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LAMINAR

ISSUE 07 · AUTUMN 2026 · THE CLEAN LINE



COVER STORY

Nothing touches the product

A week inside the quietest room in medicine, where one torn glove can cost a month

Light, held still

The research campus that let the sun back into the lab

The honest object

Things that show you how they work

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On making nothing happen, beautifully: a filling line that has not let a microbe through in seven years, a campus built around daylight, and the honest objects in between.



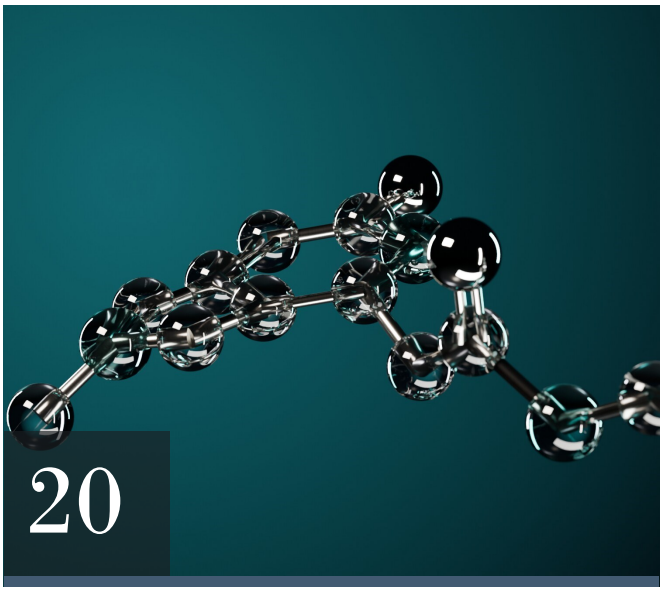
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Nothing touches the product



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Light, held still



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The honest object



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On the cover Bioreactor BR-201 in a darkened clean-room bay at Eastmere, where the journey that ends on page 6 begins. Every image in this issue is an original 3D render made for LAMINAR.

FROM THE EDITOR

The clean line

There is a particular kind of engineering that is only visible when it fails. Nobody notices the bridge that holds, the pump that keeps running, the filling line that has not let a single microbe through in seven years. We notice the collapse, the leak, the recall. This issue is about the other kind of news: the long, quiet, unphotogenic work of making sure that nothing happens.

Hester Quayle spent a week at Eastmere, where a sealed steel box and a slow curtain of filtered air stand between a medicine and everything that might spoil it. Her report, which begins on page 6, is a portrait of people who have designed their own clumsiness out of the room — not because they are careless, but because they know exactly how careful a person can be, and for how long.

Anselm Durward's visit to Marrowgate, on page 16, is in some ways the opposite story. Laboratories have spent half a century shutting out the sun; Studio Aveling Roos has let it back in, carefully, through a roof of timber fins that turns the building's central atrium into a kind of sundial. The two pieces share more than a subject. Both are about control, and about the moment when control stops being a constraint and becomes a kind of grace.

Between them you will find a view from altitude, the numbers behind the filling line, a gauge that has not needed redesigning for a hundred years, and a small studio that makes glass for laboratories and kitchens with equal seriousness. Our cover shows a single bioreactor in a darkened bay: the start of the journey that Quayle's filling line finishes.

A note on the pictures. Every photograph-like image in this issue is an original three-dimensional render, modelled and lit for these pages. We have enjoyed the freedom that gives us to show things as they were designed to be, and we have tried hard not to abuse it.

As ever, we would like to hear from you, especially if you think we have got something wrong.

Ilse Marrow

ILSE MARROW · EDITOR

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FEATURE · ASEPTIC MANUFACTURING

The last three metres of a medicine's journey happen inside a sealed steel box, under a slow waterfall of filtered air, watched by people who are not allowed to reach in. Hester Quayle spent a week on the filling line at Eastmere.

WORDS HESTER QUAYLE · IMAGES PIM ALDOUS

Above Eight needles descend, dose and rise in under a second. The liquid falls the last few millimetres through air; the steel never touches the glass.



At twenty past six in the morning the filling suite at Eastmere is the brightest room for thirty miles, and the quietest. There is a low, even hiss from the ceiling, the sound of air being pushed through filters the size of dining tables, and underneath it the small glass percussion of vials meeting a steel rail. Nobody talks much. When they do, it is through a slot in a wall, or over a headset, or not at all.

Annika Rhee has run sterile operations here for eleven years, and she describes the job as the management of absence. “Everything we do is about what isn’t there,” she says, standing in the corridor outside the suite in a gown that has taken her nine minutes to put on. “No particles, no microbes, no people where people shouldn’t be. You can’t photograph any of that. You can only prove it, over and over again, every shift.”

The product is a monoclonal antibody, grown for fourteen days in the stainless bioreactors at the far end of the site and then filtered, purified and concentrated through a chain of process skids until what remains is a clear, faintly straw-coloured liquid worth more per litre than most people earn in a year. It cannot be boiled, irradiated or baked. Proteins that fold into the shapes that make them useful unfold again at the temperatures that would make them safe. So the liquid is sterilised the only way left — by passing it through a membrane with pores too small for bacteria — and from that moment on, the entire building exists



The filling suite The isolator runs along the right-hand wall. Operators work through the glove ports and never enter the chamber; materials pass in through the transfer hatch beside the door.

to make sure that nothing gets back in.

THE BOX

That is the job of the isolator: a long cabinet of steel and glass, sealed from the room around it, in which the filling machine lives. Operators reach it only through glove ports, thick rubber sleeves set into the glass wall, each ending in a glove that is tested for pinholes before every campaign and replaced on a schedule Rhee can recite without looking. Inside, the air moves in one direction only, straight down, in a slow curtain that sweeps anything shed by the machine away from the open vials and out through grilles at the base.

It is a curious thing to watch. The needles descend, pause, dose and rise, eight at a time, with a precision that makes the rest of the room look careless. A vial arrives, is filled, is stoppered and moves on in less time than it takes to read this sentence. None of it is touched by a human hand. That, says Dev Marlow, the site's senior validation engineer, is the entire point of the design, and also its greatest weakness.

