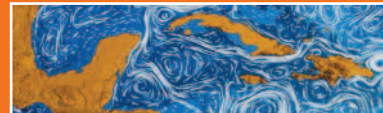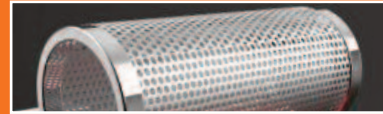# Futureminds

Tomorrow's world explored today

Summer 2017

CLEAPSS D&T e-newsletter

Design and Technology from CLEAPSS

Welcome to the fifth edition of *Futureminds*. We have been producing this e-newsletter for just over a year and would appreciate your feedback. If you have any comments about this edition, previous editions or thoughts about what we should include in future editions, please drop us a line dt@cleapss.org.uk

We were in Manchester in April having a really interesting day at the Health and Safety Executive engagement event entitled *Helping Great Britain Work Well.*

It was the 5th of 5 events which had toured the UK, with around a hundred delegates from across all industries, and a number of HSE colleagues and presenters.
The event started with presentations chaired by Selvin Brown MBE. This was followed by a number of presentations and group discussions:

Engagement Event Manchester

1. Tackling ill health and keeping pace with change by Sarah Pinch, a Board member of the HSE. Provided a very interesting and well presented talk. The aims for Work Well are to improve the workplace, concentrating particularly on stress, muscular skeletal damage, and lung disease. These three cause the greatest loss of working days and have the greatest impact on workers, businesses and the economy across all sectors.

2. *The Here and Now* by Peter Brown, deputy Director, Health and Work programme, HSE, who explained the role of HSE and the 16 sector plans. The sector which covers schools is Public Services, and you can find more about the plan at: http://www.hse.gov.uk/aboutus/strategiesandplans/sector-plans/public-services.pdf

3. The discussion tables were all led by an HSE facilitator. Geoff Cox led our table and was excellent. We discussed ideas around 'what does good look like' and came up with the notion of a 'charter' that businesses could sign up to. It included several core values around the three areas of focus. We also came up with a snappy title: 'Happy, Healthy and Here'

4. *The role of the trade union* by Doug Russell, USDAW, was also interesting, showing a direct and measurable link between improved H&S and the role of union reps. USDAW train over 10,000 reps in H&S every year.

5.   *Sharing Good Practice* by Moira Greenwood, Senior Safety Advisor, Sefton local authority, explained how Sefton and the HSE are working on a pilot with schools to develop the Work Well strategy. They are currently investigating stress in the workplace and are hoping to develop support and other strategies to reduce the incidence of stress-related absence by staff in Sefton schools.

Helping Great Britain work well

Jobs in the Future

- Elderly well being consultant
- Vertical farmer
- Haptic programmer
- Waste data handler
- Avatar manager
- Memory augmentation surgeon

You have no excuse to forget again.

MEMORY AUGMENTATION SURGEON

#HelpGBWorkWell

6.   *Thinking about the future* by Dr Stephen Kinghorn-Perry, Head of Foresight Centre, HSE, offered a short but interesting presentation of some developments in the workplace that may or may not have an impact on the three focus areas. These included automated systems, different ways of working, new technologies and so on.

7.   Further discussion tables were arranged as the final session of the day, this time grouped by sector and concentrating on the appropriate draft sector plan. Again this was facilitated by an officer from the HSE.

Overall, this was a really interesting day. It was good to see increased emphasis on the 'health' part of health and safety. Schools are already relatively safe environments, but there are still some health issues, particularly around stress, that might be addressed by this new HSE initiative. CLEAPSS will keep schools informed about the progress as we learn more.

THE UK ADDITIVE MANUFACTURING SPECIAL INTEREST GROUP (SIG).

In May we attended a meeting of the AM Special Interest Group, which comprises mainly academics, business personnel, and scientists working together to create and promote new knowledge and knowledge transfer in the area of additive manufacturing and 3D printing (AM/3DP). This is primarily to support UK businesses and promote economic growth, but of course there are tremendous educational opportunities. The group is run by the Knowledge Transfer Network (KTN) which is funded by the Government through Innovate UK.

It was a very interesting day, it started with an inspirational talk entitled 'On the road to Shangri La' which illustrated some of the most amazing 3D printed medical implants and developments in biomimicry that are allowing doctors to develop more successful operations and implants.
http://www.fdmdigitalsolutions.co.uk/

A second speaker took the concept of design success and explained that, with new materials and technologies, designing shape is no longer good enough, designers now need to design shapes that perform. He explained that additive manufacturing is not a cheap solution, so designers need to be taught to design for the best use of the technology.
https://www.digits2widgets.com/

Both of these topics are important in the new GCSE for D&T.

The afternoon started with a talk about copyright and counterfeit and included the statement that
'No counterfeit part has ever out performed the original'.

