

# Progressing to be an Engineer Framework



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Progressing to be an Engineer –  
The Approach. Royal Academy of  
Engineering.

Purpose	Making 'things' that work and making 'things' work better										
Engineering design process	Ask		Imagine and plan				Create			Improve	
Engineering Habit of Mind	Problem-finding	Systems thinking	Systems thinking	Creative problem-solving	Visualising	Adapting	Systems thinking	Adapting	Creative problem-solving	Problem-finding	Improving
<b>5-7 years</b>	Make observations to inspire the asking of simple questions, finding out more information about how things work.	Explain how simple systems work.	Draw and label a design with different parts, showing how they connect together.	Come up with and describe how different ideas can solve a problem.	Communicate ideas in words and simple sketches.	Observe a range of mechanisms (how things are made to work), suggesting ideas for how they could be used for a different purpose.	Use components to create a product with multiple parts.	Take an existing product and repurpose it by using it in a different way.	Create a prototype by taking a 2D design into 3D.	Check things work by testing.	Identify areas for improvement in a product and suggest changes to make it work better.
<b>7-11 years</b>	Identify problems and ask questions to better understand their cause.	Explain how simple systems work, identifying how each part depends on another and predicting what would happen if there is a missing piece or link.	Draw and label a design that uses a system, explaining the role of each part.	Generate multiple ideas, effectively communicating their fitness for purpose and why certain ideas are better than others.	Use simple annotated sketches to turn ideas into words and drawings.	Plan a design that aims to solve a problem or task for a specific user, by transforming an existing mechanism (natural or man-made).	Use knowledge of how components work and interact to create a product that achieves a specific purpose.	Repurpose an existing product so that it can be used in a different way, tailored to the needs of a specific user or purpose. Evaluate its fitness for purpose.	Create and evaluate a series of prototypes, taking 2D designs into 3D, making improvements based on observations and feedback.	Test that things work using a logical approach, gathering evidence to make an informed decision.	Evaluate how the product is working, identifying areas for improvement in a product and describing possible changes that can enhance the design.
<b>11-14 years</b>	Critically examine problems, asking questions to understand their cause and how they impact different users.	Explain complex systems, including subsystems, describing how they depend on each other and predicting what can happen if there is a missing piece or link.	Draw and label a design that includes a system, justifying why each part is there, and how it best suits a user.	Use research and experience to come up with designs to solve a problem, justifying choices by applying scientific knowledge and evidence.	Use detailed annotated sketches to turn ideas into words and drawings to create a design specification.	Plan and evaluate designs that aim to solve a problem or tasks by transforming existing mechanisms (natural or man-made), suggesting alternatives and trade-offs with due regard for criteria such as cost and safety.	Create a product for a specific purpose, justifying the suitability of choices based on local and global issues - e.g. sustainability, energy, circular economy.	Repurpose an existing product, tailored to the needs of a specific user or purpose. Evaluate based on ethical, social and economic aspects.	Create a series of prototypes, taking 2D designs into 3D. Use cycles of self and peer-evaluation to identify and make improvements based on testing, observations and feedback.	Test and evaluate products against a specification reacting to the views of intended or specific user groups.	Identify areas for improvement in a product and describe changes to enhance the design, recognising the ideas that are most feasible and desirable.