"The machine is honest," he says. "It does exactly what it was built to do. People are the variable. A person in a cleanroom sheds thousands of particles a minute even standing still, and every one of them is a raft a microbe can ride on. So we took the people out. Then we discovered that you can't quite take them out. Something jams. A stopper bowl runs low. A vial tips over. And now someone has to reach in."

Those moments are called interventions, and at Eastmere they are counted, classified, rehearsed and filmed. Each has a written procedure and a maximum duration. The glove goes in, the fallen vial is lifted clear with a pair of long sterile tongs, the glove comes out, and the whole event is logged against the batch. Seven years ago the line averaged forty-one interventions for every ten thousand vials. This year the figure is three.

REHEARSING FAILURE

Getting there took less new equipment than you might expect, and much more rehearsal. Twice a year the line runs what is called a media fill: a full-scale simulation of a production batch in which the drug is replaced with a nutrient broth that bacteria love. Everything else is real — the same machine, the same operators, the same shift patterns and, crucially, the same interventions, performed deliberately and repeatedly. Then every filled vial is incubated for two weeks and inspected by eye. A single cloudy vial means something got in, and the investigation that follows can halt production for a month.

Joan Achterberg, the microbiologist who reads those results, keeps a drawer of photographs from media fills at other sites, years ago, before she came here. She keeps them the way a pilot keeps accident reports. "The broth doesn't care how good your paperwork is," she says. "It tells you the truth about what your hands did."

Callum Fenwick has been on the line for nineteen years, long enough to remember the room before the isolator, when operators in full gowns worked beside an open machine behind a curtain of plastic strips. He does not miss it. "You used to feel the air on the back of your neck and think, that's the clean air, that's keeping it safe," he says. "Now you know it was also carrying you. Everything that came off you. The box doesn't have that problem. The box just has us, on the outside, trying not to be clumsy."

His hands, when he demonstrates an intervention on the training rig, are unhurried. There is a sequence of movement — sleeve extended, wrist turned, tongs lifted, pause —

> *"Everything we do is about what isn't there. You can't photograph any of that. You can only prove it."*
>
> ANNIKA RHEE, HEAD OF STERILE OPERATIONS

that operators practise until it stops being a sequence and becomes a gesture. The trainers time it. They also watch the angle of the arm, because an arm that crosses over an open vial casts a shadow in the airflow, a pocket where the downward curtain breaks and particles can drift sideways. “First aid for the air,” Fenwick calls it. “Don’t stand in its way.”

NINE MINUTES

Before anyone goes near the suite, they get dressed, and at Eastmere getting dressed is an engineering problem in its own right. The gowning room is divided by a low bench that nobody is allowed to step over; you sit, swing your legs across, and become cleaner by the width of a plank. Hands are washed, then gloved, then sanitised, then gloved again. The coverall is sterile, folded so that it can be put on without its outside ever touching the floor or the wearer’s own skin, and the sequence — hood, mask, goggles, coverall, boots — is taught with a patience that borders on liturgy.

Nine minutes is the target, and Rhee is unapologetic about how long it is. “People think the gown is there to protect us from the product,” she says. “It’s the other way round. You are a cloud. The gown is how we put a lid on you.” Every gown is worn once and sent away to be laundered and sterilised; every operator is filmed gowning twice a year and scored against a checklist that runs to thirty-two steps.

The fabric has changed more in the last decade than the machine has. The old woven polyester breathed, which was pleasant for the wearer and less so for the room. The current suits are a tightly bonded fibre that sheds almost nothing and holds heat stubbornly, so shifts are now broken every two hours for water and air. Nobody complains about the breaks. Fenwick’s only objection is to the boots. “Forty years of progress,” he says, “and they still don’t come in half sizes.”

A ROOM THAT CLEANS ITSELF

Between campaigns, the isolator is sealed and filled with a fog of vaporised hydrogen peroxide, which reaches every surface the gloves cannot. The cycle takes a little over three hours and is followed by a long aeration, during which the peroxide is broken down and flushed away until the sensors inside read effectively zero. Then the doors of the transfer ports are opened, one at a time, in an order that is painted on the floor.

Rhee is fond of pointing out that this is the least glamorous part of the operation and the most im-

SIDEBAR

How a media fill works

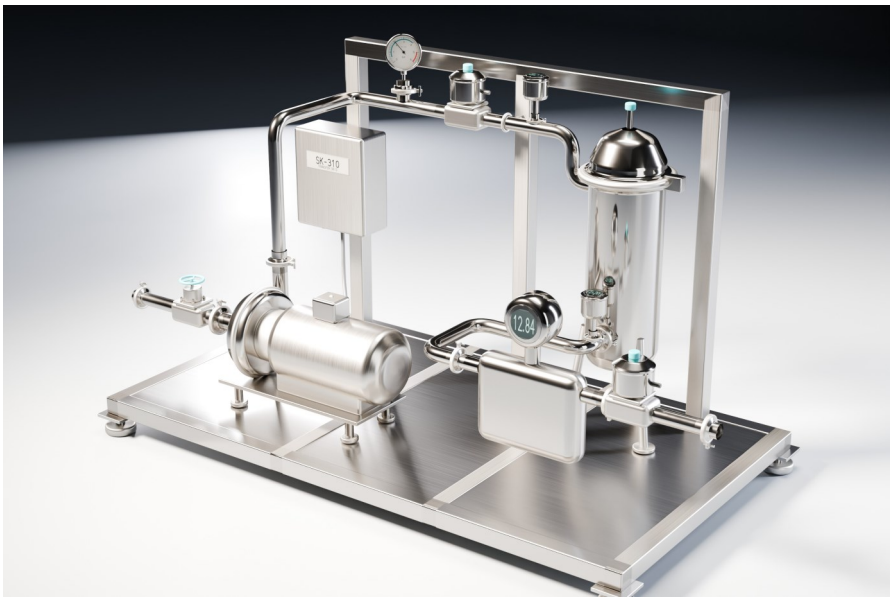
Twice a year the Eastmere line runs a full production batch in which the medicine is replaced with nutrient broth. If anything gets in, it will grow.

1. Sterile broth replaces the product and follows exactly the same path: tank, filter, needle, vial.
2. The shift runs at normal speed with its normal crew, including the people most recently trained.
3. Every routine intervention is performed at least as often as in a real batch — some deliberately more.
4. Filled vials are incubated for fourteen days, half of the time at each of two temperatures.
5. Each vial is inspected by eye against a light box. A single cloudy unit fails the run.
6. A failure stops the line. Nothing is released until the cause is found and the fill repeated three times.



