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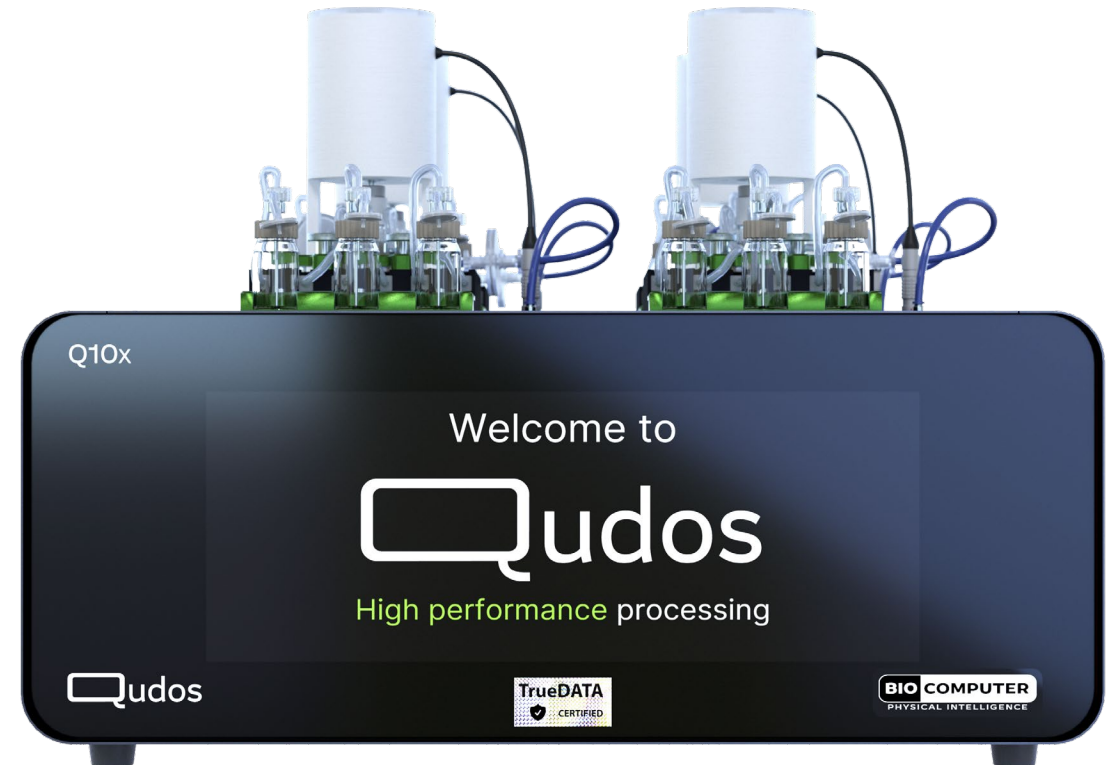
Leader in
personal
manufacturing
systems

Master biologics faster

Production grade product, process and intelligence

Qudos. High performance bioreactor array

*Listen to the reassuring click and whir as the first in a new class of **personal manufacturing system** stirs into life . . .*





Give Intelligent People High Performance Tools and They'll Work Wonders

*Isn't it high time you had tools powerful enough to consistently produce
the best advanced biologics you are passionate about?*

**Are you under mission critical
pressure** to develop advanced biologics?
To achieve more, faster, with fewer resources
– without ever compromising exacting quality
design goals? To work with more intelligence?

With 74% of biologics rejected due to
quality and manufacturing deficiencies, being
successful in both scientific innovation and
manufacturability at the same time used to be
an almost impossible trade off. *But not any
longer . . .*

Say hello to Qudos

Qudos is the first in a new class of personal
manufacturing system. It is purpose-built to
give you production grade product, process
and intelligence. Its very latest high
performance processing technology helps
you achieve precision controlled,

characterised and validated processes that
deliver maximum consistency with minimum
deviation for the best product.

Production quality product, process and intelligence

With **Qudos**, you can master advanced
biologics. Engineer with greater control. Build
reproducibly at production quality. Efficiently
resolve your quality design space. With
confidence that your work will transfer into
regulated production at scale.

High performance processing

*Feel the weight of the Q10x smart
bioreactor in your hand. Study the data as it
streams in real time.*

**Would you like to take a closer look at
how Qudos delivers Mastery in every
Moment of Truth . . . ?**



Smart production science starts with Qudos
Systems without compromise start from just £25,000
and grow as you grow

Greater Mastery . . .

Qudos thinks like a scientist and works like a **factory**. It is the first in a new class of personal manufacturing system. One that propels your biologic development in a modern, high quality and intelligent production environment designed for interactive problem-solving without compromise. One that helps you resolve quality design spaces in half the time and half the cost.

