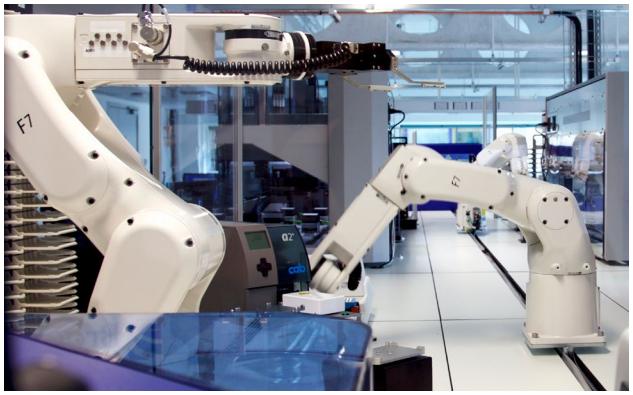
Case Study: The use of high performance nucleic acid extraction chemistry and high-throughput liquid handling platforms

The Edinburgh Genome Foundry adopt Promega high-throughput plasmid extraction chemistry for synthetic biology.

Synthetic biology

This combines the disciplines of both biology and engineering automation to design and assemble biological components for applications as diverse as human medicine to crop development. The discipline relies on the use of high performance nucleic acid extraction chemistry and high-throughput liquid handling platforms.



The Edinburgh Genome Foundry

The Edinburgh Genome Foundry (EGF) is a research facility specialising in the assembly of large DNA fragments using a highly automated platform. They design, build and validate large gene constructs for academic and industrial projects in the UK and beyond.

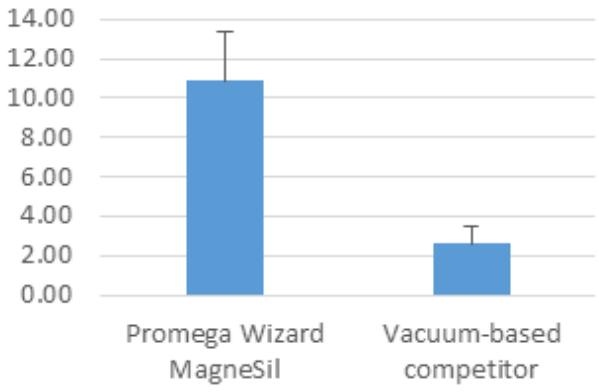
They aim to manufacture genetic material on an unprecedented scale, using a fully automated robotic platform. The EGF creates and modifies strands of DNA up to 1 mega base pairs in length to equip cells or whole organisms with new or improved functionality. This enables customers of the EGF, in a variety of research disciplines, to for example, programme stem cells for use in personalised medicine, produce disease-detecting bacteria or to increase the yield of biofuel crops.

Promega high-throughput chemistry for plasmid extraction

Promega offers several magnetic-bead based chemistries for the rapid isolation of plasmid DNA in 96-well plate format on liquid handling platforms.

The Edinburgh Genome Foundry are using the standard Wizard® MagneSil® Plasmid Purification System in conjunction with the on-deck MagnaBot® 96 Magnetic Separation Device. The starting material for the DNA extraction process is *Escherichia coli* (*E. coli*), grown in 1ml culture volumes.

The system generates high quality DNA from plasmids, which is used for a variety of downstream applications including PCR, cloning and quantitative PCR. A comparison of the yield (per ml LB culture) and quality of pUC19 DNA extracted using MagneSil® magnetic bead technology results in an average yield of 10.9µg DNA and an average 260/280 ratio of 1.87. In comparison, use of a vacuum-based chemistry results in a much lower average yield of 2.6µg DNA and an average 260/280 ratio of 1.74.

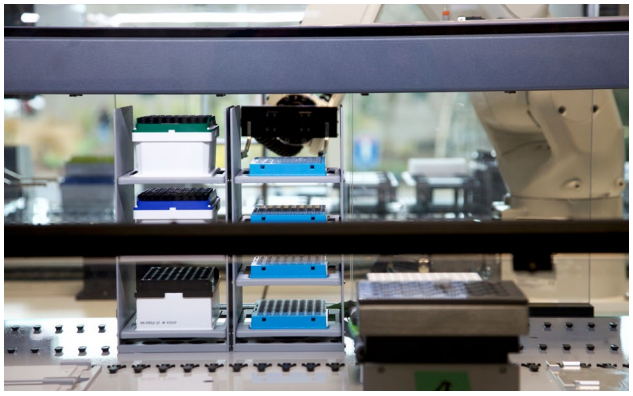


Total Yield DNA (µg) per ml LB culture from Promega Wizard® MagneSil® kits vs vacuum-based competitor kit. Mean n=16 (minimum) with SD.

The Edinburgh Genome Foundry also plan to implement Promega's Wizard MagneSil Tfx™ System which is a method for isolating transfection-quality plasmid DNA in a 96-well high-throughput format.

Promega Field Support Scientists (FSS)

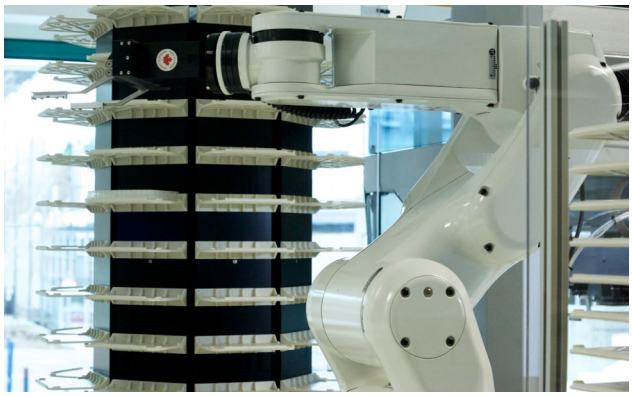
This is a dedicated team of specialists who work with and support customers in the implementation of high-throughput extraction and quantitation chemistries on complex liquid handling systems.



Promega provided an on-site FSS to work with The Edinburgh Genome Foundry to optimise and implement the MagneSil Plasmid extraction protocols on the Tecan EVO® and also the Beckman Coulter Biomek® FXP platforms.

Ivan Yuan Ph.D, Automation Engineer at the Edinburgh Genome Foundry, commented: "The Promega FSS was instrumental in a successful and timely work-up of our automation workflow, providing much expertise and experience of the chemistry on our liquid handlers". He went on to say that, "The time to implementation of the chemistry scripts was significantly reduced by the on-site support and the quality and yield of the plasmid DNA output was optimised for our systems. We would highly recommend Promega's chemistry and support to similar labs who plan to work-up these methods on automation platforms".

Promega partners with all the major liquid handling suppliers in the UK and supplies and supports



a wide variety of nucleic extraction chemistry for diverse samples (e.g. blood gDNA, plant leaf, FFPE, circulating free DNA), in both manual and automated formats, to extract targets such as DNA, RNA and miRNA.

In addition Promega supplies ancillary reagents and instrumentation for stand-alone benchtop nucleic acid extraction, amplification and nucleic acid quantitation.

To learn more about Promega products, please visit: www.promega.com. Contact Promega to discuss your high-throughput project: ukcustserve@promega.com.

To find out more about The Edinburgh Genome Foundry please contact them: egf@ed.ac.uk or call 0044 131 650 5032.

Edinburgh Genome Foundry