The speaker went on to describe methods of adding trace elements to printed components, including food, and how packaging can be used to protect product copyright, through labelling and the use of new ink technology. **https://www.tracerco.com/**

A new technology was demonstrated, using daylight printing to 3D print large items very quickly. The liquid crystal printer uses a flat screen below a vat of liquid polymer to illuminate the polymer in a sequence that allows the polymer to react and the 3D print to grow. **http://photocentric3d.com**

The last speaker of the day talked about scale of production. He spoke about items that are made in scales of 300 billion items per year, which equates to around 10,000 per second for every second of the year! He went on to talk about new high speed printing processes that are being developed to enable more products to be scaled up to this sort of volume, meaning that prices could be reduced or products made more accessible. **http://www.archipelagotechnology.com/**
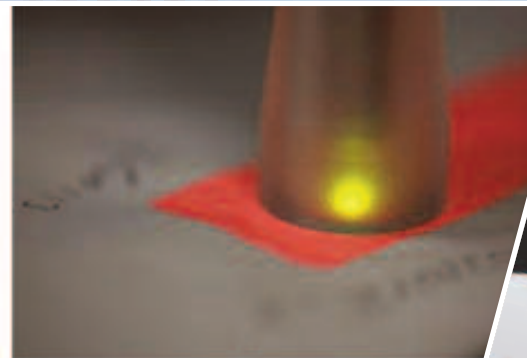
Throughout the day there were opportunities for companies and others to 'pitch' their ideas or requirements to the around 120 delegates. We will follow up some of these in future newsletters.

Overt

Covert

Forensic

As readers of *Futureminds* will be aware, we are building our own robot at CLEAPSS, using the InMoov designs (www.inmoov.fr). We now have two working arms and hands, and are starting to build the shoulders.

You may also be aware that there has been an exhibition of robotics at the Science Museum in London. In addition, the Royal Commission for the Exhibition of 1851 has been running a STEM competition for schools, entitled:

Catch the Robots Bug!

There are lots of other robot competitions being run throughout the year, so if you are doing robotics with your pupils, at any age, you should be able to find something in which they can compete. We have identified a few links to interesting websites that you may want to follow.

RobotChallenge - The Competitions

RobotChallenge is an international championship for self-made, autonomous, and mobile robots. Each year robots compete in different competitions – Robot Sumo, Line Follower, Air Race, Humanoid Sprint, Puck Collect and Freestyle.

Pi Wars – the Raspberry Pi robotics challenge competition

continued...

Competitions include the Institute of Engineering and Technology running the Lego League, the international robot Olympics, NASA competitions, and other STEM technologies including Raspberry Pi challenges.

http://firstlegoleague.theiet.org/

https://www.robotchallenge.org/competition/

https://robotics.nasa.gov/events/competitions.php

http://piwars.org/

There are also various exhibitions and shows that you or your pupils could attend to get some inspiration for this exciting field of D&T.
http://www.extremerobots.co.uk/

We have found that the building of these complex machines is a great team activity. Here at CLEAPSS we are combining the D&T skills of manufacturing with the scientific principles from Physics and often discuss aspects of the build with the Chemists and Biologists. All of this has been inspired by our work with the 3D printers in investigating safe use of the machines and materials.

ROBOTS

FEA

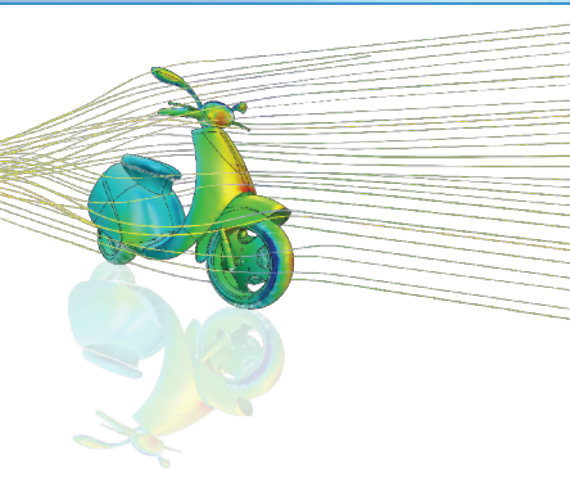## (Finite Element Analysis): Where Physics meets D&T

by Alasdair Jones (Techsoft)

Recently, CLEAPSS has been showing off the model wind tunnel. This is a great resource for departments (D&T and/or science) to build, and a perfect example of the sort of 'hands on' learning activity that is needed to raise interest in STEM subjects. The wind tunnel can be used to demonstrate topics such as air-resistance, aerodynamics, and the force of lift around a range of objects or models.

In the manufacturing world, one of the main reasons for prototyping is to see how a product reacts to the typical forces encountered under normal working conditions.

- *Will drag cause resistance?*

- *Are there weak spots where it may break due to fatigue?*

- *Will melted plastic flow through mould efficiently, or will there be expensive defects in manufacturing?*

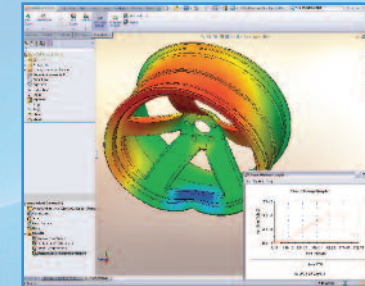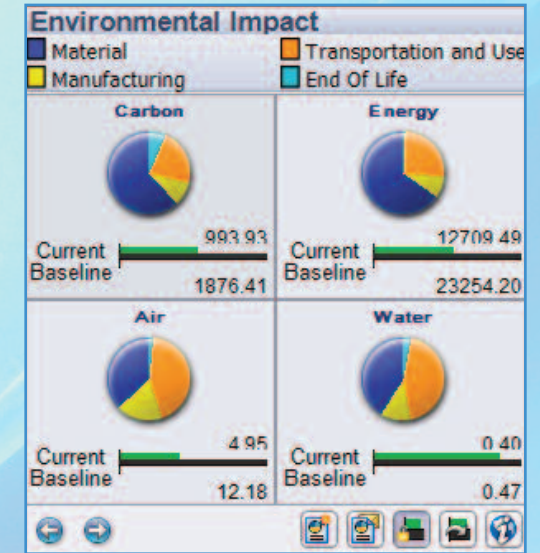- *Will moving parts cause stress, impact or vibration?*

These questions are of great importance to the designer, the manufacturer, and (above all) the consumer.

