and awarded anything as per the challenge rules.



1st Stage hand in deadline:

EDIT DATE LATER



1st Stage minimum requirements:

**Completed design Portfolio.
2 Minute accompanying video**

Follow the below link to see where to enter the students work.

ADD LINK HERE



Key dates and Entry requirements for final stage of the challenge



Final Stage hand in
deadline:

EDIT DATE LATER



Final Stage
minimum
requirements

**Completed Model
Verbal presentation
Team Display stand**

**You will not be
expected to
upload your work
this time instead if
you have been
selected you will
be called to show
your prototype
made with the
prototyping kit at
the finals event.**

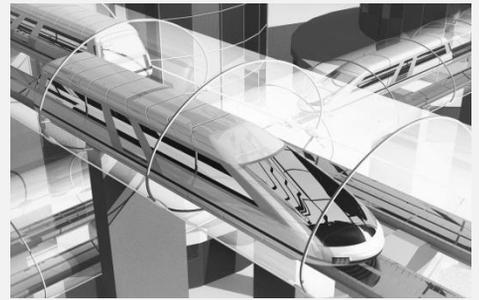
If your team were successful in the initial online stage, they will then be tasked to model their final design. The team will be given a specially tailored prototyping kit. They will need to bring their final design with them. They need to prepare the display booth provided to display their work and need to deliver a verbal presentation to the judges where they will talk about what they have done and how they have worked as a team.

The Four Challenge Themes

The students will have a choice of choosing to complete the design challenge concentrating on one of four themes which are outlined below.

1. Futuristic Transportation

Aluminium being light, strong and flexible allows people to design transportations that move at breakneck speeds, cross oceans, fly in the sky and even leave our planet. Design and create futuristic transportation solution that can be based upon Air, Water or Roadways with Aluminium as a core component.



2. Architectural Marvel

Aluminum is recognized as one of the most energy efficient and sustainable construction materials has been extensively used in building architectural structures round the world. In this theme the student needs to create structurally stable designs of superstructures.



3. Kinetic Art

Using aluminium as a core component design a kinetic art form, sculpture or a product that uses natural elements such as wind, water or sunlight for the movements. The product should include STEAM concepts.



4. Humanitarian Relief Packaging

Packaging saves ten times more waste than it creates. Right packaging saves space, reduces, preparation, travel and energy consumption cost. Design innovative and efficient packaging designs for Food or Liquids or other kinds to be delivered to sustain humanitarian needs.



Initial stage Scheme of Learning

This scheme of learning can be used as a structure for planning delivery of the design challenge content. It has been split up into 8 sessions to cover the main aspect that will be assessed.

Session	Topic	Suggested time	Learning Objectives	Skills being covered	Recourses	Helpful links
1	Project introduction, team set up and topic selection	30 mins	Students should learn about the details of the project. Learn how to form a team.	Project knowledge, Team work	Teachers Support materials.	https://gulfnnews.com/news/uge/leisure/famous-american-artist-brings-kinetic-sculptures-to-dubai-1.1835247
2	Planning, Research and empathy	120 mins	Students should learn research and planning skills. Learn how to collect useful information	Time management, Team work. Information gathering, analytical skills	Specific Design portfolio. PC access	https://www.ranker.com/list/architecture-s-modern-marvels/nychickhttps://challenges.opentideo.com/challenge/refugee-education/ideas/educational-card-games-on-food-packaging
3	Video construction and editing	120 mins	Students should learn how to record and edit their own video	Team work. Filming, Video editing.	PC access. Camera or camera phone.	https://listverse.com/2014/03/26/10-futuristic-forms-of-transporadation-we-could-see-soon/
4	Initial concepts ideation	120 mins	Students should learn how to come up with ideas. How to solve real life problems and generate a range of different design	Design skills: Drawing techniques, Critical thinking, problem solving.	Specific Design portfolio. Basic drawing equipment	
5	Design skills and techniques	120 mins	Students should learn how to produce design ideas. Students should learn how to draw using different techniques and how to present their ideas in a recognized format	Design skills: Drawing techniques, Critical thinking, problem solving.	Specific Design portfolio. Basic drawing equipment	
6	Development	240 mins	Students should learn how to improve their initial designs. Students should learn how to use CAD to improve their design work.	Design development skills, CAD skills.	Specific Design portfolio. Basic drawing equipment, CAD software	
7	Final Design and Criteria checking	60 mins	Students should learn how to use an assessment rubric to check their work.	Idea presentation skills. Assessment reflection	Specific Design portfolio. Basic drawing equipment. Competition assessment	
8	Evaluation and Competition entry	60 mins	Students should learn how to reflect on your work. Students will learn how	Time management, Team work. Reflection. Evaluation skills.	PC access. Specific design portfolio	

If your team are successful and get them selves to the final stage of the design challenge, they will need to prepare some other materials for this. This scheme of learning can be used as a structure for planning delivery of the challenge content.

Final stage Scheme of Learning

Session	Topic	Suggested time	Learning Objectives	Skills being covered	Resources	Helpful links
1	Review of materials pack, planning for model making and health and safety.	60 mins	Students should learn about the materials and how they may combine them. They should also learn how to safely cut and join different materials	Planning, materials knowledge and construction. Safe use of tools and equipment.	Model making materials pack.	https://www.wordpress.com/2013/04/14/presentation-board-layout-tips/ https://bizfluent.com/how-4926059-create-business-display-board.html
2	Model construction	240 mins	Students should learn practical skills and how to problem solve	Time management, Team work, Information gathering, analytical skills	Model making materials pack, DT workshop basic construction tools and equipment.	
3	Verbal presentation planning and draft	120 mins	Students should learn how to talk in front of others and how to talk about the process they have been through	Team work, Presentation skills, communication skills, script writing, reflection skills	Paper and drawing equipment	
4	Planning presentation space	60 mins	Students should learn how to present their ideas in a clear manner	Graphic skills, Display layouts	Paper and drawing equipment	
5	Design and construction of presentation space	120 mins	Students will learn how to promote and advertise themselves to show their work in a positive manner	Practical skills, presentation skills, problem solving	PC access, DT workshop basic construction tools and equipment.	
6	Verbal presentation practice	240 mins	Students should learn how to improve their initial designs. Students should learn how to use CAD to improve their design work.	Team work, Presentation skills, communication skills, script writing, reflection skills	None	

Theme-Based Checklist

1. Futuristic Transportation

- Vehicle Shape Plan, exhibiting exterior look
- Ergonomics of seating and controls
- Chassis Design
- Safety Considerations

2. Architectural Marvel

- Architectural sketches
- Structural Function
- Structural Stability
- Accessibility

3. Kinetic Art

- Performance requirements and functionality
- Physical Requirement of the Art
- Alignment with STEAM Conceptual
- What natural element is used to power the art?

4. Humanitarian Relief Packaging

- The practicality of packaging
- Shelf Life of product is improved with the packaging
- The packaging addresses the needs of the user
- Packaging highlights the overall theme by using the right colors, visual metaphors, textures, materials and word choices.