CSC8004: Website Design and Technologies

Practical 6 – Webpage Content Presentation

Aim

The aim of this practical is to:

- Introduce the use of media queries on CSS
- Familiarise yourself with the CSS Validation Service
- Put into practice HTML and CSS knowledge to build your first webpage from scratch

Task

Work your way through the following exercises. Save this file (and any related files) in a safe place.

Please note that these practicals are *optional formative* exercises. This means that while they do not directly contribute to your final module mark, they are aimed to help you complete all related assessments.

Deliverables

This practical is for formative feedback only and does not have deliverables.

Remember that the best and quickest way to get individual feedback is by asking the demonstrators.

Exercise 1 – Utilising media specific styles

For this exercise you will need to download practical6a.html, practical6a.css, print.pdf, screen550.png from Blackboard. Open Notepad++ using the Windows start menu, then open practical6a.css. As mentioned in the notes you can apply a specific style depending on which media is invoked. Your task is to insert the relevant CSS so that practical6a.html looks like print.pdf when displayed in Print Preview and screen550.png when displayed on screen smaller than 550px in width. To help you may need to read ahead in the notes and/or look at the online w3schools CSS Tutorial.

This concludes exercise 1.

Exercise 2 – Using the validator to test and debug CSS

For this exercise you will need to download “MakeMeValidCCS.css” from Blackboard. I have injected 5 faults in this file. Using the CSS Validation Service identify and fix these faults. Note that similar to your coursework, you will need to update the profile to CSS Level 2.1. Use the table below to document your findings.

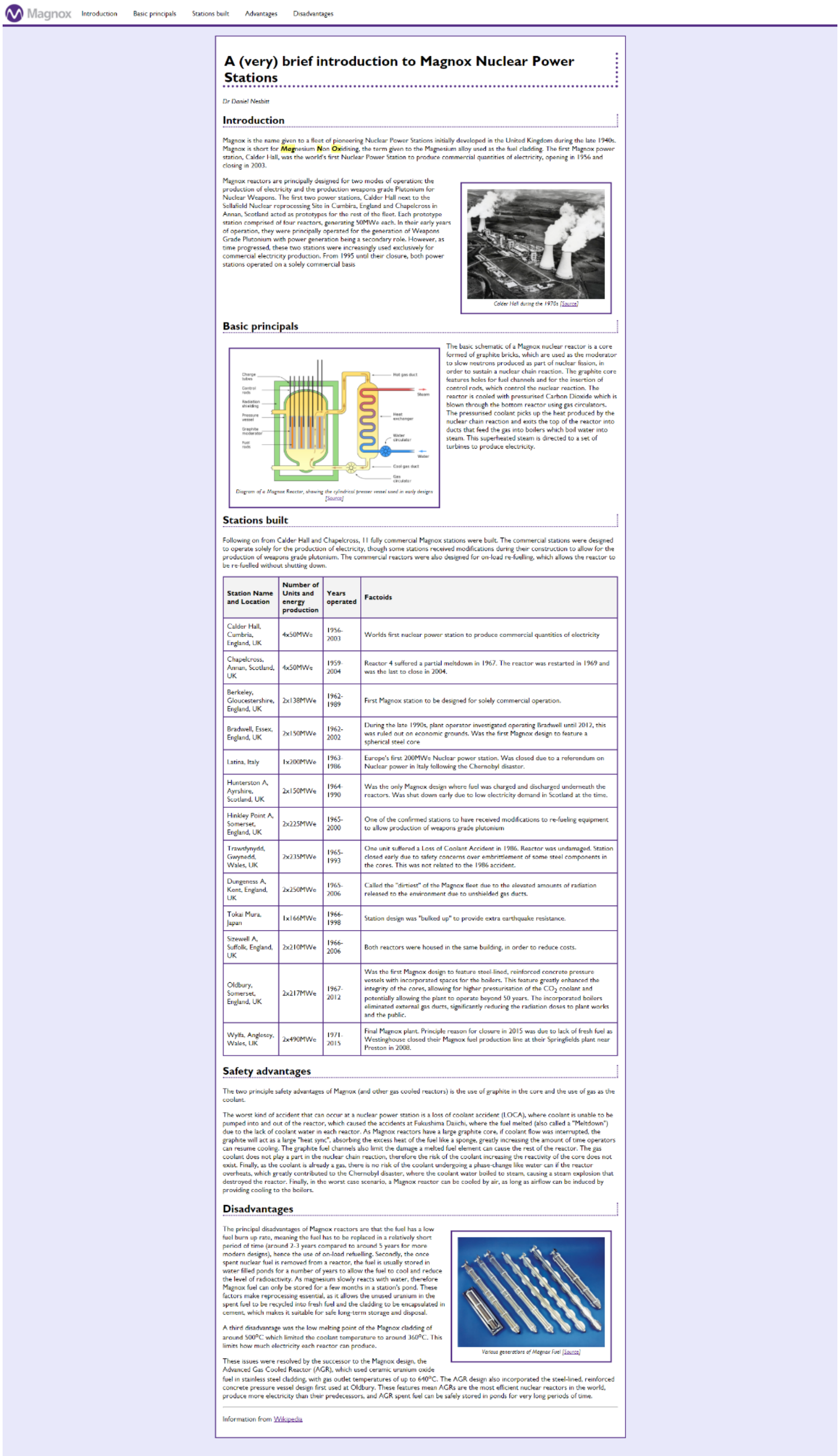
#	Identified Fault	Fix applied
1		
2		
3		
4		
5		