Easy and affordable way to start











Qudos has everything you need to produce advanced biologics. Your entry level **Q10** smart bioreactor array has all the basic features you expect from an upstream bioprocessing system. Like high precision geometry, sensing and control of pH, gassing, agitation and thermals.

High performance processing

But biologic mastery demands even greater performance. And that's why your **Q10x** system offers high performance processing focused on production grade product, process and intelligence. Each bioreactor operates with full independent control to give you the most efficient means of achieving your quality design space.

Qudos upgrades your processing power in 3 ways: 1) Precision control consistently gives you product quality; 2) Process parallelisation and serialisation let you resolve advanced design spaces; and 3) Process intensification gives you many ways to increase yield.



 Industry Standard Bioreactors FDA grade materials, configurable with precision control	 Rapid Digital Pulse Gas Dosing 4 gas dual gassing into headspace overlay and sparge	 High Fidelity Scale Down True production micro-environment for reproducible quality	 Massively Parallel Array Extend to 100s of instances, add perfusion or downstream	 Triple peristaltic pump Precision control with dynamic flexibility for media, feed, reagents
 Durable Sustainable and with superior performance	 Turbulent Fluid Dynamics Efficient mixing and accurate model of large scale systems	 Real Time Data Cloud monitoring, control and analysis	 Rack Mountable Intensive process in small footprint	 Design Space Efficiency Most efficient system for quality by design and DoE

. . . Greater Truth

Production grade intelligence

Importantly, your product and process design space intelligence are greatly enhanced by production grade processing, helping you achieve your target product profile consistently with more signal, less noise and with greater confidence. With precise, accurate and traceable real-time data, **Qudos** gives you greater intelligence with positive predictive power for more effective decision making.

Level up your production skills

With manufacturing knowhow embedded directly into the platform, **Qudos** empowers you with a new level of production science skill.

Designed to be easy to use for both beginners and experts, **Qudos** is affordable for any team. And, with a roadmap of upstream, downstream and analytical modules across a range of scales, it may be the only platform for developing advanced biologics you will ever need.

BIO COMPUTER PHYSICAL INTELLIGENCE Biocomputer physical intelligence technology delivers a new kind of interactive and easy to use problem-solving platform architected to drive the future of digitalised biomanufacturing.

TrueDATA CERTIFIED The TrueDATA standard codifies and provides assurance of product, material and process intelligence. TrueDATA underpins **Qudos** as a smart and empowering personal manufacturing platform you can trust to deliver in every Moment of Truth.

The high throughput array versus The high performance array

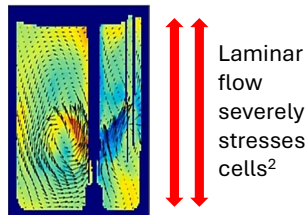
Research published by Fujifilm¹ levelled this criticism at the most expensive high throughput 15ml bioreactor array: “there are a number of physical features which are quite different...compared to those found at the larger scale.” They described the flow regime as transitional not turbulent, the gas velocity as very low and the specific power input as very much higher than large scale.

In defence, this machine was not really designed for scalability.

In fact, it is merely an example of a wholly separate school of thought that prioritised

“THROUGHPUT OVER EVERYTHING”. And in that, it excels. That equipment was designed over 15 years ago to squeeze lots of bioreactors into a small footprint, so they were made in

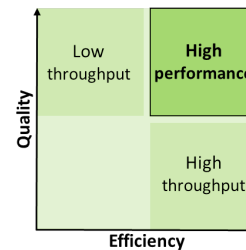
**High throughput 15ml
Non-standard geometry**
Specific power input ~400W/m³



a “rectangular parallelepiped” shape.

And, in fairness, it performed better than shake flasks. The trouble is, the cuboid geometry means you have to stir really hard to satisfy the oxygen demands of your cells, which puts them under great stress and affects their behaviour.

Why, even at an early stage, would you ever develop a million dollar biologic in a geometry that doesn't scale?



Leaving aside the lack of individual bioreactor control and process mimicry, the problem is that the non-standard high throughput geometry affects consistent product quality, data and scalability. At well over \$500,000 a machine, we think this is too much compromise for you.

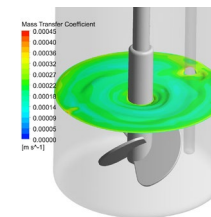
PERFORMANCE OVER EVERYTHING

Our contention, when “the process is the product”, is that your processing performance is crucial. Why?



Because high performance processing provides you with “**PRODUCTION QUALITY DESIGN SPACE**”.

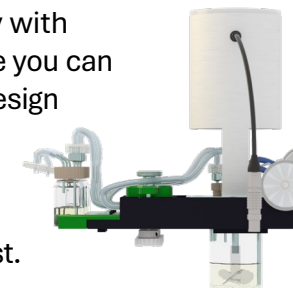
That is, your product, process and intelligence consistently operate at production quality. This helps you achieve precision controlled, characterised and validated processes that deliver maximum consistency with minimum deviation.