But what if we could predict how a product will react to real-world forces at the design stage, rather than destructive testing later on? Well, you can, it's called Finite Element Analysis, or FEA.

Now that 3D printers are commonplace in schools, virtually all D&T departments will be using some sort of 3D CAD. (And if they're not, they should be.) There are a great deal of basic options out there, but at the professional end, software such as SolidWorks will allow students to access a wide range of simulation tools, gaining skills that they can take with them into industry.

Entering a range of simple constants, such as the type and grade of material (there are thousands to choose from), fixed points, type of forces, and where they are applied, allows the software to use sophisticated algorithms to calculate stress and displacement, identifying weak points on a part a student has designed. Results are displayed graphically as colours on the 3D model, or as an animation, making it easy to spot potentially weak areas of the design.

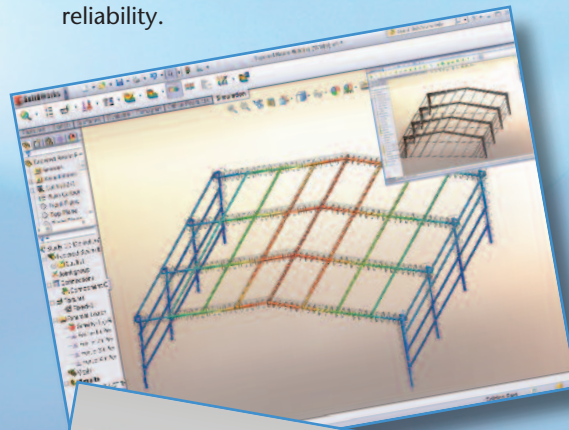Sounds complicated? It really isn't, and the results are impressive.

FEA

Once students have grasped this concept, it's possible to take it even further with them. Car manufacturers (for example) want to save weight and money by using the minimum amount of raw material. What would happen if the product was made hollow, or thinner with supporting ribs? SolidWorks can tell you in minutes.

Built-in costing tools allow students to calculate how much parts should cost to manufacture. They can then create different versions of their design and try to economise materials, whilst maintaining strength and reliability.

What about the sustainability of a product?

With built-in sustainability features, modern 3D CAD software like SolidWorks uses real-world data to allow students to generate a life-cycle assessment and a report showing the environmental impact of their design. With a few clicks, it's possible to work out whether it's cheaper to have a part manufactured in the UK or China.

A recent case study in the D&T department at Sevenoaks School showed how all this works in a typical classroom environment.
The YouTube video is well worth a watch.
Check out this link
https://www.youtube.com/watch?v=oEpY_l5K7fo, or have a look at the news article on TechSoft's website.

TechSoft has been providing CAD software including SolidWorks and 2D Design to D&T Departments for 30 years, and also offer a wide range of CAD/CAM equipment, manual equipment, tooling, materials and teaching resources. Please visit www.techsoft.co.uk for more information.

TECHSOFT

DS SOLIDWORKS

Non-Specialist Food Teachers - getting to grips with the basics

By Suzanne Gray (Food Teachers Centre)

Many schools are resorting to in-house cover for shortfalls in timetabling as recruitment from agencies puts a massive strain on finances. This means more teachers are filling the gaps in the teaching of food, and struggling with a subject outside their discipline. This situation is often made worse by the lack of technician support.

Teaching food is not just about going into a food room, delivering a lesson and then leaving after an hour. The subject demands much more than that. Learners need to develop their understanding, skills and knowledge of the requirements of the D&T Key Stage 3 Programme of Study, and/or the GCSE Food Preparation and Nutrition. Learning about the place of food today within the wider school curriculum is very much on the agenda and forms a large focus of the Ofsted criteria for *Personal Development, Behaviour and Welfare* (page 48-51). Pupils are expected to be able to 'explain accurately and confidently how to keep themselves healthy and make informed choices about healthy eating'.

Principles of nutrition and health must be taught, with students being aware of the nutrients in food and the effects that they play on health. Pupils need to understand and apply their knowledge of the nutrients in order to make informed choices for a varied and balanced diet. The ability to be able to produce food to meet the needs of specific groups of people with special dietary needs should also be taught. The model for this is the *Eatwell Guide,* and this and lots of further help can be sourced using the following link.
http://www.foodafactoflife.org.uk/

As well as introducing experimental work or investigations and sensory testing activities into schemes of work, topics to be taught include: looking at the scientific aspects of food production; focusing on the students being able to select appropriate cooking methods for the food; explaining how and why food is cooked using a variety of heat transferral methods; and the function and chemical properties of food. Most are investigated through practical tasks, some may take place in science labs, whilst others may be part of food room activities.

The delivery of practical food skills needed in the curriculum today, and how to develop competency in these in the classroom causes one of the big concerns for non-specialist teachers. Practical work includes a range of skills and techniques including basic knife skills, use of the hob/oven/grill and other hand and electrical equipment. Although most teachers have experience of these at home,

the worry is that they need to model good practice to ensure appropriate learning. Many practicing, non-specialists have not had any formal training, which may result in mixed messages being passed to the learner. Whilst managing all of these tasks, the teacher also need to include the topic of Food Provenance and Sustainability, as well as teaching through the principles of health and safety. The need to adhere to effective risk assessments and successfully manage food safety in the classroom, features high on their agenda of training needs.