This concludes exercise 2.

Exercise 3 – Create a complete webpage

Using the skills that you have learned from the course so far, create a webpage that is XHTML 1.0 and CSS 2.1 compliant. For example, a review on your favourite topic, TV show, Movie, Game or Sport. I leave the content and presentation up to you, however don’t forget to keep it professional.

Here is an example:



Magnox Introduction Basic principals Stations built Advantages Disadvantages

A (very) brief introduction to Magnox Nuclear Power Stations

Dr Daniel Nesbitt

Introduction

Magnox is the name given to a fleet of pioneering Nuclear Power Stations initially developed in the United Kingdom during the late 1940s. Magnox is short for ***Mag***nesium **N**on **Ox**idising, the term given to the Magnesium alloy used as the fuel cladding. The first Magnox power station, Calder Hall, was the world's first Nuclear Power Station to produce commercial quantities of electricity, opening in 1956 and closing in 2003.

Magnox reactors are principally designed for two modes of operation; the production of electricity and the production weapons grade Plutonium for Nuclear Weapons. The first two power stations, Calder Hall next to the Sellafield Nuclear reprocessing Site in Cumbira, England and Chapelcross in Annan, Scotland acted as prototypes for the rest of the fleet. Each prototype station comprised of four reactors, generating 50MWe each. In their early years of operation, they were principally operated for the generation of Weapons Grade Plutonium with power generation being a secondary role. However, as time progressed, these two stations were increasingly used exclusively for commercial electricity production. From 1995 until their closure, both power stations operated on a solely commercial basis

Calder Hall during the 1970s [Source]

Basic principals

Diagram of a Magnox Reactor, showing the cylindrical presser vessel used in early designs [Source]

The basic schematic of a Magnox nuclear reactor is a core formed of graphite bricks, which are used as the moderator to slow neutrons produced as part of nuclear fission, in order to sustain a nuclear chain reaction. The graphite core features holes for fuel channels and for the insertion of control rods, which control the nuclear reaction. The reactor is cooled with pressurised Carbon Dioxide which is blown through the bottom reactor using gas circulators. The pressurised coolant picks up the heat produced by the nuclear chain reaction and exits the top of the reactor into ducts that feed the gas into boilers which boil water into steam. This superheated steam is directed to a set of turbines to produce electricity.

Stations built

Following on from Calder Hall and Chapelcross, 11 fully commercial Magnox stations were built. The commercial stations were designed to operate solely for the production of electricity, though some stations received modifications during their construction to allow for the production of weapons grade plutonium. The commercial reactors were also designed for on-load re-fuelling, which allows the reactor to be re-fuelled without shutting down.

