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Malaysia Ailines MH370 crash

How do planes work?

Interview with TATA Steel Employees

Coke to Coke Project 2014
Henk Gotlieb, Piet Gotlieb,
Robin Wacanno and Wilco Stam
Ir S. Ramgolam

Preface

The magazine you are about to read was written for the Coke to Coke project which is organized by Jet-Net and our school. The purpose of this project is to interest students to pick a scientific study. With school we've visited TATA Steel in Ijmuiden where we got a tour around some important parts of the steel production. We also interviewed some TATA Steel employees there.

The main subject of our magazine is aeroplanes. Thus this magazine will give you some essential information about aeroplanes and how they function. Our writers and editors have visited Schiphol Airport on the 29th of April 2014 to get a better look at the aeroplanes and the Airport itself. Sadly The weather was not on our side and we weren't able to take pictures of aeroplanes outside.

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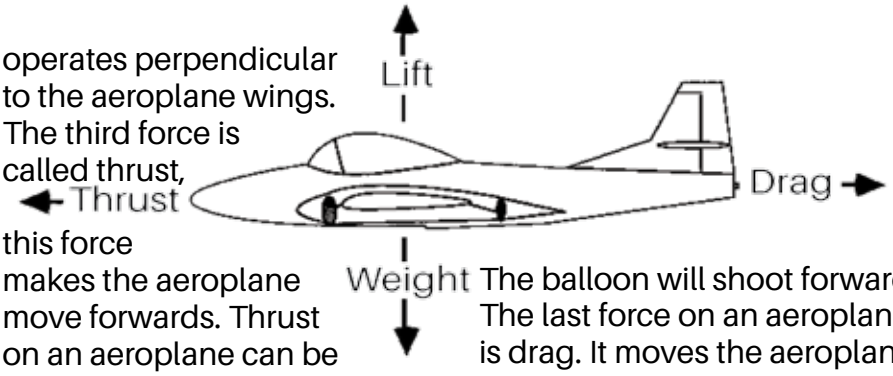
AIRPLANE PHYSICS

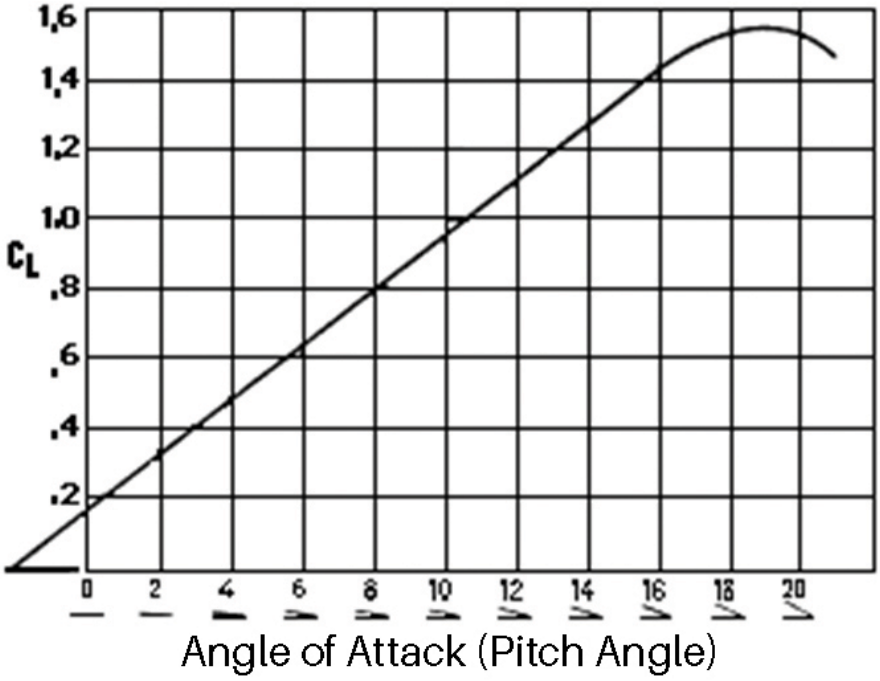
To explain how an aeroplane flies you should start by thinking of the forces. There are 4 forces on an aeroplane. The first one is applied to everything on earth, this one is called the weight force or gravity. This creates a downwards force. We can calculate the downwards force with the formula m * g. M being the mass and g being gravity which on earth is about 9.81. But of course an aeroplane moves up. For this we have a force called lift. Lift operates perpendicular to the aeroplane wings. The third force is called thrust,