Growth media and reagents in the quality-control laboratory at Eastmere, ready for the next media fill.

Procedure as described by the Eastmere quality team.







Left A buffer-preparation skid: pump, filter housing, flow meter and valves on one stainless frame, built off site and wheeled in whole.

Top right A dose of 2.2 ml leaves the needle 4 mm above the vial.

Bottom right Glove ports on the isolator wall. Every glove is tested for pinholes before each campaign.

portant. The fill takes the headlines; the decontamination takes the risk away. It is also where much of the recent progress has come from. When the line was commissioned the cycle took nearly six hours. Marlow's team spent two years mapping where the vapour went and where it did not, moving a single fan by forty centimetres, re-sequencing the injection and eventually rewriting the cycle to reach the same kill in half the time. "Nobody outside this building will ever know we did it," he says. "That's how you know it was worth doing."

The suite is monitored continuously. Particle counters sample the air at the fill point every second and send their counts to a screen outside, where a column of green bars twitches gently and almost never moves. Settle plates — small dishes of agar left open beside the needles — collect whatever falls out of the air across a four-hour window. Operators press contact plates against their gloved fingertips on the way out. Each result joins a record that now runs to several hundred thousand entries and that Achterberg can interrogate by shift, by operator, by glove port and by season. The worst month, historically, is August. Nobody is entirely sure why.

THE LAST METRE

After filling, the vials are stoppered inside the isolator and then leave it through a small opening in the wall — the operators call it the mouse-hole — to have their aluminium caps crimped on. This, too, is a design decision: crimping produces metal particles, and particles belong on the far side of a barrier. From there the vials pass through automated inspection, where cameras look for cracks, specks and misplaced stoppers at several hundred a minute, and then through a second, human inspection, where trained eyes study a sample against black and white backgrounds under controlled light.

It would be easy to see the human inspectors as a leftover, a job the machines have not quite finished taking. The people who run the line do not see it that way. The cameras are very good at the defects they were trained to find. The inspectors are good at noticing that something is odd. Twice in the last year, Rhee says, an inspector has flagged a batch for a reason no camera would have caught, and twice they were right.

DESIGNING FOR THE CLUMSY

What is striking about Eastmere, to an outsider, is how little of it looks like the future. There are no robot arms in the filling isolator, although the site is considering one for the next line. The screens are functional rather than beautiful. The most advanced piece of equipment in the building may well be the gown.

What it has instead is a design philosophy, repeated so often by the people who work here that it begins to sound like a creed: assume that everything that can be touched will be touched, and that everyone who can make a mistake eventually will. Then build a room in which the mistake does not matter. The isolator is not there because the operators are careless. It is there because they are human, and because the product on the far side of the glass is destined for someone who is already ill.



Filled, stoppered, waiting Vials on the outfeed bench before the crimp that seals them for good. The grey stoppers are pressed home inside the isolator; the teal caps are added outside it.

The site's phrase for this is designing for the clumsy, and it turns up in places you would not expect. Door handles in the corridor are placed so that they can be opened with a forearm. The labels on the transfer hatches are printed in a typeface chosen for legibility through a misted visor. The floor of the gowning room is marked in two colours so that nobody has to remember which side of the bench they are on. Each of these is trivial on its own. Together they add up to a building that forgives.

"We don't talk about patients much on the line," Fenwick says. "It's not that we don't think about them. It's that if you thought about them every time you put your hand in the glove, you'd never do it. So you think about the glove instead. Is it sound. Is the sleeve clear. Is my arm out of the air. You do the small thing properly and the big thing takes care of itself."

The next line at Eastmere, due to be commissioned in two years, will be smaller, faster and almost entirely automated. It will fill from single-use bags rather than steel tanks, so that nothing has to be cleaned and validated between products; the whole fluid path, from bag to needle, will be thrown away after each campaign. The design team has already walked the new layout in a virtual model, with operators in headsets reaching into a simulated isolator to find out where their elbows would go. Several glove ports moved as a result. One door changed which way it opened.

Marlow thinks the next ten years will be about data rather than machines. The counters, plates and cameras already produce more information than anyone can read; the question is whether it can be taught to raise its hand before a problem rather than after one. Achterberg is more cautious. She has seen trend lines that looked like warnings turn out to be a new batch of agar, and quiet months that were quiet only because nobody had looked. "The room will always be smarter than the spreadsheet," she says. "You have to go and stand in it."

> *"The broth doesn't care how good your paperwork is. It tells you the truth about what your hands did."*
>
> JOAN ACHTERBERG, MICROBIOLOGIST

At the end of the week I asked Rhee what she would change, given the chance, about the suite she has spent more than a decade refining.

Continued on page 24 ›



INTERLUDE · THE LONG VIEW

The cleanest air on the map

Above a mountain lake at first light, every cubic metre of air still carries millions of particles: pollen, salt, soot and dust blown in from the far side of the world. The air that falls over an open vial at Eastmere is allowed 3,520, and on most days it carries fewer than a hundred.

Nothing about that is natural. It is filtered, counted and paid for, second by second, and it is the reason the rest of this issue exists.



Interlude The Varrow ridge at first light. Like every image in this issue, an original 3D render.

BY THE NUMBERS · EASTMERE, 2019–2026

Where sterility is really lost

The filling line at Eastmere has cut hands-in-the-box interventions by more than ninety per cent in seven years. Here is where the time, and the risk, actually go.

