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| **Drop it!** |
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| Designing a system to drop emergency aid pallets from an aircraft |
| **Subject(s):** Design and Technology, Engineering, Geography**Approx time:** 70-110 minutes |  | **Key words / Topics:** * annotation
* design ideas
* development and iteration
* drone
* emergency aid
* evaluation
* future of flight
* parachute
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| **Stay safe** Whether you are a scientist researching a new medicine or an engineer solving climate change, safety always comes first. An adult must always be around and supervising when doing this activity. You are responsible for:• ensuring that any equipment used for this activity is in good working condition• behaving sensibly and following any safety instructions so as not to hurt or injure yourself or others Please note that in the absence of any negligence or other breach of duty by us, this activity is carried out at your own risk. It is important to take extra care at the stages marked with this symbol: ⚠ |
| **Suggested Learning Outcomes**  |  |  |
| * To understand the need for emergency aid and how this can be deployed
* To be able to design a method or system of safely dropping emergency aid to its intended destination
* To be able to develop ideas iteratively
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| **Introduction** |  |  |
| This is one of a series of resources designed to allow learners to use the theme of the future of flight to develop their knowledge and skills in Design & Technology and Engineering. This resource focusses on designing a system to drop emergency aid pallets from a future air vehicle.People in countries affected by natural disasters or war often need food, water, shelter and other aid delivered to them. Can you design a method of getting this safely from aircraft to the people who need it on the ground?  |
| **Purpose of this activity**In this activity learners will make use of the theme of the future of flight to design a method or system of getting emergency aid from an aircraft to the ground safely. They will analyse existing methods of achieving this. They will then use this information to create sketches of their initial ideas, before producing a developed and completed final design.This activity could be used as a main lesson activity to teach about sketching and design skills within an aviation theme. It could also be used as part of a wider scheme of learning to support the teaching of the design process within Design and Technology and Engineering, or about engineering career opportunities within the aviation sector. |
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| **Activity** |  | **Teacher notes** |
| **Introduction, context and brief (10 minutes)**Teacher to introduce and discuss the context and design brief shown in the presentation.**Existing methods (10-20 minutes)**Learners to discuss and write down what they think are the advantages and disadvantages of using drones and parachutes to drop supplies from an aircraft. **Producing the design ideas (30-40 minutes)**Learners to choose one of the methods analysed in the previous activity. They should then sketch ideas for improved and new versions of their chosen method on the worksheet.Learners then take the best parts of each idea and combine them into a developed design.Learners then combine all they have done into the best drawing that they can produce – this will be their final design. It can be drawn from more than one viewpoint.**Added features (10 minutes)**Learners to add extra features to their design development, following prompts given, which should help to build detail and depth to their ideas. Annotations could be added to explain each feature.**User evaluation (10-30 minutes)**Learners to question several different people, showing them their design work and recording their feedback. Teacher to discuss the importance of getting critical comments as well as what went well. Learners to record responses on the activity sheet. |  | **Introduction and brief**The crisis in Ukraine or famine situations in Africa could be used as examples for context.Discuss the types of aid that might need delivering and the requirements for keeping them safe during delivery:* Food - it is essential in every crisis to first determine whether food supply is a correct response.
* Shelter - shelter is a critical to survival in the initial stages of a disaster.
* Non-food items - water, sanitation and hygiene
* Medical supplies.

**Existing methods - advantages and disadvantages**Drone Delivery – unmanned and remotely controlled from a large distance away, suitable for populated areas due to accuracy of control, issue of strong winds, visibility, weight to carry.Parachute Delivery – needs an airplane to deliver which could be an issue during conflict, simple technology with little to go wrong, more suited to remote areas where accuracy is not critical, accessible with airplanes. **Producing the design ideas**Learners should be encouraged to produce a minimum of 3-5 initial ideas. Approaches such as SCAMPER or SCARED could be used to prevent design fixation during ideas generation or development.Final ideas could be drawn using a 3D method, such as isometric for example.  |
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| **Differentiation** |  |  |
| **Basic** |  | **Extension** |
| * Provide learners with templates or isometric grids for the sketch and development work.
* Provide sentence starters for the evaluation and design annotations.
 |  | * Provide detailed annotation covering the manufacture and materials choices for the final design.
* Learners to use their own alternatives to drones and parachutes.
* Make and test a 3D model of the final design to check features and properties such as impact resistance and functionality of the landing method.
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| **Resources** |  | **Required files** icon-docicon-pdficon-ppt |
| * Pencils
* Paper
* Ruler
* Computer access for researching (optional)
 |  |  Presentation – Drop it!icon-doc Drop it activity sheet |
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| **Additional websites** |
| * **UNICEF:** Official UNICEF website for research into the task. <https://www.unicef.org.uk/>
* **YouTube - How Amazon delivery drone will work:** Video showing Amazon’s new delivery drone which could provide help for learners during the analysis of existing products activity. <https://www.youtube.com/watch?v=mzhvR4wm__M>
* **YouTube - Avidrone parachute delivery:** <https://www.youtube.com/watch?v=p9JdQmVUb7M>
* **Heavy aerial delivery:** <https://www.youtube.com/watch?v=qzmvfpAnEa8>
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| **Related activities (to build a full lesson)** |  |  |
| **Starters** (Options) * Show a picture of a disaster situation and discuss what is happening, what the issues are for the people that live there and what their needs are.
* Discuss the existing methods of delivering supplies from the air to people in disaster affected areas. E.g. parachutes and drones.
 | **Plenary*** Learners to share their findings on the success of their designs and any significant feedback they may have received.
* Self/peer assess the design ideas produced.
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| **The Engineering Context** film |
| * The future of flight is a great context to explore the opportunities that working in the aeronautical engineering industry presents! For example, designing, making and maintaining aircraft and all their different parts.
* Engineers have ethical responsibilities to ensure that the designs they produce have a positive affect on society and help to solve real world problems.
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| **Curriculum links** |
| **England: National Curriculum**Design & Technology * develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations

Geography KS3* KS3 locate the world’s countries, using maps to focus on Europe (including the location of Russia) and North and South America, concentrating on their environmental regions, key physical and human characteristics, countries, and major cities.

**Scotland: Curriculum for Excellence**Technologies* I can apply a range of graphic techniques and standards when producing images using sketching, drawing and software.
* TCH 3-11a
 | **Northern Ireland Curriculum**Technology & Design* KS3 demonstrate understanding that the design process may contain some or all of the following: − design opportunity; − research; − brief; − specification; − idea generation and development; − manufacture; and − testing and evaluation.

**Wales: National Curriculum** Design and Technology* KS3 explore, develop and communicate design ideas in a range of ways, including annotation, drawings and CAD, e.g. clip art libraries, internet resources, scanners, digital cameras.
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| **Assessment opportunities** |
| * Formal teacher summative assessment of completed worksheets and designs.
* Self/peer assessment of designs produced.
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