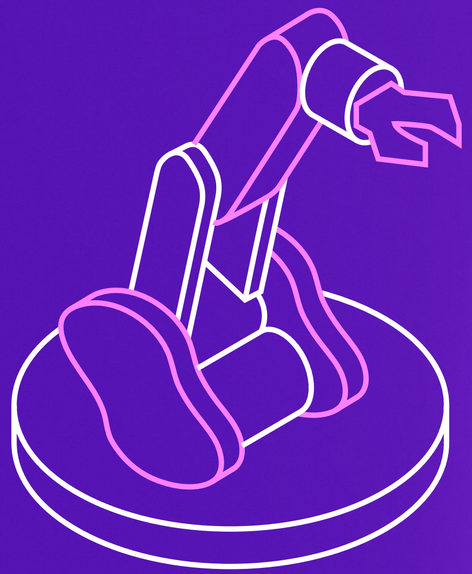
Engineering – Digital Manufacturing

Factories Of The Future



When you think of manufacturing, you probably think of huge factories with hundreds of people and machines that all build something along an assembly line, like a car for example. In fact there are lots of other parts to consider in the process, from mining the raw materials needed to create the product; transporting those to the warehouses, building them and then distributing them to shops or customers. Digital or 'smart' manufacturing is the process in which all of this is brought together and controlled centrally via computer systems and clever software programmes.

Fun Fact: On December 1, 1913, Henry Ford installed the first moving assembly line for the mass production of an entire Ford car. His innovation reduced the time it took to build a car from more than 12 hours to just one hour and 33 minutes!

With the computer at the heart of everything, it can control all operations performed by both the humans and machines and allows tasks to be performed autonomously (without the need for humans to get involved). This massively helps companies become more efficient by reducing the time it takes to make things, improving the accuracy of the production line and saving money in the process. This has all come about due to the rise in the quantity and power of modern computer systems.

Smart factories will be fully connected with Wi-Fi or 5G and they'll be flexible, able to adapt what they do to meet the changing demands of the customers. It means you will be able to track individual products throughout a factory, monitor robotic machinery without needing to be there and automate jobs to free up people to do more labour-intensive tasks. These are the factories of the future.

In this activity you'll get the opportunity to build your own 3D Rolls-Royce Trent engine so get ready to get hands on!

Have a Go

- A brief history of stuff
  https://atadastral.co.uk/go/bsweh1
- Rolls-Royce STEM activities
  https://atadastral.co.uk/go/bsweh2
- 3D print you own Raspberry Pi flight case
  https://atadastral.co.uk/go/bsweh3

Teacher Links

- Raspberry Pi STEM curriculum resources
  https://atadastral.co.uk/go/bswet1
- Tech for manufacturing and engineering lesson pack
  https://atadastral.co.uk/go/bswet2
- Engineer your future: Teacher resource pack
  https://atadastral.co.uk/go/bswet3
- IET STEM activities and resources
  https://atadastral.co.uk/go/bswet4