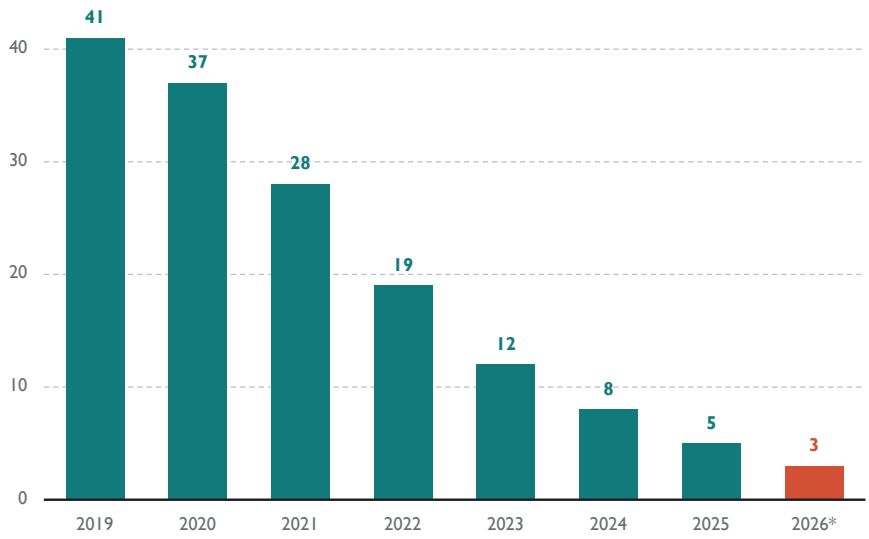
1,184
days since the isolator was last opened to the room

24,000
vials an hour at full rate, eight needles at a time

0
contaminated units in fourteen media fills since 2019

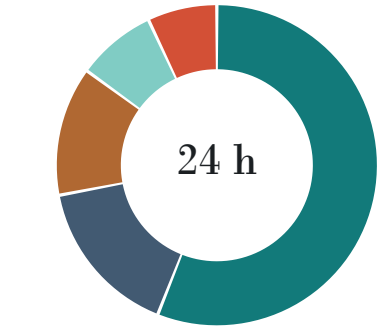
INTERVENTIONS PER 10,000 VIALS FILLED

Eastmere filling line, 2019–2026



A DAY ON THE LINE

Share of a 24-hour cycle



Filling	56%	13.5 h
Changeover & set-up	16%	3.8 h
Decontamination	13%	3.1 h
Monitoring & checks	8%	1.9 h
Unplanned stops	7%	1.7 h

PEOPLE INSIDE THE FILLING ROOM DURING A RUN

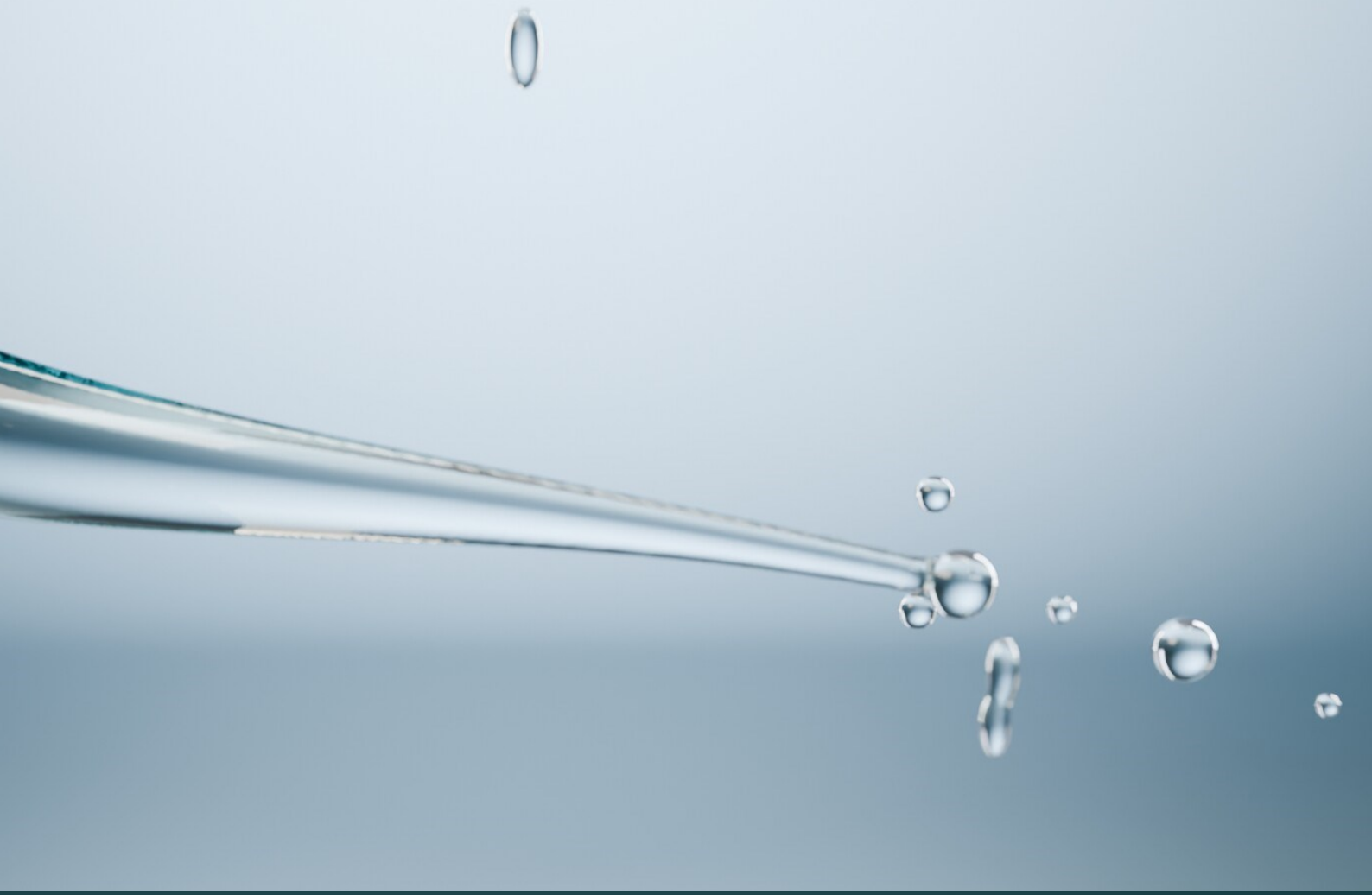


Why the numbers fell The isolator arrived in 2016 and took most of the people out of the room. The rest came from rehearsal: every intervention written down, timed, filmed and practised on a training rig until it became a single unhurried gesture.

Source: Eastmere site quality records, as supplied to LAMINAR. *2026 covers January to August. Percentages are rounded.

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PLACES · ARCHITECTURE

Light, held still

Laboratories are usually built to keep daylight out. At the new Marrowgate research campus, Studio Aveling Roos turned the problem inside out. Anselm Durward walks the length of it.