Teaching Food is very much a full-on task, which involves lots of extra curricular activity on the part of the teacher. A technician is essential, and when allocated, they can be the backbone to success for the non-specialist.

For further advice on developing safe working practices, contact CLEAPSS, and the Food Teachers Centre for general support and advice on subject-specific classroom issues.

Preparing students at KS3 for the new GCSE D&T

by Louise T Davies (Bright Ideas Consulting Ltd)

One of the biggest changes for teachers in the new GCSE will be the move from Awarding body-set controlled assessment design briefs, to much broader 'contextual challenges'.

In future, 10% of the overall GCSE grade will be awarded for AO1: Identify, investigate and outline design possibilities to address needs and wants. 10% of the grade is awarded entirely by NEA (Non examination assessment) for interpreting the contextual challenge and developing a design brief.

Sample contextual challenges from AQA include:

- *A high profile sporting event*

- *Addressing the needs of the elderly*

- *Children's learning and play*

Year 7	Year 8	Year 9
Explore needs, wants and opportunities in the context of **designing for themselves** • Brainstorming • Mind-mapping • Line-ups • Product pairs	Explore needs, wants and opportunities in the context of **designing for clients** • Live like the user • Be a problem-finder • Observe people and products • Using materials	Explore needs, wants and opportunities in the context of **designing for markets** • A day in the life • PIES
Identify design possibilities by discussing **needs and opportunities** presented by the task • Keywords • Mind-mapping	Explore and play with **conventional and unconventional ideas** related to the task • Word association • Using materials	Speculate about and envisage both **common and unusual possibilities** presented by the task • PIES
Develop design **criteria** to satisfy the design brief • Brainstorming	Recognise **critical factors** that need to be included as design criteria • Live like the user • Observe people and products • Product footprint • Winners and losers	Draw up a design specification for the product detailing the design **criteria which reflect a user's needs** • Design abacus
Identify **constraints** imposed by the task and/or resources and acknowledge them when formulating criteria • Mind-mapping	Identify conflicting criteria and determine which should take **priority** • Product footprint • Winners and losers	Select information sources, **gathering and sorting data** that will help with ideas for, and decisions about, the design • A day in the life • Walk around a building • Centring • Inspirational products
Find and select information which informs and **clarifies thinking** about the task • Role-play and user needs • Mood-board homework • Mood-boards • Product pairs	**Discuss and debate,** information and the nature of the task itself • Big and small questions	**Debate, question and challenge** information and the nature of the task itself • Product footprint
Use **existing, familiar products** and systems to inform their design thinking • Mood-board homework • Mood-boards • Line-ups • Product pairs	Use **solutions to problems from the present, and other times and cultures,** to inform their design thinking • Be a problem-finder • Learn from the past and other cultures	Explore ideas in ways that show an understanding of their **impact for the future** • Why put it right? • The bigger picture
Record their research using notes, sketches, diagrams, etc.	Draw conclusions from the gathered information and comment on its usefulness • Role-play and user needs	Comment on how **effectively the information has been used** • A day in the life • The bigger picture

For some schools, this means that they will need to adjust their KS3 schemes of work, so that students can practice the skill of investigating the context, examining needs and opportunities, and addressing them through writing and developing a brief from their personal consideration of the context. Students need to build this up in stages to develop their skills and confidence. These will be underdeveloped and may impact on their examination marks later if KS3 students have got used to being given a design brief by the teacher.

Some experienced teachers will remember the original national curriculum, where there was always a strand that echoed the ability to 'identify needs and opportunities', and as such there were some excellent strategies offered to develop this key designing skill. Perhaps it's wise to re-visit those highly effective strategies again, rather than re-inventing the wheel, when you are already so busy with planning the new GCSE.

We are always asked to map out progress in our lessons and in our schemes of work, so a typical progression planned for pupils at KS3 to prepare them for these contextual challenges in GCSE is illustrated in the table below. The bullet points suggest some of the learning activities that will help students to learn these skills. These are engaging and practical learning activities.

You can find the further information about the practical activities under 'exploring ideas and the task' (and many more):
http://webarchive.nationalarchives.gov.uk/20130401151715/http://www.education.gov.uk/publications/eOrderingDownload/0971-2004PDF-EN-05.pdf

Design For A Better World

Further resources can be found here:

Cracking Ideas
http://crackingideas.com/keystage/Key+Stage+3

Practical Action -
https://practicalaction.org/design-for-a-better-world

Ellen MacArthur Foundation
https://www.ellenmacarthurfoundation.org/programmes/education/schools-colleges/teaching-learning-resources

101 Red Hot D&T starters (sorry out of print)
https://www.amazon.co.uk/Letts-Red-Hot-Starters-Technology/dp/1844190595

Louise T Davies offers D&T consultancy across the country through Bright Ideas Ltd, having previously held many leadership and curriculum development roles including Deputy Chief Executive at the D&T Association, Subject Officer at QCDA and Senior Research Fellow at the Royal College of Art.

At GoPrint3D, we believe that 3D printing is the future of industry and manufacturing. Offering an unprecedented range of 3D printers and 3D printing solutions, we help people and organisations choose the right 3D printer for their needs.

GoPrint3D are able to offer impartial advice, and sell and hire 3D printers, we also offer a 3D printing service. For many multinationals, 3D business is one of the most important growth areas. And for many SMEs, desktop 3D printing has driven innovation and development.