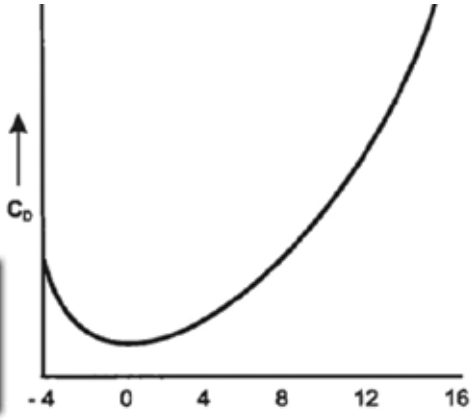
this force makes the aeroplane move forwards. Thrust on an aeroplane can be created by a propeller or a jet engine. The principal of such an engine is that it accelerates air out of the back and then follows newton's third law. This can be proven by a balloon filled with air an opening it. The balloon will shoot forward. The last force on an aeroplane is drag. It moves the aeroplane backwards. Drag is created mostly by air resistance. We can minimalize this drag by making the aeroplane aerodynamic. This means that it has smooth lines.

We can calculate the lift with the equation of magnitude of lift per unit wing area. This equation is L=0.5 * P * Cl * V squared. In this formula L is of course lift. P is the density of the air which creates the resistance. This resistance is normally 1.2754 kg/m cubed. Cl is the coefficient of the lift. This coefficient has to do with the wings and changes with the angle of attack. The angle of attack is the angle between the nose of the aeroplane and the horizontal line formed underneath the wings. This horizontal line is formed because even if an aeroplane is taking of it is still partially moving horizontally. As you increase the angle of attack the lift rises until a certain point. At this point the wings are almost vertically and create a surface of drag force. This point is called stall.

Graph of the coefficient of lift



There is a similar equation for the drag on an aeroplane. This equation is $D = 0.5 \times P \times C_D \times V^2$. This formula works the same accept for that Cd is the coefficient of drag. This also has to do with the angle of attack. As the angle of attack increases the coefficient of drag also increases. This is because as the aeroplane is pitching there is more wing area perpendicular to the flow.



Facts about aeroplanes

Air transportation is the safest form of travelling in the world.

A plane lands somewhere in the world every 3 seconds.

If the chance of daily disaster was only 0.01%, this would mean that 13 air-planes must crash. The odd of a plane crash are around 0.001%.

Donkeys kill more people annually than plane crashes.

A person is 10 times more likely to be killed by a car while standing at a crosswalk waiting for the green light.

Before each take-off, the plane goes through complex technical inspection.

Plane crashes are never a coincidence, but always a combination of highly unusual faults inside a plane's infrastructure.

More than 80% of the population human is afraid of flying. 5% completely abandons flying and takes alternative forms of travel. The scientific name of fear and flight altitude - aerophobia.

More people fall in love with flight attendants than representatives of other professions.

Source: http://owip.net/cool/191-12-interesting-facts-about-airplanes.html#.U2I9_Pl_vHU

Tata Steel Assignments

Chapter 1

Question 1: What are the main three raw materials used to make iron?

The main three raw materials used to make iron are, Iron ore, coal and limestone.

Question 2: Where do the raw materials come from and how are they transported to the plant?

Limestone comes from all over the world because it's found almost everywhere. It's transported by ship and truck. Coal comes from rests of plants which died during the Carboniferous period. Due to compression it became rock solid and there are coal mines now a days. Coal is transported by truck or mostly by ship. Coal is found mostly in China and the U.S.A. Iron comes from mines mostly from Australia, Asia and South America. It is mined in mines and transported by ship and truck as well.

Question 3: How and why are the raw materials processed before they are used in the blast furnace?

The raw materials are processed to remove most of the impurities. The process is called coking coal, the coking process consists of heating coking coal to around 1000-1100°C in the absence of oxygen to drive off the volatile compounds (pyrolysis). This process results in a hard porous material - coke. Coke is produced in a coke battery which is composed of many coke ovens stacked in rows into which coal is loaded.

