

## Lesson 8 – Robots

### I. Discuss:

1. What is the etymology of the word “robot”?
2. What types of robots do you know?
3. What are the tasks robots can perform better than people?
4. Describe a robot (real or fictional) that you know well.
5. What trait/function would you like to see in future robots?

### II. A 20<sup>th</sup> Century Dinosaur – ROBOSAURUS

#### Before you read:

##### 1. How to combine words

*You can often put two or more words together to form word combination which expresses a single idea, e.g. an air brake = a brake which is operated by air*

*arm and finger control system = a system for the control of the arm and finger*

##### 1.1 Work out the relationship between the words of the following combinations. Try to explain to your partner what the following expressions mean.

1. Licensed pilot
2. Compact infra-red transmitter
3. Full-scale star
4. Latter-day electrohydromechanical dinosaur
5. Aeronautical engineer
6. 2-ton automobile

##### 1.2 You have probably discovered that, in order to understand such phrases, we have to start with the last word and work out the meaning in reverse order, e.g.

3    2    1    1    2    3

*Full grown monster = monster which has grown to its full size*

##### Try, with your partner, to make up the phrases which mean:

1. Requirements concerning the safety of brakes
2. Principles acting in engineering and which have been proven
3. A building which has four storeys
4. Robots that eat cars and breathe fire
5. Constraints of design

##### 2. Vocabulary. Practise the pronunciation of the words below.

*robot - maintenance – carnivorous – license – engineering – incinerate – routine – rip – performance – transmitter – infrared – cylinder – hydraulic – valve – consultant – Renaissance – patent – invention – electronics – accelerate – emergency – aviation – transportation – requirements – carcass – circuit – component – weigh - simultaneously*

### 3. Building a Dinosaur for Fun and Profit

Read the article. Match the main ideas with the corresponding paragraphs. Two ideas do not fit any paragraphs. Guess the meaning of the words in italics.

1 It sounds astonishing. If you have your radio on in Southern California, you might hear the *rapid-fire* delivery of a 30-second commercial promoting the world's first fire-breathing car-eating robot.

2 "The monsters are coming! It's the gathering of monsters at the stadium tomorrow night! Monster trucks! Monster mud racers! Our first glimpse at the true carnivorous monster! Robosaurus! Standing taller than a four-storey building and weighing 58,000 pounds, this metal marvel can grasp, crush and eat 2-ton automobiles – all while spitting flames and *roaring* at the top of his amplified sound system!"

3 Robosaurus is the latest invention of engineer Douglas J. Malewicki, who, according to his résumé, is an inventor, engineering consultant, author, speaker, craftsman, and licensed pilot. Malewicki is a high-tech Renaissance man, practising what he calls "wing-it engineering". His *credentials* include a B.S. in aerospace engineering from the University of Illinois and an M.S. in aeronautical and astronautical engineering from Stanford. He holds US patents for inventions in the fields of aviation, ground transportation, toys, medical instruments and monster robots.

4 Robosaurus's ancestors include Japanese film monsters of two decades ago such as Godzilla and Rodan, and the whole Transformer series of toys. Malewicki got his idea for his latter-day electrohydraulic dinosaur from a discussion with a colleague and he then pushed the concept to the point where Robosaurus is now – a full-scale star of the Big Foot Car Show circuit, earning \$25,000 per appearance.

5 Malewicki sought the best-quality components and used simple proven engineering principles to ensure a 10-year life with minimum maintenance. Robosaurus is engineered to lift 400-pound cars 50 feet in the air while breathing 20-foot fingers of flame that incinerate paint and plastic.

6 Robosaurus is controlled by a human pilot and co-pilot strapped inside its cranium. It hydraulically *folds down* into a legal licensed trailer for easy road transportation from show to show.

7 A major design constraint was building Robosaurus so that when transformed, it would become a legal (and licensed) trailer for highway transport: 48 feet long, less than 8.5 feet wide, weighing less than 60,000 pounds, and still meeting all legal lighting and air brake safety requirements. Robosaurus *crouches down* to a 13.5 foot maximum legal height to fit under bridges and overpasses.

8 At show time, a semi truck is driven slowly into a dimmed stadium. The truck headlights flash and the horns blare. Then the truck stops, and Robo unfolds and transforms into its full height. The full-grown monster stands 40 feet high and weighs 29 tons. Its theatrical main event is biting a hapless auto into half, ripping off its roof, and crushing it in its monster-size hands before *hurling* the mangled carcass to the ground. Malewicki's monster goes through this routine several times during a public performance.

9 Malewicki compares Robosaurus's electronics to those of an F-16 aeroplane. "A pilot and co-pilot are in the head, and they run all the commands with electronic signals. Each of the 20 hydraulic valves has its own small computer. We can dial the rate that any given hydraulic cylinder accelerates and the maximum linear speed that each cylinder reaches."

10 Twenty different motions can be controlled simultaneously with a unique finger and arm control system that operates the machine smoothly and safely. In an emergency, a ground operator, in touch by radio with the operator in Robo's head, can take over with a *backup* control using a compact infrared transmitter.