In schools, 3D printing can change the way students learn, and in dental labs, it has revolutionised how orthodontic devices are made. Look elsewhere, and it's plain to see the impact desktop 3D printing has had on industry in such a short period of time.

3D Printing with

GoPrint3D

by David Whitehouse

For example, the 3D Jewellery Company (Facebook: Amy's 3D casts and jewellery) is a recipient of our 3D printing service. Amy creates beautiful 3D casts of children's hands, feet and fingerprints. These casts are made using a quick-setting mould, and 3D scanning is then used to map this. We then 3D print the models in our workshop using the Formlabs Form 2, 3D printer, rendering a fingerprint-perfect model for Amy's customers. For Amy and her company, our 3D printing service is a low-cost way to manufacture products.
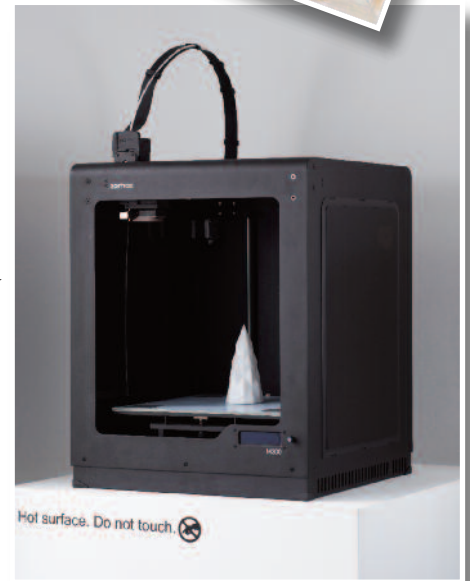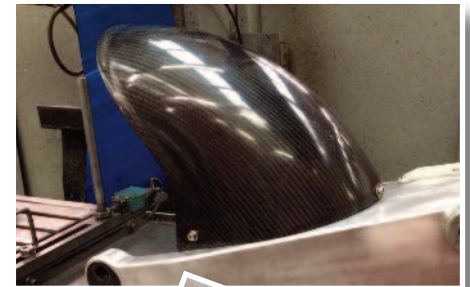
Elsewhere, Metmachex Engineering use 3D printing to manufacture prototype swing arms and billet parts. These are printed using the Zortrax M200 3D printer, and if they are printed with a functional resin, they can be used for mechanical applications. We recommended and supplied the Zortrax M200, because it's a high-accuracy, high-output machine.

Another exciting project we worked on recently was for the Beyond Boundaries: Art by Email project, set up by the Yorkshire Sculpture Park. We supplied the Yorkshire Sculpture Park with a Zortrax M300 3D printer, so they could 3D print a sculpture submitted to them by artist Sahand Hesamiyan. The sculpture, named "Pardis", was inspired by mysticism and Islamic geometry. A beautiful, opaque white sculpture with interesting geometries, it printed successfully and formed part of the Yorkshire Sculpture Park's exhibition in March.

Beyond these projects, we provide customer service and support for customers who purchase a 3D printer through us. We are authorised by our partners (where applicable) to provide support, and in cases, warranty work, and our experienced team can help you to get the most out of 3D printing, whatever the application.

Some of our partners include Formlabs, Ultimaker, 3D Platform, Markforged, Leapfrog, MakerBot and Zortrax, and we are always looking for new partners to work with. From dual-extruder Fused Filament Fabrication 3D printers to Stereolithography 3D printers, which print from a tank of resin, we offer it all, and we're excited and proud to be part of such a diverse, high-growth industry that's showing enormous potential.

Here at CLEAPSS we have been doing lots of interesting things with our 3D printers, as you may have read earlier, or seen from our tweets. We have also been working on our new D&T website which now has project ideas, so if any of the methods mentioned in this article interest you, take a look at the new website for information related to the safe practices you need to bear in mind when developing a 3D printing project.

Hot surface. Do not touch.

An interesting approach to teaching food, and more.

Schools often look for innovative ways of teaching parts of curriculum. Here at CLEAPSS we also spend time investigating different methods of delivery, and supporting schools in developing new approaches to practical work. We came across Foodoppi, based in Ireland, which seems to have a fresh and interesting approach to teaching the food curriculum. We asked if they might provide an article explaining what they do. We hope you find it interesting.

Growing Potatoes On Mars – Say Whaa!!!
Growing Potatoes on Mars Say Whhaa??

Foodoppi

by Aisling Larkin (Foodoppi)

Today's busy millennial parents and teachers value creativity, critical thinking and STEM, along with health and wellness for the next generation. However, many struggle with having the time or resources to get creative with their kids. Foodoppi is creative educational platform created by experts, trusted by parents and loved by kids. Its extraordinary approach to food and STEM/STEAM education has already proven to be an effective way to foster positive relationships with food while exciting children about learning and gaining skills for a bright future.

Some of the core philosophies of Foodoppi include experiential learning, an appreciation for multiple intelligences, design thinking and a growth mindset.

The foodoppi team has a tribe of engaged children (6 -12 years old) across the UK and Ireland who love their content. It allows children to explore food, nutrition, art, culture, creativity, science, technology,
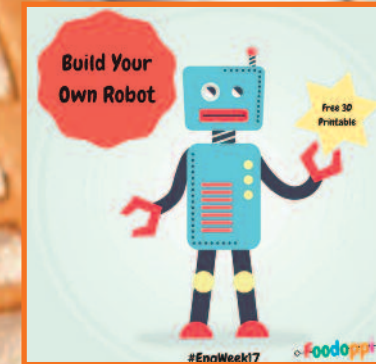

Foodoppi Food Miles
Parent & Teacher Resource

engineering and maths while moving them from online experiences to hands on practical learning.
Foodoppi provides a multi-disciplinary approach to learning, with opportunities for critical thinking, problem-solving and creativity, which it hopes will give children an edge.