Station Name and Location	Number of Units and energy production	Years operated	Factoids
Calder Hall, Cumbria, England, UK	4x50MWe	1956-2003	Worlds first nuclear power station to produce commercial quantities of electricity
Chapelcross, Annan, Scotland, UK	4x50MWe	1959-2004	Reactor 4 suffered a partial meltdown in 1967. The reactor was restarted in 1969 and was the last to close in 2004.
Berkeley, Gloucestershire, England, UK	2x138MWe	1962-1989	First Magnox station to be designed for solely commercial operation.
Bradwell, Essex, England, UK	2x150MWe	1962-2002	During the late 1990s, plant operator investigated operating Bradwell until 2012, this was ruled out on economic grounds. Was the first Magnox design to feature a spherical steel core
Latina, Italy	1x200MWe	1963-1986	Europe's first 200MWe Nuclear power station. Was closed due to a referendum on Nuclear power in Italy following the Chernobyl disaster.
Hunterston A, Ayrshire, Scotland, UK	2x150MWe	1964-1990	Was the only Magnox design where fuel was charged and discharged underneath the reactors. Was shut down early due to low electricity demand in Scotland at the time.
Hinkley Point A, Somerset, England, UK	2x225MWe	1965-2000	One of the confirmed stations to have received modifications to re-fueling equipment to allow production of weapons grade plutonium
Trawsfynydd, Gwynedd, Wales, UK	2x235MWe	1965-1993	One unit suffered a Loss of Coolant Accident in 1986. Reactor was undamaged. Station closed early due to safety concerns over embrittlement of some steel components in the cores. This was not related to the 1986 accident.
Dungeness A, Kent, England, UK	2x250MWe	1965-2006	Called the "dirtiest" of the Magnox fleet due to the elevated amounts of radiation released to the environment due to unshielded gas ducts.
Tokai Mura, Japan	1x166MWe	1966-1998	Station design was "bulked up" to provide extra earthquake resistance.
Sizewell A, Suffolk, England, UK	2x210MWe	1966-2006	Both reactors were housed in the same building, in order to reduce costs.
Oldbury, Somerset, England, UK	2x217MWe	1967-2012	Was the first Magnox design to feature steel-lined, reinforced concrete pressure vessels with incorporated spaces for the boilers. This feature greatly enhanced the integrity of the cores, allowing for higher pressurisation of the CO_2 coolant and potentially allowing the plant to operate beyond 50 years. The incorporated boilers eliminated external gas ducts, significantly reducing the radiation doses to plant works and the public.
Wylfa, Anglesey, Wales, UK	2x490MWe	1971-2015	Final Magnox plant. Principle reason for closure in 2015 was due to lack of fresh fuel as Westinghouse closed their Magnox fuel production line at their Springfields plant near Preston in 2008.

Safety advantages

The two principle safety advantages of Magnox (and other gas cooled reactors) is the use of graphite in the core and the use of gas as the coolant.

The worst kind of accident that can occur at a nuclear power station is a loss of coolant accident (LOCA), where coolant is unable to be pumped into and out of the reactor, which caused the accidents at Fukushima Daiichi, where the fuel melted (also called a "Meltdown") due to the lack of coolant water in each reactor. As Magnox reactors have a large graphite core, if coolant flow was interrupted, the graphite will act as a large "heat sync", absorbing the excess heat of the fuel like a sponge, greatly increasing the amount of time operators can resume cooling. The graphite fuel channels also limit the damage a melted fuel element can cause the rest of the reactor. The gas coolant does not play a part in the nuclear chain reaction, therefore the risk of the coolant increasing the reactivity of the core does not exist. Finally, as the coolant is already a gas, there is no risk of the coolant undergoing a phase-change like water can if the reactor overheats, which greatly contributed to the Chernobyl disaster, where the coolant water boiled to steam, causing a steam explosion that destroyed the reactor. Finally, in the worst case scenario, a Magnox reactor can be cooled by air, as long as airflow can be induced by providing cooling to the boilers.

Disadvantages

The principal disadvantages of Magnox reactors are that the fuel has a low fuel burn up rate, meaning the fuel has to be replaced in a relatively short period of time (around 2-3 years compared to around 5 years for more modern designs), hence the use of on-load refuelling. Secondly, the once spent nuclear fuel is removed from a reactor, the fuel is usually stored in water filled ponds for a number of years to allow the fuel to cool and reduce the level of radioactivity. As magnesium slowly reacts with water, therefore Magnox fuel can only be stored for a few months in a station's pond. These factors make reprocessing essential, as it allows the unused uranium in the spent fuel to be recycled into fresh fuel and the cladding to be encapsulated in cement, which makes it suitable for safe long-term storage and disposal.

A third disadvantage was the low melting point of the Magnox cladding of around 500°C which limited the coolant temperature to around 360°C. This limits how much electricity each reactor can produce.

Various generations of Magnox Fuel [Source]

These issues were resolved by the successor to the Magnox design, the Advanced Gas Cooled Reactor (AGR), which used ceramic uranium oxide fuel in stainless steel cladding, with gas outlet temperatures of up to 640°C. The AGR design also incorporated the steel-lined, reinforced concrete pressure vessel design first used at Oldbury. These features mean AGRs are the most efficient nuclear reactors in the world, produce more electricity than their predecessors, and AGR spent fuel can be safely stored in ponds for very long periods of time.

Information from Wikipedia

This completes exercise 3 and the practical sheet.