WORDS ANSELM DURWARD · IMAGES PIM ALDOUS

Left The atrium runs almost the full length of the plan. Timber roof fins at 600 mm centres admit the low winter sun and cut out the steep summer light.

The building is two hundred and fourteen metres long, and for most of that length it is made of timber and glass in roughly equal measure. Approach it across the reflecting pool in the late afternoon and the facade reads first as a single warm surface, then as a screen, then — once you are close enough to see the vertical fins that shade every window — as something closer to a textile, a long woven thing laid along the edge of the water. It is not what a research building usually looks like. That was the point.

"Laboratories have a very particular relationship with the sun," says Hana Aveling, who founded the practice with Teodor Roos in 2011. "Most of the equipment hates it. Heat, glare, ultraviolet — all of it is a problem for instruments and for samples. So for fifty years the standard answer has been a deep plan, artificial light, and a corridor with a window at the end if you're lucky. And then everyone is surprised that people don't want to work there."

The Marrowgate brief asked for two things that pulled in opposite directions: forty thousand square metres of controlled laboratory space, much of it built to cleanroom standards, and a building that eight hundred scientists would actively want to come to. The practice's answer was to split the problem along its length. The laboratories occupy a sealed, stable core, stacked four storeys high and served from above and below. The people occupy the edges, the atrium and the bridges between — everywhere the light can reach.

A SPINE OF LIGHT

The atrium is the building's organising idea and the thing visitors remember. It runs almost the entire length of the plan, four storeys high, roofed with a lattice of timber fins set at six-hundred-millimetre centres and angled to admit the low winter sun while cutting out the steep midsummer light. At the far end, a full-height wall of glass looks out over the woodland, so that the long perspective always ends in something green.

The fins do most of the work. Their depth and angle were refined over two years using a digital model of the sky over the site, hour by hour, until the atrium could be kept within a narrow band of brightness across the whole year without blinds. On a clear morning the floor is striped with light; by noon the stripes have shortened to almost nothing; in the evening they lengthen again and climb the east wall. "It's a sundial you can walk through," Aveling says. "People start to know the time by where the light is."

Along both sides of the atrium, the upper floors step back as they rise, so that each level has a strip of open floor looking into the void — places to stand with a coffee, to read, or to talk to someone from another group without booking a room. The research director at Marrowgate, Oluwaseun Brandt-Iversen, says the strips have changed the way people work more than any of the building's technical systems. "We have chemists who now know the names of the imaging team," he says. "In the old building they were on different floors for nine years."

BRIDGES AND THRESHOLDS

Every forty metres or so, a glazed bridge crosses the atrium at each upper level, linking the laboratory core to the write-up rooms on the far side. The bridges are narrow —



Above The south facade at golden hour, doubled in the reflecting pool that also cools the building's intake air.

two people can pass, three cannot — and that is deliberate. Aveling calls them the building's handshakes. They are where people meet on the way to somewhere else, and the practice sized them so that a meeting there would be brief and cheerful rather than a blockage. Their undersides are lined in the same larch as the facade, so that from the atrium floor they read as a series of warm horizontal lines floating in the light.

The thresholds between the core and the edge were harder. A cleanroom suite cannot open straight onto a sunlit balcony; there has to be a sequence of airlocks, gowning areas and pressure steps, each slightly cleaner than the last. Rather than hide these in the depth of the plan, the practice lined them up along the atrium and gave each one a small window, so that a scientist changing into a gown can still see the light moving across the floor outside. It is a small thing. Several people mentioned it without being asked.

THE QUIET EDGE

The perimeter is where the building meets the weather, and where the practice was most disciplined. Each bay of the facade is a prefabricated timber cassette, three metres wide, carrying triple glazing, an opening panel for fresh air and a rank of fixed vertical fins in untreated larch. The fins are spaced more closely on the west elevation, where the evening sun is lowest, and more widely on the north. From a distance the variation is invisible. Up close, it gives each side of the building a slightly different grain.

Behind the facade are the write-up rooms, where the scientists do the other half of their work: reading, writing, analysing, thinking. They are deliberately plain. A table, a chair, a lamp, a wall that takes the light. The practice designed a single desk for the whole building, in oiled ash with a steel frame, and resisted every request to make it adjustable in more than one way. "Most of what makes a room good to work in is subtraction," Roos says. "Take away the noise, the clutter, the glare, the bad chair. What you are left with is a place where you can think for an hour without being interrupted by the room."

Acoustics were treated with the same restraint. The timber soffits are perforated in a pattern that absorbs speech without deadening it, and the atrium floor is laid on a resilient layer so that footsteps land softly. It is possible, in the middle of a working day, to hear a conversation twenty metres away and not be able to make out a word of it — which, Aveling says, is exactly the right amount of company.

> *"It's a sundial you can walk through. People start to know the time by where the light is."*
>
> HANA AVELING, ARCHITECT

WATER AND TIME

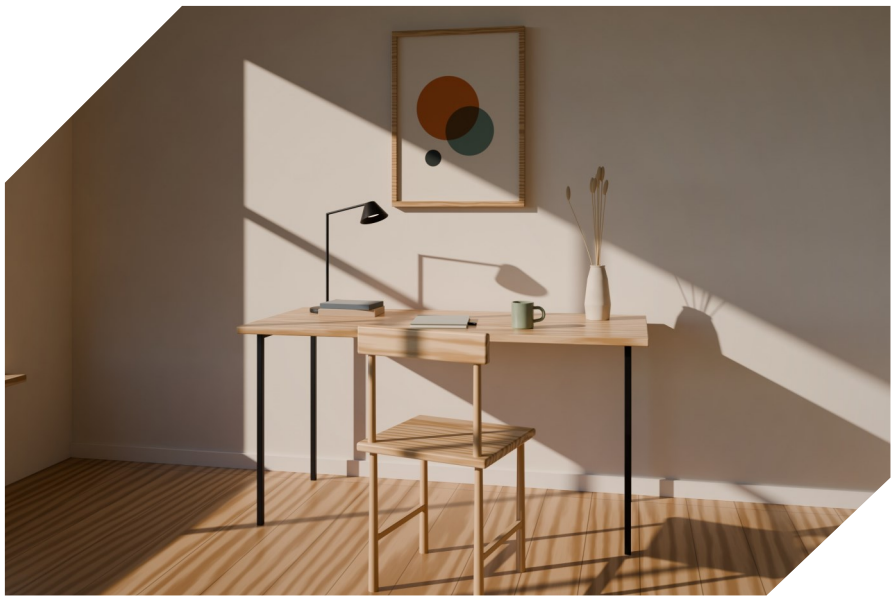
The reflecting pool along the south side is not only decoration. It holds rainwater collected from the roof and cools the air drawn into the ground-floor plenum in summer. It also doubles the facade, so that at golden hour the building appears to rise out of its own reflection, a long horizontal band of warm light held between two skies. In winter the pool is drained to a shallow film,