Foodoppi believes that education and learning has been done in the same way for hundreds of years. It's boring and static at times, and not very engaging or exciting. It's done mostly through books and 2D images. We want to transform this by using technology to connect

Deliveroo, Deliverwho? Drones are the latest, coolest way to get food delivered

with our future generations and with food. STEM, like never before, makes learning fun, exciting, delicious, relatable, accessible and inspiring.
Children play to have fun, not to deliberately educate themselves. At Foodoppi we foster this desire to learn and understand through curiosity, playfulness and sociability. We bring them on a journey of play and exploration and use the design thinking process to achieve this.

When children become motivated and engaged with a task they enjoy they want to learn and discover more. As they persevere they figure things out and problem solve as they go through this process of learning.

continued...

Build Your Own Robot
Free 3D Printable
#EngWeek17

STEM FOOD ENGINEERING
VIRTUAL REALITY DINING

14

An interesting approach to teaching food, and more.

Through making and creating something with their own hands they experience a real sense of pride and achievement which gives them confidence. At Foodoppi we aim to support the development of this new learning mindset. From the Foodoppi Food Education programmes in schools we have ascertained children are more engaged when they have autonomy and independence and 'feel like a grown up'. They begin to exercise their leadership and teamwork skills, and feel comfortable learning as they naturally gravitate towards using their strongest multiple intelligence.

Ultimately, Design Thinking Projects allows them to explore where their natural abilities lie. It has also been shown that students who use this design cycle process exhibit higher order thinking skills more than those who do not.

Foodoppi is starting conversations for parents with their children about STEM/STEAM and food. Children are becoming the catalysts for change. They are bringing home these new inspirations and sharing what they have learned, thereby engaging and teaching their parents.
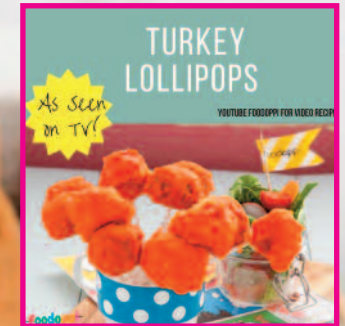
Foodoppi is making creativity and fun the secret sauce to science, technology, engineering and maths for the future.

Foodoppi offer a range of free themed cross curricular STEM & food resources each month in their newsletter as well as their professional development training programmes for teachers which are launching this summer.

To find out more about Foodoppi, please visit http://foodoppi.com

INSPIRING STUDENTS WITH HANDS-ON LEARNING – BUILDING A REMOTE-CONTROL 4X4

by Alison Hill (the Land Rover 4x4 Schools Technology Challenge)

Inspiring the next generation of engineers with the practical challenge of designing and building their own remote-control all-terrain vehicles, the Land Rover 4x4 in Schools Technology Challenge captures the imagination of students.

Teams of three to six students, working to a set of rules and regulations, build a four-wheel drive vehicle that will tackle obstacles and navigate through an off road test track and emulates the capabilities of a full size 4x4 vehicle.

It is an international challenge aimed at key stage 3 and 4, and post-16 students in school, and young people aged 11 – 19 years in any out of school initiative, e.g. STEM Clubs, Scouts, Cadets, Guides, and Youth Clubs. The challenge is split into three classes, Entry, Development and Professional, with scope for all abilities, skill levels, and ages to participate.

The Entry Class is an introduction to vehicle design, aesthetics and concept modelling, with a focus on showcasing a cool, futuristic 4x4. The Development Class builds on the foundations established in the Entry Class with manufacturing, engineering and electronics incorporated into the vehicle development. The Professional Class, for experienced participants, challenges the teams to use more complex engineering and electronics, including tilt sensors, drive train, suspension, steering and wheels.

The Land Rover 4x4 in Schools Technology Challenge can be used as an education tool or hook to engage students in STEM subjects, to give both them and teachers the opportunity to develop key skills such as communication, presenting and team work. This will help form a foundation for any career path students choose to follow.

This exciting education initiative provides teachers with the opportunity to run a real-life competition with their students where they follow the same design processes as automotive engineers, from initial business plan through to car design.

The Challenge can be a stand-alone project in schools and clubs, offering a competition opportunity with students benefiting from sharing their work and experience. Teams can enter a vehicle into a Regional Final to compete for a place at a National Final. The National Champions from each country that runs the Challenge are then invited to the Land Rover 4x4 in Schools World Final.

At each event a panel of judges assesses the design and build of each team's remote controlled scale-model vehicle and the students also steer their vehicle around a test track. It will have to negotiate obstacles and challenging road surfaces, including water dips, a rope bridge, and rocks, on a bespoke Land Rover track replicating the capabilities of a full-scale 4x4 vehicle.

For information about the Land Rover 4x4 in Schools Technology Challenge, visit the website at www.4x4inSchools.co.uk. The new season of the Challenge starts this month, with the first Regional Finals events taking place in early 2018.

To teach the new GCSE in D&T and the changes at A Level, teachers will be looking for interesting methods of teaching some of the theory. We often come across suppliers and manufacturers who are using practices that are difficult to replicate in school. One such company is UTENSA who make bakeware. The composite materials they use are found in many kitchens and may prove to be useful examples for teaching material technology.

