UHB HEARTLANDS HOSPITAL BIRMINGHAM

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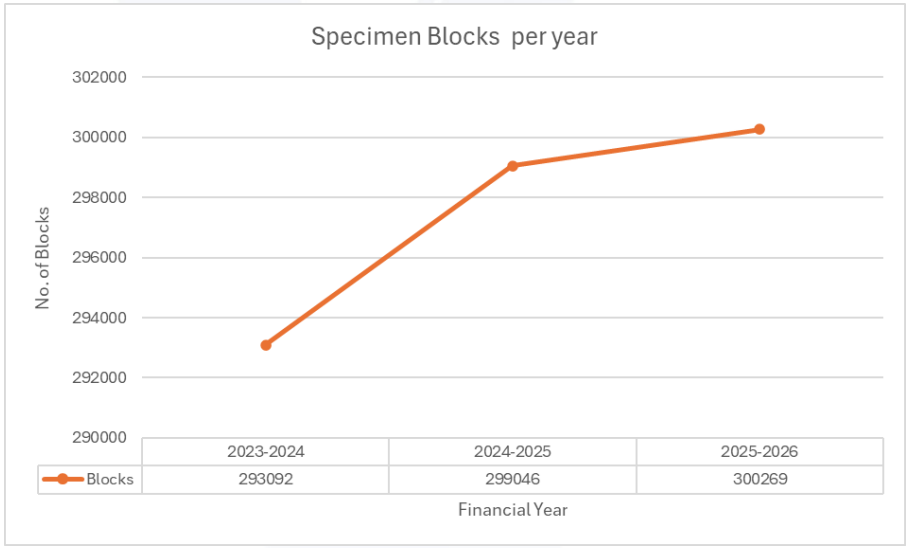
UHB- workload

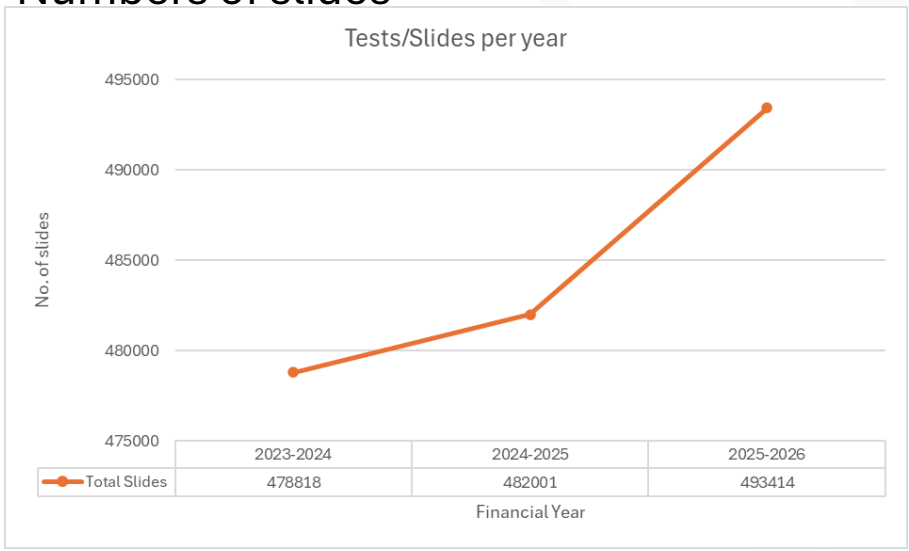
- Increasing workload
- Increasing staff pressure
- Pressure on turn around time
- Cross-site pressure
- Increasing service demand

					Combined Cases	Combined Blocks
	BHH		QEHB			
Year/Site	Cases	Blocks	Cases	Blocks		
2021/2022	29566	83350	21500	68078	51066	151428
2022/2023	47971	133832	37154	117884	85125	251716
2023/2024	53895	150209	40730	138608	94625	288817
2024/2025	50463	151119	41579	142140	92042	293259
2025/2026	50180	151040	40211	137165	90391	288205

Number of Blocks



Numbers of slides



Four hospital sites across UHB with 2 Cellular Pathology departments (QE + Heartlands)

Business case approved

AS-410M purchased and installed

Validation and workflow integration initiated

UHB – AS410M Autosectioner Team Structure

- Started with two trained superusers
  Establishing trained superusers early was critical to a successful implementation particularly for troubleshooting and supporting wider staff training.
- Competent staff - 5 BMS and 3 MLA
- Shift pattern – Total of 9.5 working hours
- Daily staffing - 1 BMS & 1 MLA