Question 4: What role does each of these three raw materials play in the iron-making process?

Coal is used to burn everything. Of course the oxygen is used in this as well because you can't have fire without oxygen and of course iron ore is molten to make iron liquid which can be shaped.

Question 5: What can you say about the ecological effects of using these raw materials?

Transportation = a lot of pollution. Due to mining the amount of iron ore in the country of origin will become less until it will finally run out

Question 6: How can these side effects be reduced?

By following the environmental laws and implementing innovative technics. Also they make use of solar energy and put filters in the exhaustion tube.

Question 7: Why is scrap used?

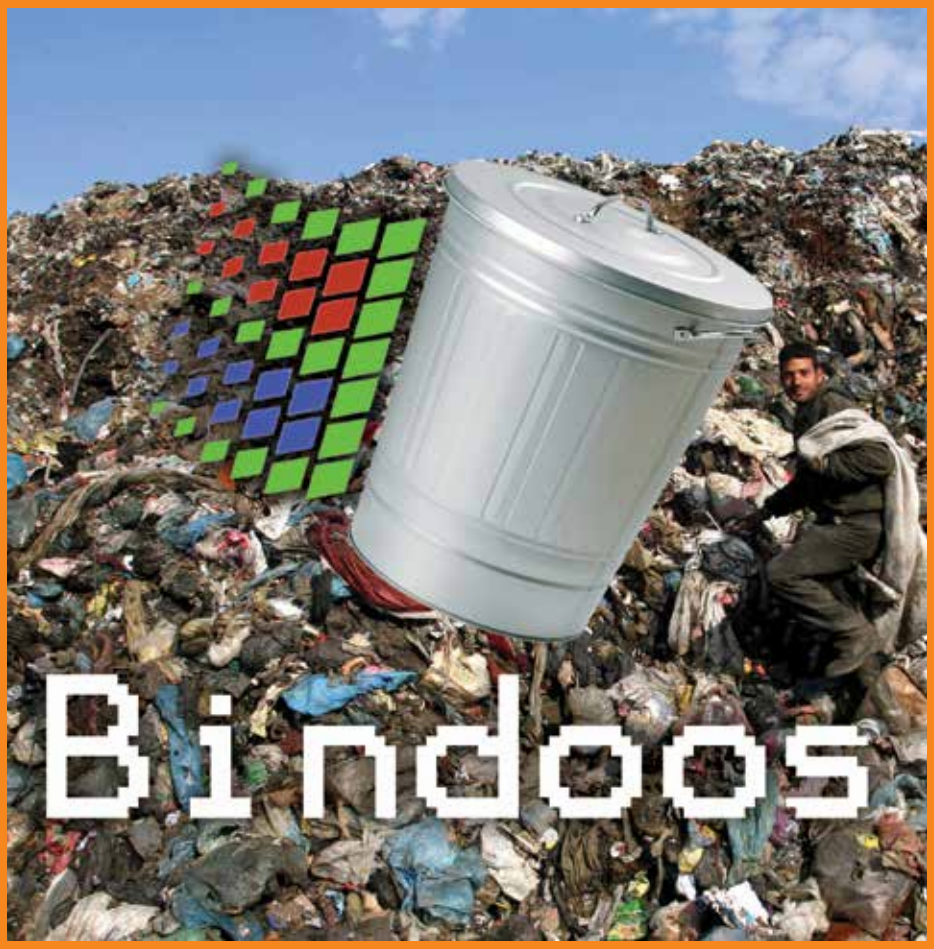
Scrap is cheaper and by recycling we don't run out of the resources earth gave us. By using this method you also automatically take out the unwanted toxics.

Question 8: what are the advantages and disadvantages of using scrap in the steel making process?

Advantages: by using scrap you can save up to 74 percent of the money and 86 percent of environmental damage. Also, the demand for processed scrap has risen dramatically.

Disadvantages: they need to use more energy and transporting it is more expensive.

