

Sustainability through technology Exam 2020

Oliver Gordon

page 1

P150782

M6X02212

Home exam

13:00

Q2)

a) analyse the typical End of lifecycle Recycling process (scrapping & depollution) that an automotive vehicle experiences

firstly work out the general number of Scrapped Vehicles which is done in two methods, Method 1 being - proportionally related to the number of new Vehicles Sold, Method 2 being - Assume Average age of EV vehicles is 13 years.

There are a number of different materials in a vehicle such as

What materials are a vehicle		% By Weight in a Vehicle
	ferrous metals	68.3
	Plastic	9.1
	light non ferrous metals	6.3
	Tyres	3.5
	Glass	2.9
	fluids	2.1
	rubber	1.6
	Heavy non ferrous metals	1.5
	Other	1.5
	Battery	1.1
	Process Polymers	0.1
	Electronics	0.7
	Carpet	0.4

Sustainability through technology Exam 2020

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P150782

MBX02212

Home exam

13:00

page 2

Q2)a)

With the rate of Vehicles sold increasing meaning the rate of vehicles being scrapped increasing. The EU have three directives

- Waste disposal Directive
- Waste Electrical and Electronic Equipment (WEEE)
- End of life Directive

The End of life Directive 2000/53/EC

With the aim of to encourage the reuse, recycling and recovery of components from End of life Vehicles. Which came into effect on the 3rd November 2003

ELV Directive had 2 targets of:

1st Jan 2006

Reuse & recycle = min 85%

Reuse & recovery = min 85%

&

2015

Reuse & recycle = min 85%

Reuse & recovery = min 95%

Sustainability through technology Exam 2020

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P150782

M6X02212

Home exam

13:00

Page 3

Q1a)

10 components to consider during the recycling

Phase:

↳ Engine oil

↳ Oil filters

↳ Glass

↳ Powertrains

↳ Batteries

↳ Tyres

↳ Waterpumps, Starter motors & Alternators

↳ Belts & chains

↳ Rubber hoses

↳ Mats & carpets

End of life Recycling

Disassembling

Shredding

Magnetic Separation

Sink-float Separation

Eddy current Separation

Leaving

Steel

Aluminium

Magnesium

Plastics

these 4 materials go through
their own recycling phase

Sustainability through technology Exam 2020

Oliver Gordon
P150782
M6X02212
Home exam
13:00

page 4

Q2) b) analyse the 5 levels of autonomous driving and the effect this will have on the Automotive industry. Evaluate issues that could arise as a result of ~~development~~ development of the levels 3-5 in autonomous vehicles

Level 1 (Driver Assistance)

This is the lowest of automation. The vehicle features a single automated system for driver assistance, such as steering or accelerating (cruise control). Adaptive cruise control, where the vehicle can be kept at a safe distance behind the next car, qualifies as level 1 because the human driver monitors the other aspects of driving such as steering & braking.

For example the 2011 Jeep grand Cherokee had ACC introduced.

Level 2 (Partial Driving Automation)

This means advanced driver assistance systems or ADAS. The vehicle can control both steering & accelerating/decelerating. Here the automation falls short of self driving because a human sits in the drivers seat and can take control of the car at any time.

Example is Tesla autopilot system & Cadillac (GM) super cruise system.

This is where the current vehicle market is at, level 1 & more recently level 2.

Sustainability through technology Exam 2020

Oliver Gordon

P180782

M6X02212

Home exam

13:00

Page 5

Q2)b)

Level 3 (conditional Driving automation)

The jump from level 2-level 3 is substantial from a technology perspective, but subtle if not negligible from a human perspective. Environment detection capabilities. The vehicle can perform most driving tasks, but still requires a human override.

The first production car rumoured to be capable of this is the 2019 Audi A8.

Concerns are - Are the vehicles smart enough?

- Can they be proven to be safe for the occupants or for the general public on the pavements?

Level 4 (high Driving automation)

The key difference between level 3 & level 4 vehicles automation is the level 4 vehicles can intervene if things go wrong or there is a system failure. In the sense, these cars do not require human interaction in most circumstances. However, a human still has the option to manually override.

Level 4 vehicles are limited due to legislation and infrastructure needing to evolve, so the self-driving mode can only be used in urban areas (with Avg speed of 30mph)

Example of this is the partnership between Volvo & Baidu and introduce the vehicles to the robo taxi market in China.

Sustainability through technology Exam 2020

Oliver Gordon

page 6

P150782

M6X02212

Home exam

13:00

Q2)b)

The concerns for this are, using the robotaxi example, are that if there is hundreds of driverless cars going about it'll make existing drivers nervous around the robotaxi, and if in the scenario of a child ~~was~~ walking out in front of the vehicle has no time to stop. What does it do, run over the child in the road or the pedestrians on the pavement or go into the oncoming traffic in the other lane.

Level 5 (Full Driving Automation)

Level 5 vehicles do not require human attention - the dynamic driving task is eliminated. Level 5 cars won't even have steering wheels or pedals. They will be free from ~~go~~ opening, able to go anywhere and do anything that an experienced human driver can do. Fully autonomous cars are undergoing test in several parts of the world, but none yet available to the general public.

Example: Volvo & Uber claim to have the world's first fully autonomous vehicle/production car.

Concerns - Security issues e.g. cars being hacked

- the belief of them replacing taxi services is a myth.
- reduced emissions claims are believed to be alive

- are they proven to be safe.

Sustainability through technology Exam 2020

Oliver Gordon

P180782

M6X02212

Home Exam

13:00

page 7

Q3)a) Discuss and evaluate noise reducing strategies that a range of circuits employ to help reduce the impact of circuit generated noise travelling into the local communities.

Snetterton are one of many circuits to receive a Noise abatement notice over the years and the way circuits get around these are by:

- ↳ Introducing noise reducing features such as attenuation bunds, fences and dirt mound and trees and bushes and other tall structures.

- ↳ have a slight ~~redesign~~ redesign of the track

- ↳ Noise caps on testing, track days and racing vehicles

- ↳ Limit circuit activities to within certain hours like Brands Hatch

- ↳ Brands Hatch Noise management -
Race meetings

Fridays, Saturdays and Bank Holiday 9:00 to 18:30

Sundays 10:00 to 18:30

engines start on Fridays, Saturdays & Bank holidays @ 08:15 & 09:15
On Sundays.

- ↳ Modification & monitoring of vehicle noise emissions.

Sustainability through technology Exam 2020

Oliver Gordon

P150782

M6X02212

Home exam

13:00

page 8

Q3) b) With the introduction of formula E & announcement of the New generation of Hybrid powered WRC cars in 2022, explain the Impact that motorsport could have on the automotive Industry. Include examples of technology transfer, reduction in noise & public perception

technology transfer - first thing that spring to mind is the la ferrari & the formula one KERS (kinetic energy recovery). Being introduced to formula one in 2009 and being developed and introduced to the world at the 2013 Geneva Motor Show.

the public perception on formula E & Hybrid WRC cars - the purists of motorsport would've at first been against formula E & Hybrid WRC cars. but since formula E was first on the scene the support has grown significantly. Showing the diehard motorsport fans eventually adapt to change.

When it comes to the public perception on motor sport technology being introduced the public are being more interested in the development of EVs because of the ban on selling new petrol & diesel cars in 2035.