Find Out More

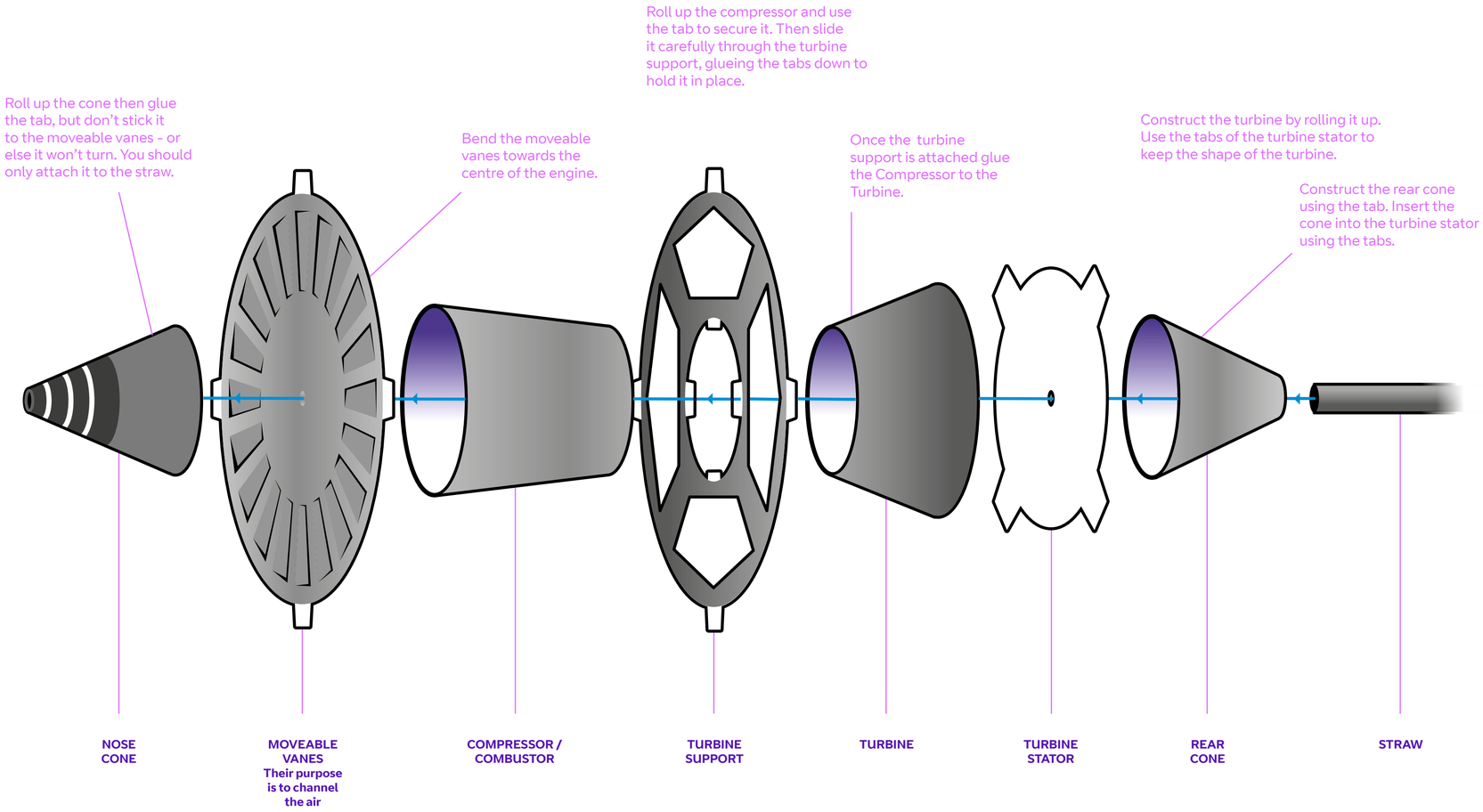
- Introducing engineering
  https://atadastral.co.uk/go/bswef1
- Women in Engineering
  https://atadastral.co.uk/go/bswef2
- Everyday technology
  https://atadastral.co.uk/go/bswef3

Activity 1
Build a Rolls-Royce Trent Engine

You can do this activity by yourself or in small groups. Have a think about efficient ways of producing lots of these engines. How could you work together with others to create more in a shorter time-frame, but still ensure each engine is of the same good quality?

Before starting this activity, we advise that you stick the following templates to some thin card and then carefully cut out the pieces.

1 Use the straw to act as the central support for your engine. Pop out the internal pieces and lay them out in the order shown below.



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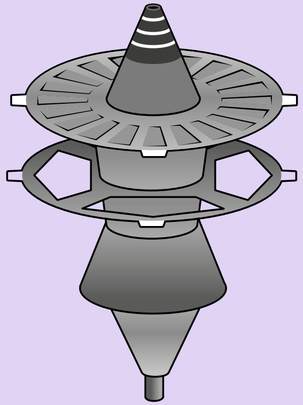
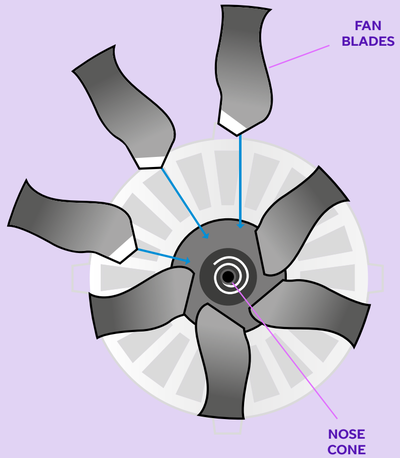
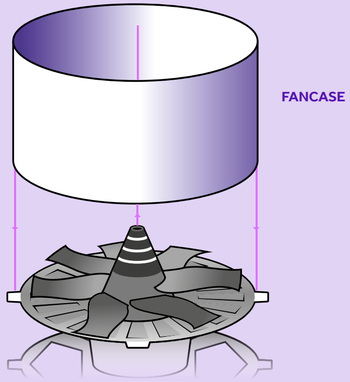
2 You should now have the engine's internal parts constructed.



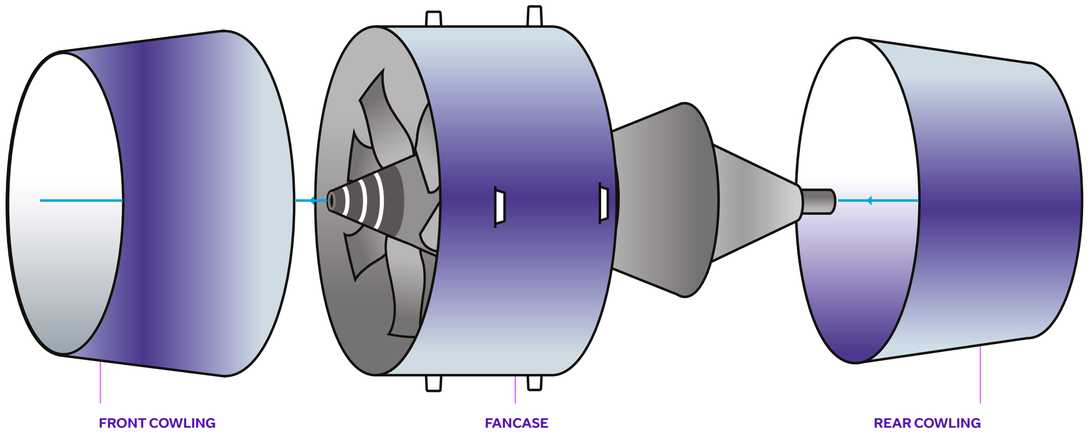
3 It's time to add the all-important fan blades. Just pop them out and slot them into the nose cone as shown below.