MLA (7am start)	BMS (9am start)
• Prepare microtome • Load rough-cut blocks • Case sorting and block checking • Load slides onto the stainer	• Select and rough-cut blocks • Load machine • Quality check slides • Send complete cases for scanning and allocation • Troubleshoot

Considerations

Increasing workload and service demand

Staffing pressures and training superusers to troubleshoot

Backlog and turnaround time pressures

Tissue type suitability and limitations

Need for consistency and efficiency

Capacity - 96 blocks per run

Physical space and heat generation

Trimming → Embedding → AS410M → Staining → Reporting

Initial Validation and implementation

1

Cut various test tissue blocks for all tissue types at 3µm which is our standard thickness for most tissue types

2

Assessed microscopically section quality, thickness and staining with a senior BMS - We looked at if there is any chattering, tearing, compression and that the section quality is consistent

3

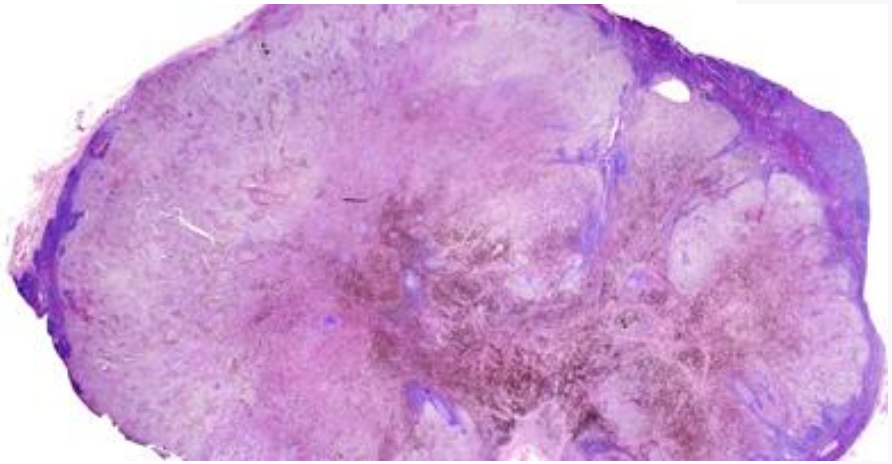
Sectioned previously reported cases on the autosectioner and compared them with the original manually cut slides used at reporting.

4

Blind test – Pathologists from different speciality scored slides- Looked at H&E stained to look at if tissue morphology was preserved

Validation focused on ensuring section quality, thickness accuracy, and preservation of morphology were comparable to manual microtomy before progressing to routine use.

H&E Quality Assessment



Early consultant engagement was essential in building confidence in the system, addressing quality concerns, and supporting successful integration into workflow.

✓= Acceptable
X = Artefact observed in slide

AS-410M H&E Slide Quality Assessment

Tissue Type :	1		2		3		4		5		6		7		8		9		10	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Section thickness correct																				
Rough cutting artefact																				
Scores																				
Chatters / cracking	For most tissue types, the autosectioner produced sections of acceptable quality comparable to manual cutting, with some cases demonstrating more consistent thickness and improved overall section quality.																			
Folds / creases																				
Lifting / displacement																				
Squames / floaters-carry over																				
Knife back debris / carry over																				
Positioning on slide																				
Tissue missing off slide																				
Bubbles																				
Meltdown artefact																				
Total score (1-5)																				

Comments:

Signature Assessor: ..... **Date:** .....

NOTE: Please write the score with a marker directly on each slide.

Scoring Guide

- 1 – Poor: Unacceptable; significant flaws affecting interpretation (NOT SUITABLE FOR REPORTING)
- 2 – Fair: Below standard; multiple issues present (NOT SUITABLE FOR REPORTING)
- 3 – Average: Acceptable; minor flaws but adequate for diagnosis
- 4 – Good: Above average quality with minimal imperfections
- 5 – Excellent: Optimal quality; no detectable flaws

