Turning Plastic Waste into Purpose

Pat Link, Lead Engineering Teacher, STEM Coordinator and Founder of Neston High School Makerspace

At Neston High School, a student-led Makerspace has become a vehicle for teaching engineering, sustainability, and problem solving. Pat Link shares how turning plastic waste into usable materials has reshaped curriculum thinking and strengthened technical skills.

Teaching Sustainability Through Plastics Recycling Webinar with Pat Link
tinyurl.com/mux295ka

Pat won the James Dyson Foundation Excellence Award Recognising Outstanding D&T Teacher
tinyurl.com/mvnh8rt3

Precious Plastics
tinyurl.com/yrubxpkr

Innovation does not sit in textbooks alone. It happens every day in our Makerspace, where students are encouraged to explore, test ideas, make mistakes, and try again. What began as a way to engage learners more practically with engineering and design has grown into something far bigger, with sustainability and real-world problem solving at its core. A makerspace is a collaborative learning environment where people design, experiment, and make things using a mix of traditional tools and modern technologies.

Over the past eight years, our students have recycled more than 800,000 plastic bottle tops. Along the way, they have learned not just how materials can be reused, but how design, engineering, and responsibility are closely connected. The Makerspace has changed how students think about waste, manufacturing, and their own role in addressing environmental challenges.

Building a Culture of Making

I set up the Makerspace to give students the opportunity to learn by doing. In the early days, it was little more than a small area with hand tools and scrap materials. Over time, and with a lot of problem solving, it has developed into a well-equipped space with 3D printers, electronics benches, fabrication tools, and student-built recycling machines. Students design using CAD, solder circuits, code microcontrollers, and manufacture real outcomes. This hands-on approach helps make STEM learning meaningful and accessible, particularly for students who thrive when they can see and touch what they are working on.

A huge part of making this work is the support of our technician, Colin Cooper. Colin's expertise in fabrication and machinery ensures ideas can be realised safely and effectively. From machining parts to troubleshooting equipment, his role is vital in supporting ambitious student projects and maintaining a strong culture of health and safety. Projects like this need a good technician, and we are incredibly lucky to have Colin Cooper.

From Waste to Wonder

Our plastic recycling work is based on open-source designs from the 'Precious Plastic' project. Students have built shredders, extruders, and moulding presses that allow us to turn bottle tops and packaging into usable materials. These are then transformed into items such as plant pots, small tools, and component.

More recently, funding from Sustainable Design Studio enabled us to purchase a filament maker and hand extruder. This has allowed students to take recycled plastic all the way from waste to 3D printer filament. For many, this was a powerful moment: seeing the full cycle closed helped them recognise the impact of their work and the value of persistence.

Students also experiment with mixing colours and materials, learning how different plastics behave and how aesthetics and function can work together. Finished products are often shared at school events and community activities, helping students see that recycled materials can have genuine value.

Curriculum Transformation

As the Makerspace developed, it became clear that our curriculum needed to reflect this way of working. We now place a stronger emphasis on engineering, construction, and sustainability, with projects rooted in real-world contexts.

Students regularly work across disciplines, combining mathematics, physics, design, and technology. They might calculate load-bearing requirements for a product made from recycled plastic or programme sensors to automate part of a recycling process. These experiences help them see how knowledge connects and why accuracy, testing, and iteration matter.

The aim is not just to teach technical skills, but to build confidence, resilience, and a sense of responsibility. Many students begin to see engineering as something relevant to their lives and futures, particularly within the growing green economy.

Community Engagement and Partnerships

The Makerspace does not exist in isolation. We work with local businesses, sustainability groups, and universities whenever possible, giving students opportunities to share their work and learn from others.

Running workshops for younger pupils and community groups has also become an important part of what we do. Teaching others reinforces students' own understanding and helps them appreciate the wider impact of their skills. Design challenges, such as creating solar-powered solutions or community installations from recycled plastic, encourage teamwork, creativity, and communication. These projects have helped raise awareness beyond the school and have encouraged other departments and schools to explore similar approaches.

Learning That Lasts

Through Makerspace projects, students develop teamwork, problem-solving skills, and resilience. They learn how to manage projects from initial ideas through to making, testing, and evaluation, and how to explain their thinking to different audiences.

For many students, this is where learning becomes real. Alumni frequently tell us that their time in the Makerspace shaped their confidence and influenced their next steps into engineering, design, or environmental pathways.

At Neston High School, plastic waste has become a learning resource, a design material, and a source of pride. The Makerspace continues to show how Design and Technology, when rooted in real challenges, can empower students to think critically, act responsibly, and give materials a second life.