Ads



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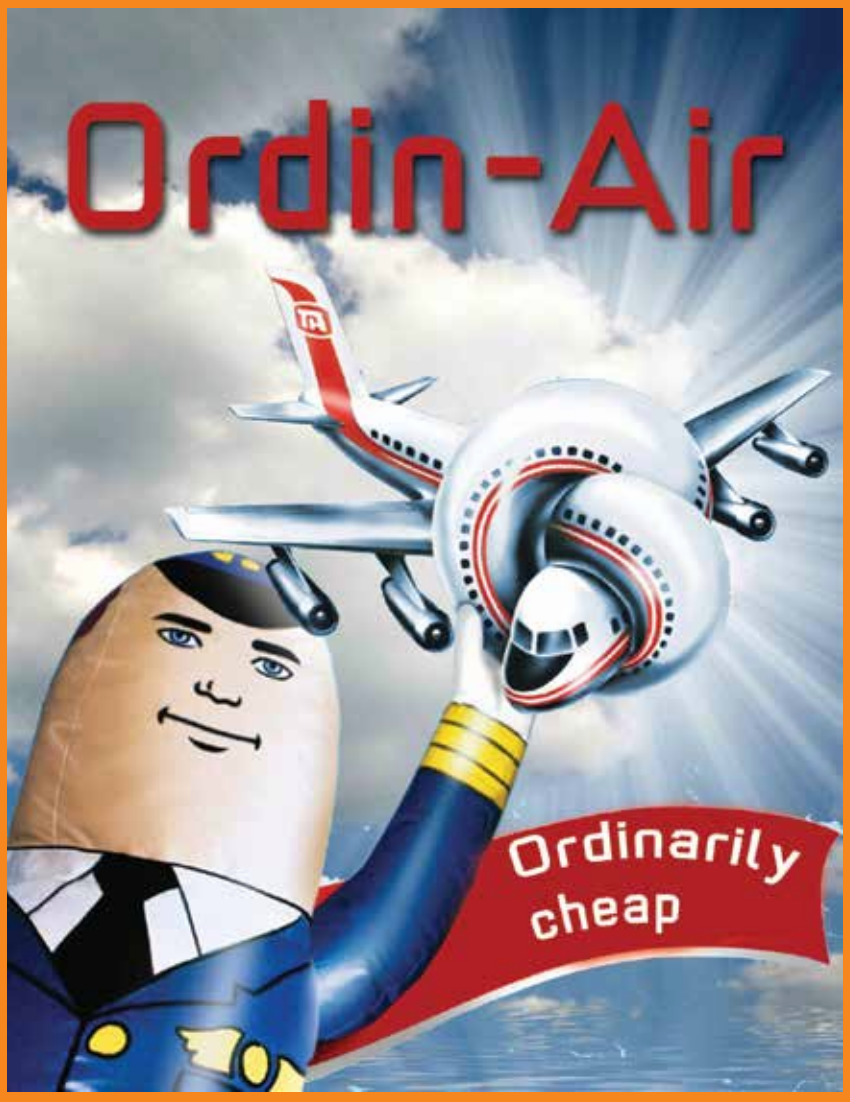
"Just in case"



Important events in aviaton history

One of the first jet planes

The Fokker Dr.1. This plane was used during WW I

In 1910 the concept of a plane propelled by jet engines was patented by Henri Coandá.

The 1st World War was the first war during which aeroplanes were used to fight the enemy. This also meant that the current design of the time was improved to be suitable for warfare.

1900 **1903** **1910** **1914** **1918** **1945**

1903 was a very important year in aviation history. For on the 17th of December of that year the Wright brothers had succeeded in creating and flying an engine powered aeroplane. Many inventors had attempted to fly a plane before them, they used: gliders, balloons and airships.

A picture of the Wright Flyer

After the 2nd World War commercial aviation became more popular. This meant that the transportation of both passengers and cargo would happen much faster compared to the conventional methods of transport at the time.

The DC-10 used to be a very popular aeroplane.

A Space Shuttle without
the extra fuel tanks

In 1982 the U.S. began to use Space Shuttles to re-enter the atmosphere from space. This plane-like spaceship went up into space with three enormous fuel tanks/engines. These are detached when they run out of fuel.

The security on planes an in airports would change dramatically after the 11th of September 2001.
On this day a group of terrorists hijacked two planes and flew them into the Twin Towers.
Due to this event governments realized that the security on airports and aeroplanes was not strict enough.

The Twin Towers during the attack

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