TEACHING ABOUT NEW MATERIALS

Material technology – bakeware

by Jerry Griffiths (UTENSA Ltd)

UTENSA is a young business with over 130 years experience that has become a leading UK manufacturer of quality bakeware.

The company produces a range of bakeware shapes with various high performance coatings. Recently we have been working with schools on a number of projects and helping students to understand the manufacturing process for high quality bakeware.

Combining our expertise in manufacturing with world leading technology in non-stick application, GlideX, we produce high performing non-stick bakeware from our premises in Birmingham.

UK Non-stick bakeware market is awash with products and brands from across the globe, but only two methods of application dominate the market:

- Spray coated bakeware using a silicone-based, non-stick. This application is usually carried out in the Far East and performs reasonably well for baking, but fails quickly when used for roasting, as the temperatures cause the bonding to break down.

- Coil coated bakeware using large rollers on a flat strip of metal applying PTFE based non-stick paint. This application is carried out in the EU, and works well for baking AND roasting as the two materials are bonded together under pressure and the bonds can withstand the temperatures and other conditions.

GlideX is an advanced scientific coating technology, used to apply the non-stick coating to the base metal. The composite material is then pressed or moulded into complex dishes and other shapes for use in the food industry.

GlideX technology bakeware is a UK-sourced, coated and manufactured product with a carbon footprint of around 120 miles. (it is 5,000 miles coming across from China!)

What makes it distinctly different?
- Durability. The surfaces are coated, not sprayed, so the non-stick coating is bonded directly to the surface.

- Performance. Products are tested against competitors and results have proven that GlideX bakeware is the outperforming non-stick solution for any kitchen, at home or at work

- Choice. The unique process means that bakeware can be produced in a wide range of performance, colour, combinations, and patterns to suit every need

- Quality. GlideX product conforms to all required EU regulations, and all coatings are PFOA free.

Glidex products are used in home, office and professional contexts and may be in school. The high quality bonded coating has been shown to outperform sprayed coatings, is environmentally friendly and is produced in the UK (keeping down environmental impact of transporting goods from the far east).

Contrary to popular belief it is not weight of product that is important but the coating that counts!

For more information, visit the website: http://www.utensa.co.uk/

Over the past few months we at CLEAPSS have been looking at the new specifications as they come out, and this article may help teachers deliver aspects of the courses in material technology which are in the new GCSE. CLEAPSS has identified a few points that can be taken from this article:

- The different methods of applying coatings to metals

- The differing properties and performance of the coated metals

- The environmental impact of transporting goods

Five Top Tips for getting ready for the new Design and Technology GCSE

Paul and Julie Boyd, (Boyd Education)

With big curriculum changes coming up from September for D&T, Paul and Julie Boyd, offer their five top tips to help your planning.

1 Map your KS3 against the 2014 KS3 National Curriculum.

The 2014 KS3 National Curriculum was designed to feed into the D&T GCSE so what feels like 'new' content at GCSE should already be being taught at KS3. Following the 2014 KS3 curriculum enables departments to spread the workload, taking longer to embed key concepts. This also allows more time for a specialist material focus at GCSE, which is less of a culture change for staff and students.

Download our KS3 mapping document to get you started **https://goo.gl/sda4Y8**

2 Map the KS3 curriculum against the DfE D&T GCSE Subject Content (November 2015).

The GCSE Subject Content document was created by the DfE and was used by awarding bodies to create their examination specifications. It's a less detailed version of the exam specifications, making it easier to use. There are direct links between the KS3 curriculum and the GCSE subject content, and common themes can be identified to help to create a more joined up five year curriculum (seven year if you also map your curriculum against the A levels). You might also find it useful to map the subject content against what you currently teach, which will help identify good practice you can continue with, as well as any gaps.

Download our Subject Content mapping document to get you started **https://goo.gl/UEA2BT**

continued...

3 Use this mapped content to develop a five (or seven) year curriculum.

Plan the KS3 learning that supports the GCSE, focusing on learning rather than just thinking about project outcomes. You could allocate sections of learning to individual teachers or material areas, with these teachers taking responsibility for planning this content, as well as planning revision activities for use at GCSE to revise and embed learning. Material specialisms remain important so much of your KS4 content will be similar to what is currently taught. Any additional planning will depend on what's been covered at KS3, along with how radical an approach your department wants to take.

Get ideas on curriculum models **https://goo.gl/OohS0O**

4 Use your chosen exam specification to give you additional detail for your planning.

Once your initial mapping has been done, use the specification to give you the specific level of detail. Include KS4 content at KS3 as appropriate, and plan activities that embed KS3 learning into KS4 through short lesson activities and homework. Download our comparisons of the exam board specifications **https://goo.gl/XDaSr7**

5 Promote the changes in D&T

The changes present challenges, but see them as an opportunity to rebrand D&T and the department. Promote STEM as this is now acknowledged as an important part of D&T, and it can help raise our profile and perceived value (and can generate funding). In particular, coordinate with your maths department so you can support each other, because they already teach the maths content. At open evenings and in displays showcase high quality products along with the broader content and STEM links. This helps others understand and value D&T and recognize that it remains a creative and exciting subject despite the changes.

Get ideas for open evenings, option talks and departmental displays **https://goo.gl/D3ZM1V**

Boyd Education are producing free resources and running courses to support the new curriculum.
Visit **www.julieboyd.co.uk** for more details.