just deep enough to hold the sky, and the reflections become sharper rather than weaker. The landscape architects planted the far bank with birch and alder, which tolerate wet ground and turn yellow late in the autumn, so that the view from the atrium changes colour after most of the woodland has gone brown.

The practice is careful not to oversell the environmental credentials. Laboratories are energy-hungry by nature; a single fume cupboard can use as much energy in a year as a family home, and there are more than three hundred of them here. What the design can do, Roos says, is make sure that nothing else in the building adds to the load. Daylight replaces electric light in every space where it can. Natural ventilation serves every room without a sample in it. The timber structure stores carbon rather than emitting it. “We can’t make the science cheap to run,” he says. “We can make sure the building isn’t the expensive part.”

A year after opening, the building is already being altered in small ways by the people who use it. A group of structural biologists has colonised one of the atrium balconies with a long table and a kettle. Somebody has started a library of paperbacks on a windowsill at the north end. The practice is delighted by all of it. “Buildings like this aren’t finished when we hand them over,” Aveling says. “They’re finished when people stop noticing them and start using them. That takes about three winters.”

On my last evening I stayed until the atrium lights came on. They are few and low, and they switch on in sequence from the far end, so that for a minute or two the building appears to be breathing in. Outside, the facade had turned from gold to grey and the pool had gone still. Inside, somebody was still at a desk by the glass wall, reading, the lamp on and the woodland going dark beyond. It looked like the best seat in the house. □



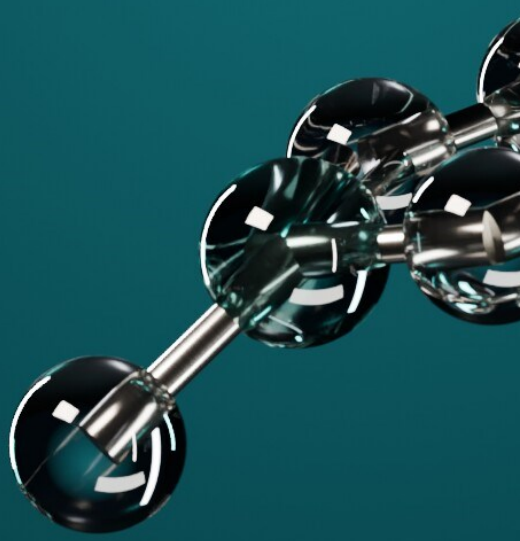
Right A write-up room on the west edge: one desk design for the whole building, in oiled ash on a steel frame.

FACT FILE · MARROWGATE RESEARCH CAMPUS

Client	Marrowgate Institute for Bioprocess Research	Architect	Studio Aveling Roos
Length	214 m, four storeys	Floor area	40,200 m² gross
Structure	Glulam frame on a concrete lab core	Facade	Larch fins, triple-glazed cassettes
Occupants	800 scientists and staff	Fume cupboards	312
Completed	Autumn 2025	Pool	Rainwater, 1,900 m³