4 Wrap the fancase around the moveable vanes and the turbine support. Make sure the fancase is the right way round, the end with the slots should be at the back of the engine.



5 You're nearly there! Carefully push the cowling over the front of the fancase. Glue the front fancase tabs onto the front cowling and the rear fancase tabs onto the rear cowling. Then slide on the rear cowling in the same way.



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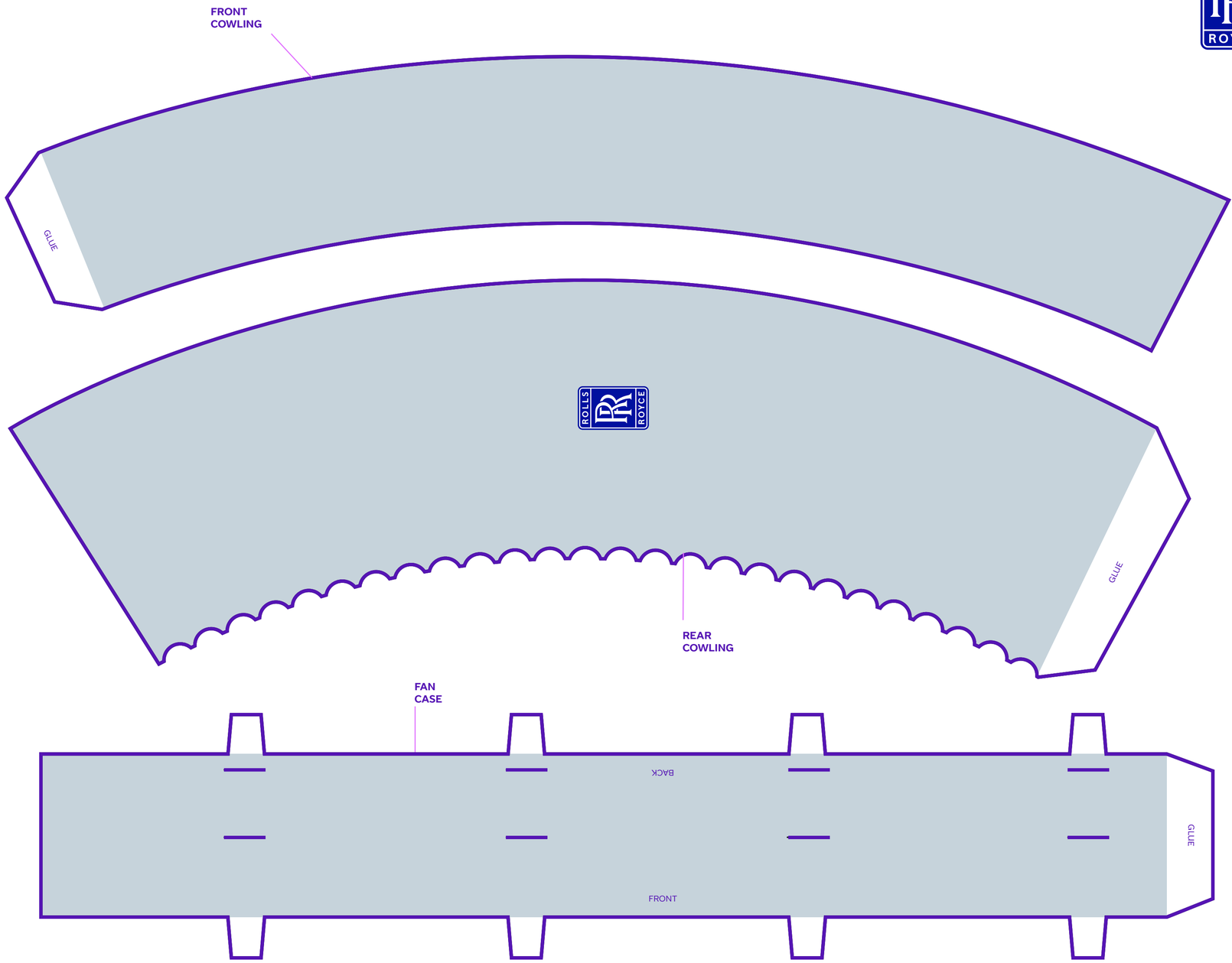

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