CLEAPSS small print

Sanding Incidents

We have recently come across two serious incidents involving sanding machines. In both, a pupil was sanding flat sheet material on a sander and in both cases the material flipped up and was dragged in between the moving sanding disc or belt and the machine table. The pupils' fingers were trapped between the upended material and the sander.

These were both very traumatic for the pupils, their families and the teachers.

We would remind schools that they must regularly check that the table of the sander is as close as possible to the moving sanding disc or belt, the gap should never be larger than 3mm, and on many machines this can be reduced even further.

We would also remind schools that the guard on the rotating disc or belt should be placed to cover as much of the sanding surface as possible.

If both of these actions are taken, it is less likely that the material being sanded can catch and be dragged into the gap between the sanding disc, or belt, and the table. Even if it does, the pupils' fingers are not likely to come into contact with the moving disc or belt.

ensure gap is as small as possible between the table and the rotating disc, this machine also shows loose sanding material and no facility to minimize the sanding area

this machine shows that the sanding area can be minimalized through adjusting the guard

the school has designed and made a guard for this machine to limit access to the moving belt

this machine has limited guarding, meaning too much of the moving sanding material can be accessed by users, thereby increasing the risk of catching fingers on the moving belt

Auditing D&T

You may have seen the new document, available on the website:

GL239 - *Top 10 hazards found in D&T audits*

This came about as a consequence of discussion at CLEAPSS of the common hazards we were seeing both D&T and Science department audits.

Over the last year or so we have carried out around 100 audits of D&T and Art and Design departments, using the guide G79 *Auditing H&S in a Secondary School D&T Department* as a tool to structure the audit and to record findings. A CLEAPSS audit costs £850, for this we carry out a site visit, go through the departmental documentation and go around the rooms and prep areas, identifying areas where improvements could be made. We then produce a detailed report that the school can use as the basis of an action plan to put in place the improvements.

We have recently updated G79 to include a number of changes:

• we have included more information on the use of dark rooms and kiln rooms, as we have found the use of these rooms is becoming more common in schools

• we have removed some of the duplications and clarified some areas to make the document easier to work with

As the document has grown we also decided to break it down into three documents:

• G79: the details of what should be found when carrying out an audit

• G79A: the checklists used to record the findings from the audit

• G79B: the space diagrams for equipment and furniture, which has been updated to include more drawings and also covers Art facilities.

These three documents can be found on the website under guides. Or, on the new website, they can be found under administration – audit documents

They also form the basis for our audit training courses which are listed on the website.

New D&T Website

We have been working on our new D&T website for a few months and are ready to do some beta testing, so if you would like to take a look at the new site use the link below. Most of the materials from the old site have been moved onto the new one, although if you cannot find what you are looking for, the old site is still live, and the materials are still on there.

We have made a number of changes to the structure of the site, the main change being that we have included an area titled 'projects'. These are outlines of projects we have seen in school with a list of the relevant MRATs and other associated documents. So, as a teacher you could look at the outlines and find one that best matches projects you are running and use the list of MRATs and documents to inform your planning.

Take a look and let us know what you think of the new site. We would be particularly interested in any problems you come across and your views on the 'projects' entries.

http://dt.cleapss.org.uk/
Email comments to: dt@cleapss.org.uk

Some recent tweets

It lives... See the elbow working, we have the #CLEAPSS #InMoov robot arms almost complete. youtu.be/QuFREJLwpDo

Are you looking at #DroneRacing in schools? interesting #microdrone site, but don't forget to check with #CLEAPSS. dr1racing.tv/micro-series

Great day in Manchester yesterday at the #helpgbworkwell engagement event.

Excellent day working with safety officers and staff in Sheffield this week, the room is ready...
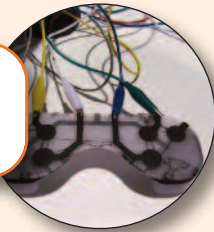
Excellent online resource for #3Dprinting. lots of useful information for staff and pupils in #DT 3dhubs.com/knowledge-base…

Food teachers may find this useful, the eat seasonably site has some interesting information. eatseasonably.co.uk/what-to-eat-no…

Trying out conductive #3Dprinting filament over the coming weeks, look for a review in the next #futureminds. proto-pasta.com/collections/ne…

Using a fake sun to make hydrogen, alternative fuel discussion for #DT dailymail.co.uk/wires/ap/artic…

Excellent day at the Additive Manufacturing SIG last week, #DT needs to get involved. http://www.lboro.ac.uk/research/amrg/about/the7categoriesofadditivemanufacturing/

If any #DT staff are practicing their #3dprinting over Easter read the troubleshooting guide from #simplify simplify3d.com/support/print-…

In FutureMinds next term:

Updates from schools delivering the new GCSE

The latest news from the Food Teachers community

Using new technologies in school Ceramics

Art and Design news

Information from the world of textiles

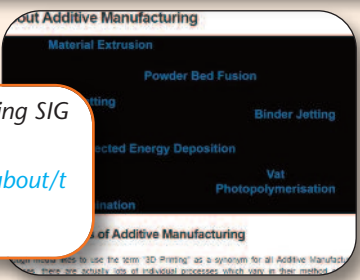Workshop safety

STEM projects

The progress of the CLEAPSS robot

Don't forget you will need the login and password for the CLEAPSS website to be able to access the materials, you should alrady have this in school, but if you are having difficulties, contact us
01895 251496, or via the website:
www.cleapss.org.uk

You can also follow us on twitter
@CLEAPSS_DT