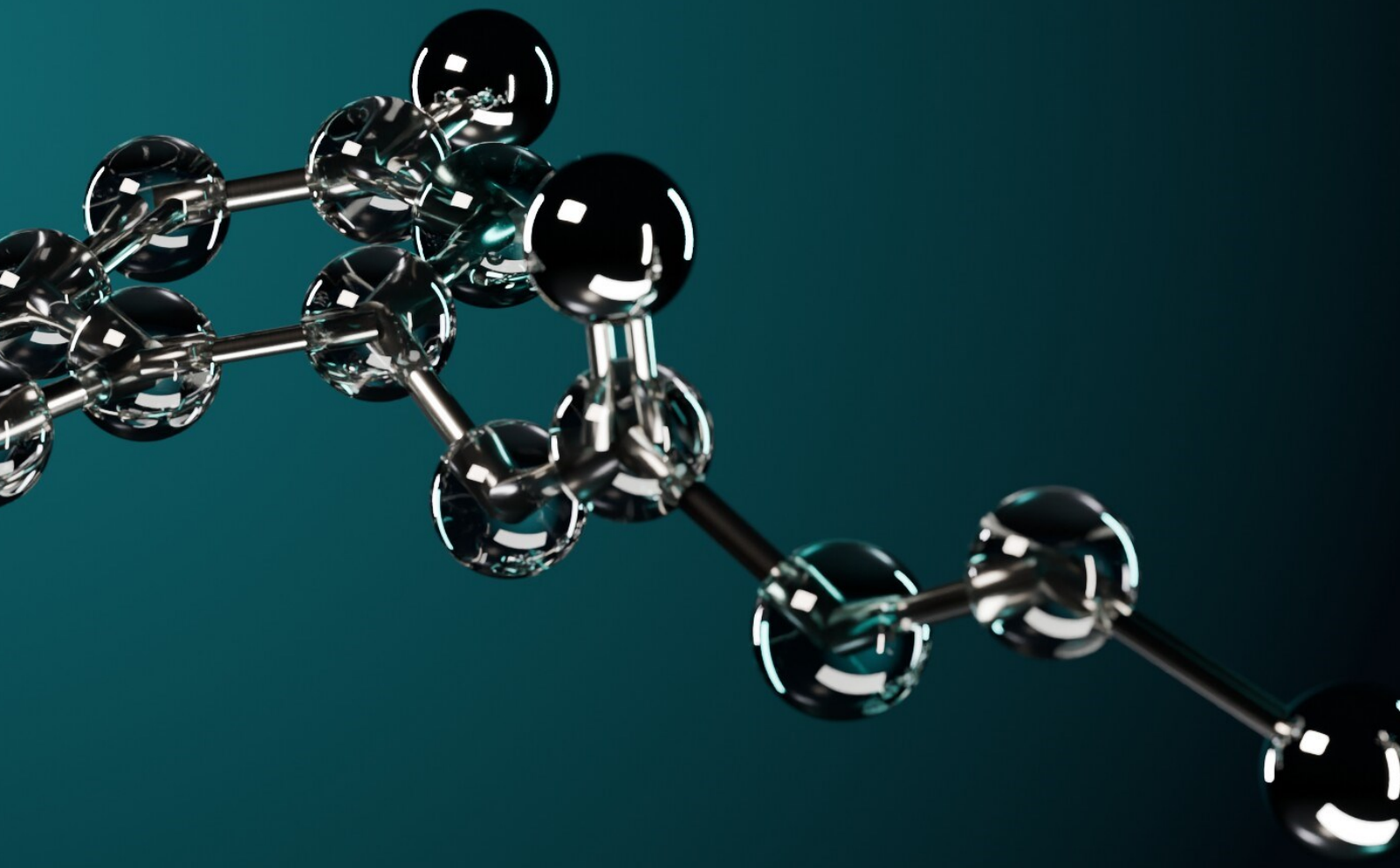
OBJECTS

The honest object

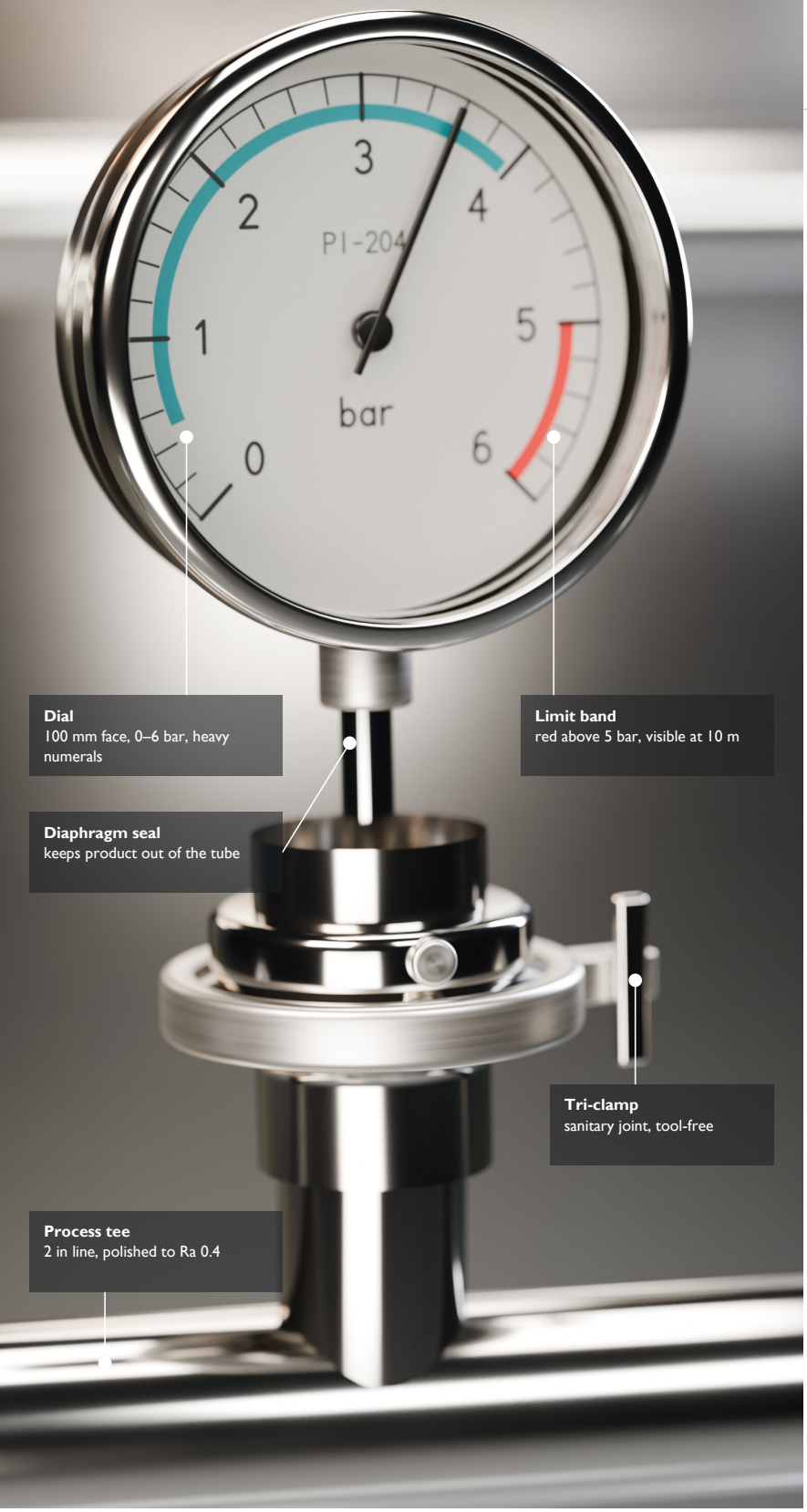


Some things hide how they work. A phone gives nothing away; a car has been sealed behind plastic for a generation. Others cannot help telling you. A pressure gauge points. A glass vessel shows you what is in it, and how much. A molecular model, all steel spheres and glass rods, is nothing but an explanation you can hold.

Over the next pages we look at objects of the second kind — instruments, vessels and tools whose form is an honest account of their function — and at the people who design them to be understood at a glance. They are not always the most beautiful things in the room. They are very often the ones you trust.



A glass-and-steel model of a small organic molecule, each bond a borosilicate rod. Pages 22–23 ›



OBJECTS · INSTRUMENTS

The gauge

A sanitary pressure gauge does one job, and shows you from across the room whether it is being done.

There is a gauge like this on almost every vessel and pipe in a sterile plant, and its design has barely changed in a century. Inside the polished case a curved, flattened tube tries to straighten as pressure rises, and a small gear train turns that movement into the sweep of a needle. There is no battery, no screen and nothing to update.