(adapted from Vilma Barr, 70/February 1992, Mechanical Engineering.)

- a) Electronic and hydraulic control
- b) Robosaurus as a star of science-fiction films
- c) Emergency control
- d) Robosaurus's main engineering characteristics
- e) News you can hear about a monster robot
- f) Robosaurus's commercial on a Californian radio station
- g) Doug Malewicki curriculum vitae
- h) Human control and road transport
- i) A short history of Robosaurus's invention
- j) Robosaurus's characteristics when turned into a trailer
- k) Robosaurus's step-by-step designing
- l) What Robosaurus can perform during a public show

#### 4. Speaking

The following are 10 ways of asking questions. Five are polite ways, five are less polite. Tick the polite ones.

*May I ask you...?*

*Look here, why...?*

*Tell me how...?*

*Could you explain to our listeners...?*

*I can't understand why...*

*If I may, I'd like to ask...*

*Let's get this straight – from where did you take...?*

*Listen, why haven't you?*

*I wonder if you would explain...*

Now work with a partner. You are taking part in a radio discussion which is designed to advertise the "Robosaurus Show". One of you is the interviewer, the other is Douglas Malewicki. The interviewer introduces Mr. Malewicki to the listeners and then uses polite question forms from the exercise above to ask about the show.

#### 5. Forming questions. Ask questions only about the word or phrase in italics.

1. Robosaurus is the latest invention *of engineer Douglas J. Malewicki*.
2. *Malewicki* holds US patents for inventions.
3. Malewicki discussed his idea *with a colleague*.
4. The engineer used *simple proven engineering* principles.
5. *Twenty* different motions can be controlled simultaneously.
6. Robosaurus weighs *less than 60,000 pounds*.
7. Robosaurus's ancestors include *Japanese film monsters*.
8. Malewicki's monster goes through the routine *several times* during a public performance.
9. Malewicki compares Robosaurus's electronics *to those of an F-16 aeroplane*.
10. A ground operator can take over *using a compact infrared transmitter*.

### III. Phrasal verbs in Science and Technology

#### 1. Complete the sentences with suitable particles:

1. When I tried to switch \_\_\_\_\_ my computer, nothing happened.
2. Would the last person to leave the room please turn \_\_\_\_\_ the lights.
3. The computer isn't working because you haven't plugged it \_\_\_\_\_!
4. Can you turn \_\_\_\_\_ the TV – I can hardly hear what the actors are saying.
5. My mobile isn't working – I need to charge it \_\_\_\_\_.
6. The alarm went \_\_\_\_\_ in the middle of the night, waking all the neighbours.
7. The pilot's radio cut \_\_\_\_\_ as the plane was flying over the Himalayas.
8. We've just bought a breadmaking machine. All you do is measure \_\_\_\_\_ all the ingredients, put them in the machine and switch it \_\_\_\_\_.
9. The mechanic pumped \_\_\_\_\_ the tyres while he was servicing the car.

(adapted from McCarthy, M.; O'Dell, F. *English Phrasal Verbs in Use*. Cambridge University Press, 2004.)

#### 2. For each sentence, choose the best word or phrase to complete the gap from the choices below.

1. Recently, scientists have \_\_\_\_\_ that the meteorite which wiped out the dinosaurs might have also resulted in an ice age.  
**A) carried out B) pointed out C) cranked out D) made up**
2. A cloned egg will eventually \_\_\_\_\_ a creature which is identical to the organism which provided the original genetic material.  
**A) grow into B) grow up C) grow out of D) grow towards**
3. By a process of elimination, the computer technician was able to \_\_\_\_\_ the faulty component in my home PC and soon it was working again.  
**A) break down B) carry out C) conjure up D) home in on**
4. If we continue to burn fossil fuels at our current rate we will eventually \_\_\_\_\_ the Earth's atmosphere to a point where it can no longer support life.  
**A) break down B) foul up C) crank out D) grow out of**
5. Researchers at the University of Bedminster have been \_\_\_\_\_ a study to determine the most efficient way to peel a banana.  
**A) pointing out B) carrying out C) figuring out D) doing without**
6. For decades, great minds have tried to \_\_\_\_\_ what shape the universe is and finally, it seems, someone has come up with an answer.  
**A) point out B) figure out C) carry out D) turn out**
7. Today a network of virus-infected computers which for months has been \_\_\_\_\_ billions of Spam e-mails has finally been shut down.  
**A) carrying out B) figuring out C) giving out D) cranking out**
8. After this the untreated sewage is placed in fermenting tanks where special bacteria are used to \_\_\_\_\_ any organic matter and solid material.  
**A) break down B) do away with C) carry out D) give off**
9. With the recent introduction of electric cars, it is hoped that petrol-driven vehicles can be \_\_\_\_\_ by the end of the next decade.  
**A) carried out B) given out C) phased out D) cranked out**

(exercise adapted from [www.ihbristol.com/free-english-exercises/test/esol-smc-phrasal-verbs-science](http://www.ihbristol.com/free-english-exercises/test/esol-smc-phrasal-verbs-science))