Modelling and Simulations

Introduction:

Simulations are almost as good as the real thing. It is a program designed to copy a real-life situation.

Simulators:

Using a simulator has some advantages, they are as follows;

1. It is much safer, as people are not injured.
2. It is a cheap option as expensive models or full size mock ups don't need to be built.
3. No equipment is damaged.
4. Modifications can be made easily and re-tested quickly.

Some disadvantages of a simulator are as follows:

1. A poor model will give unreliable results.
2. Simulations cannot completely re-create the pressures that a person might be under in a real-life situation.
3. Producing an effective model might be time consuming.
4. Running the simulation might require expensive hardware or software, like with Virtual Reality (VR).

A simulation is carried out using a **model**. A model is an artificial re-creation of an object or trend and should behave in the same way as the real thing.
A simulation is when a model is used to carry out an activity that copies real-life occurrences. For example, when a bridge designer uses a model to simulate what will happen when the bridge is actually used.
A computer model is created using programmed instructions and equations. An example would be a computer model of the way an aircraft behaves when it is in flight.

There are different types of Computer Model, they are as follows;

1. Computer-Aided Design (CAD), this is used to create a graphical image of an object based on data fed into the package by the user.
2. Virtual reality (VR), aims to give the user a more complete experience. The user may see or hear noise, movement and visions. These models are likely to be large and straightforward to use.
3. Expert systems, the computer will be given data, asked questions to do with this data and then will eventually have enough information to suggest a solution to a certain problem. These systems can be used to give advice in different areas.

These simulation models can be used to make predictions, e.g. the speed at which a car loses control on a bend.

In a car simulator the lessons are practical driving lessons. The student learns basic car handling and control skills in the simulator, before starting practical driving lessons in a car. The student also trains busy traffic situations, plus special skills like driving in difficult weather conditions. A built-in virtual instructor guides the trainee through the lessons, without the need for a full-time human instructor. After each section, the instructor receives a list of attention points, in which it will inform the instructor of the mistakes made and how they can be prevented or improved.

The types of people that would use a car simulator would be learner drivers; it will help them to practise driving on the roads pointing out the different problems that occur in every day life. This will help them to avoid these problems and drive safely of the roads.

Advantages:

1. The simulator is much cheaper than driving lessons.
2. You can experience the different weather conditions when using the simulator.
3. Learners can experience all types of problems on the roads that they may not experience at the time of their driving lesson; this means they will know exactly how to react and what to do when a problem occurs.

Disadvantages:

1. These simulators do not have the same impact and pressure that an accident or problem would have in real-life.
2. Weather conditions may be more serious and the strength may not be the same.

Images of a Car Simulator are as follows:

Formula One Simulators

Formula One Driving Simulators help drivers to practise driving on a Formula One Track. This gives them a good idea of how to drive a Formula One Car. When using these simulators the drivers will become more aware of how to steer the car and do several laps around the track. These simulators are operated to take the driver through stages; in each stage the driver can increase the speed. Some of these simulators are similar to real-life cars and are very popular as a computer game.

The types of people that use these simulators would be Formula One drivers so that they can practise driving the cars and get used to the tracks, also for people who want to drive these cars for a bit of fun as they give a good real-life effect.

Advantages:

1. These are very real-life like and have a good driving track that shows a good example of what it is really like.
2. When sitting inside one of these simulators, the car is the same size, and is set out the same way that an actual Formula One Car is.
3. These simulators prevent expensive car models from being damaged, this saves money.

Disadvantages:

1. Although these cars may look and feel the same as the real thing, the force that is impacted on the car is not the same; it will have a lighter pressure force on the car.
2. Weather conditions may be different, especially with the different impacts that are acted upon the car.
3. On the track you would be surrounded by different drivers that may be unsafe to drive along side. You have to be aware of what to do, straight away when a problem occurs. Simulators will not give the same effect.
4. These large models used for the simulators may be expensive and take a wile to build.