What makes a sanitary gauge different is the part you cannot see. The process liquid never enters the tube; it presses on a thin stainless diaphragm, flush with the inside of the pipe, which passes the pressure through a sealed fill to the mechanism above. There are no crevices for product to collect in, and the clamp beneath comes apart by hand.

The dial of the Brask 316 is a small lesson in graphic design: heavy numerals, a teal band for the working range and a red one for the limit. You do not need to know what the numbers mean to know when to worry.

> *“You do not need to know what the numbers mean to know when to worry.”*
>
> ON THE BRASK 316 DIAL

THE BRASK 316 SERIES

Model	Range (bar)	Dial	Process connection		Price
			Size	Type	
BG-63	0–4	63 mm	1½ in	Tri-clamp	**£212**
BG-100	0–6	100 mm	2 in	Tri-clamp	**£264**
BG-100W	0–10	100 mm	DN40	Weld-in	**£298**
BG-160	−1 to 3	160 mm	2½ in	Tri-clamp	**£341**

Prices exclude VAT. Every gauge ships with a calibration certificate traceable to the Brask works standard.

OBJECTS · STUDIO

The kiln and the lathe

Stoneware, glass and stone from Hollin Street Studio, a two-person workshop that makes things for laboratories and kitchens alike.





Rosa Ilić throws the stoneware; Benedek Salo works the glass. Their carafes start life as the same borosilicate tube used for laboratory ware, softened on a lathe and drawn into a neck by hand. The bottle's speckle is iron in the clay, surfacing through a matt glaze in the firing.

Nothing here is decorated. "If the shape is right, the decoration is already there," Salo says. The celadon bowl is the exception that proves it: its colour comes from a trace of iron fired without oxygen, and no two come out of the kiln quite alike.

The studio sells in small batches from a converted boiler house, and every piece carries a stamp with the date of its firing. The travertine blocks are offcuts from a stonemason next door, honed flat and sold as trivets; the pebble is not for sale.

HOLLIN STREET STUDIO · PRICE LIST

Item	Material	Dimensions (mm)		Price
		Height	Width / Ø	
Stoneware bottle	Iron-speckle stoneware	240	92	**£68**
Celadon bowl	Porcelain, celadon glaze	62	180	**£54**
Carafe, 1 litre	Borosilicate glass	265	96	**£72**
Tumbler, 250 ml	Borosilicate glass	88	74	**£24**
Travertine block	Honed travertine	60	160 × 110	**£38**

Dimensions in millimetres. Prices include VAT. Made to order; allow six weeks.

NOTHING TOUCHES THE PRODUCT · CONTINUED FROM PAGE 11

She thought about it for long enough that I assumed she would not answer. Then she said: the window. There is a small window in the corridor outside the gowning room, facing west, and in the afternoons it throws a long bar of light across the floor. The cleanroom itself has no windows, for obvious reasons.

"Eleven years," she said, "and I still stop and look at that light every day on the way in. I'd like the next team to have a view. It's a strange job, spending your life making sure nothing happens. It helps to see something happening outside." □

NOTEBOOK

Letters

Your piece on welding inspectors in Issue 06 made me ring my father, who spent forty years doing the job and never once described it as interesting. He has now read it three times and would like a copy for his brother.

Ruth Pellow, Sandmere

Please stop photographing control rooms at night. Some of us work in them during the day, when they look considerably less like the bridge of a starship and considerably more like an office with too many screens.

T. Adeyemi-Clark, by email

I have kept every issue since the first and would like to report that the paper of Issue 04 is the best thing that has happened to my bookshelf. I would also like to ask what happened to it in Issue 05.

Graham Ossory, Tynewick

Letters may be edited for length and, occasionally, for tact.



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14 QUAYSIDE WORKS, ARDMORE

NOTEBOOK

Notebook

A museum of valves, tolerance in public, the quiet alarm — and a correction.

A MUSEUM OF VALVES

The former pump house at Orrin Lock, closed since 1998, reopens in the spring as a small museum of flow control. Its curator, Delphine Aske, has spent four years collecting valves from demolished breweries, dairies and paper mills, and the oldest — a bronze gate valve cast in 1871 — still turns. Visitors will be allowed to operate a working manifold of twelve valves in sequence, which Aske describes as the most satisfying three minutes in industrial history.

TOLERANCE, IN PUBLIC

A group of toolmakers in the Brenne valley has started publishing its rejection rates. Every month the eleven workshops in the cooperative post, on a board outside the village hall, the share of parts that failed inspection and the reason why. The figures are small and falling. The cooperative's chair, Mathis Oberlin, says the point is not competition but candour: "If you only publish your successes, nobody learns anything from you."

THE QUIET ALARM

Designers at a hospital-equipment maker in Lindqvist Harbour have spent two years reducing the number of alarms their infusion pumps make, from nineteen distinct sounds to five. Nurses in trials responded faster to the smaller set, not slower. "An alarm is a sentence," says the project's lead, Ada Mbeki-Rowan. "If it says too many things, nobody hears any of them."

GLASS THAT REMEMBERS

At the Hartwell Institute, a materials group has shown a borosilicate that can be bent at low temperature and returns to its original form when warmed. The samples are the length of a matchstick, and the team is candid that a useful product is a decade away. The first application they mention is not a phone screen but a laboratory: pipettes that straighten themselves after an accident.

CORRECTION

In Issue 06 we described the rope-driven lift at Carden Mill as the last of its kind in operation. It is the second-last. The last, several readers have informed us, is at Wendle Quarry, and it is in rather better condition. We apologise to Wendle.

DIARY

14–16 Oct	Clean Process Week, Halvergate
22 Oct	Lecture: The ethics of the invisible, Marrowgate
5 Nov	Open studio, Hollin Street Studio
19–21 Nov	Sterile Manufacturing Forum, Eastmere
3 Dec	Daylight in laboratories, a seminar, Ardmore

"An alarm is a sentence. If it says too many things, nobody hears any of them."

ADA MBEKI-ROWAN, ON THE QUIET ALARM

NEXT ISSUE

The bridge that listens Sensors, strain and the quiet art of structural monitoring. Plus a visit to the last hand-blown laboratory glassworks in the north, and the numbers behind the night shift. Issue 08 is on sale on 4 December.

COLOPHON

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LAST WORD

Good design is the part of engineering you only notice when it's gone.



L A M I N A R