**High performance
Standard geometry**
Specific power input only
~30W/m³

Q10x turbulent flow delivers efficient, low-stress mixing that is reproducible and scalable

By achieving quality with precision at small scale you can efficiently define your design space for a quality product, a reproducible process and build on intelligence you can trust.



What's more, you can operate as many (or as few) in parallel as your situation demands.

Better yet, as the first in a new class of **PERSONAL MANUFACTURING SYSTEM** built for the digital age, **Qudos** supports advanced software and real time cloud data. It enables integration of process analytical technologies, quality and process data and software tools. It is ready to integrate a full roadmap of upstream, downstream and analytic modules.

What do the experts say?

A director at a major pharmaceutical company described **Qudos** personal manufacturing as “paradigm breaking...if any technology is going to move us from the faster horses approach, this is it.”

For many serious developers in all parts of the world, Qudos is the ultimate processing machine.

[1] “The physical characterisation of a microscale parallel bioreactor platform with an industrial CHO cell line expressing an IgG4” Nienow et al; Biochemical Engineering Journal 2013

[2] “MRI hydrodynamic characterization of an ambr15® bioreactor” Biochemical Engineering Journal; Legrand et al February 2022

From personalised medicine to decentralised manufacturing



Our customers are respected and passionate scientists collaborating with us to drive a more intelligent new future with one shared ambition: to advance biologics that transform the lives of people and our planet.

Smart developers use personalised manufacturing systems for almost any advanced biologic. Right now, **Qudos** is outmoding expensive instruments in multiple applications (monoclonal antibodies, viral vectors, mRNA-LNP therapies, microbiology, stem cell feeding and reprogramming, cell and gene therapy, engineered biology), multiple processing modes (scale out, continuous) and multiple environments (decentralised, even space biomanufacturing).

Tomorrow's machines will be many orders of magnitude faster, more powerful and more intelligent than classical instruments and manufacturing systems. Architected from the ground up for the future of bioprocessing, **Qudos** is probably the only platform being actively developed to become rapidly more powerful in each generation.

Qudos is being developed to replace liquid handling robots, integrate biological workflows, cut component and assembly costs, raise reproducibility, distribute scalable biomanufacturing and produce biologics on demand.

Our partners include:

- Sheffield Gene Therapy Innovation and Manufacturing Centre
- National Horizon Centre
- CEPI
- DNA Script
- Imperial College
- UK Space Agency
- Centre for Process Innovation
- Multiple confidential customers

Qudos is making processing smarter, opening new markets and generating new sources of insight. Our customers are adapting **Qudos** to new applications and markets through custom configurations



instead of trying to operate manual workflows or mixed instruments. Your biological products get to market faster since development takes many months – perhaps years – less time to develop than using classical instruments.

Life science innovators are driving a powerful new future in real time, with manufacturing of personalised medicines distributed to the point of care, produced rapidly and flexibly on demand using predictive data and affordably to patients. Enterprise manufacture will find the sweet spot of scaling up and out on the same system.

With equal ease, a similar system will handle parallel production of multiple modalities for combination therapies or parallel manufacturing of therapies.

Start up companies will afford their own production capabilities with far less need to spend years raising large venture capital investment for capital intensive development and manufacturing.

CDMOs are transforming their business models by offering new products and services that capture customers earlier in development and convert them into highly scalable and reproducible revenues.

The bioprocessing revolution has started. Join us and lead innovation in the industry towards a smarter future.



Applications today...

- Cell line development
- Titre optimisation
- Clone ranking and selection
- Media and feed strategies
- Advanced gas and mix studies
- Transfection studies
- Reagent screening and ratios
- Thermal studies
- Activation and Induction
- Fermentation studies
- Perfusion, TFF, ATF (custom)
- Process development
- Process monitoring and control
- Process characterisation
- Process validation
- Process scaling and transfer
- Quality by Design
- GMP mapping
- Design of Experiments
- Data integration and analysis

Applications tomorrow...

- Integrated downstream
- Integrated analytics
- Molecular biology modules
- Adherent cell processing

with more to come...



“ We sincerely hope that the science expertise and precision engineering that have been poured into **Qudos** high performance processing help you master your science, build with greater truth and connect you to the work that you love.

Richard

Richard Vellacott
Chief Executive Officer

Colin

Dr Colin Barker
Chief Scientific Officer



Discover



Demo

See for yourself

*Ask for a virtual or in-person demo today and draw your own conclusions.
Contact info@biologic-tech.com*

Systems without compromise start from £25,000 and grow as you grow.
Contact us to discover more about how personal manufacturing can support your success.

We offer a range of ways you can try for yourself together with attractive finance options.