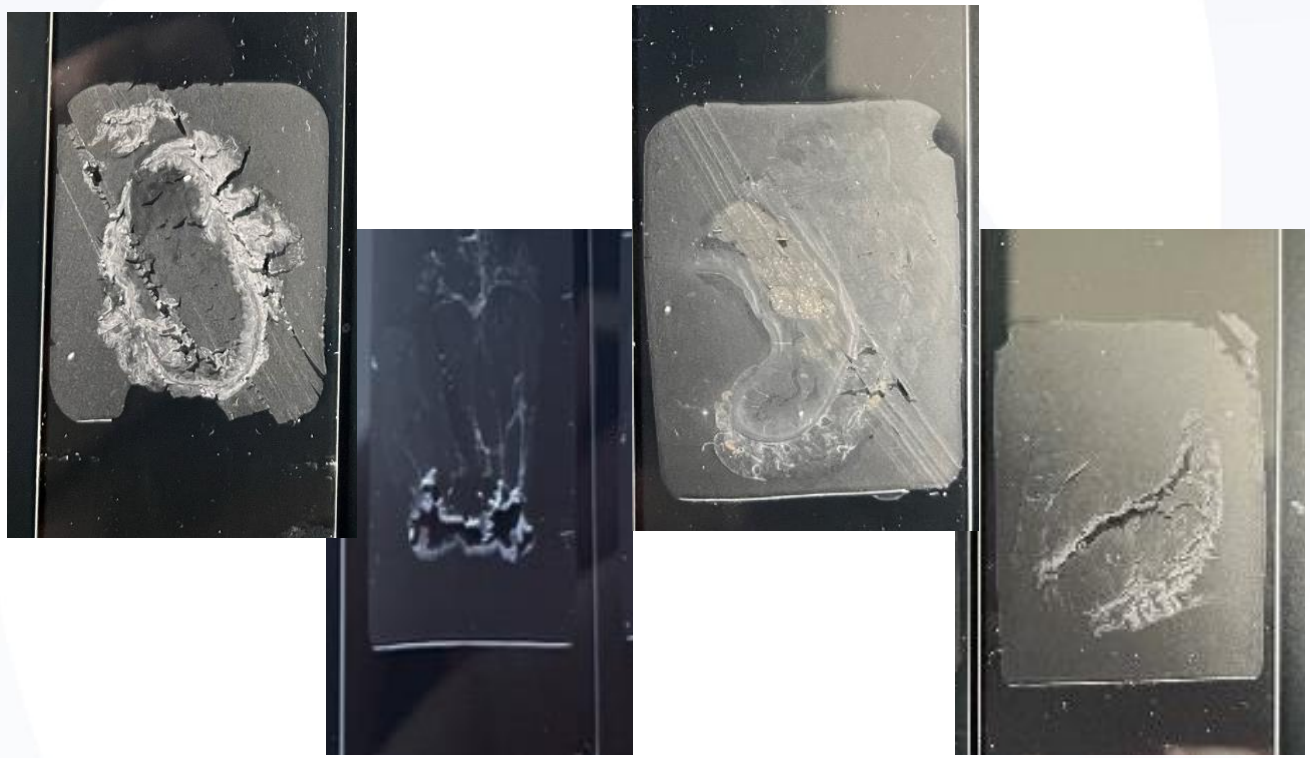
Tissue types and suitability

Not all tissue types are suitable for the autosectioner including: Biopsies, some fatty, haemorrhagic and calcified tissue.

Initial Challenge
Tearing and lifting of Fatty tissue and skin

Actions Taken
Worked with Axlab product specialist to develop a new parameter file

Workflow Improvements
Feedback to trimming room seniors and need for longer fatty tissue processing



PARAMETER ADJUSTMENTS

- **Cut Speed 1** – Speed at which the blade passes over the block to take a section. Changing this higher or lower depends on how a tissue reacts when being cut, similar to how we adjust our cutting technique on the manual microtome.

- **Cut Speed 2** – Speed at which the blade passes over the block to rough cut the block (roughing phase).

- **Tape Speed** – This is the speed at which the tape moves when collecting the section. If the section is prone to splitting/ weak structure, the speed can be reduced to prevent this happening. If sections appear wrinkled, then the speed can be increased.

- **Humidify Time** – Amount of time the humidifier is sprayed onto the block, increasing this increases the +/- interaction between the section and the tape. In the case where the section isn't adhering to the tape, then the humidifier time can be increased. If the section isn't sticking to the slide well, we can decrease the time.

- **Extension Time** – Amount of time the finished slide is on the hot plate. We reduce this when the section has a weak structure and is prone to blowing. Thicker tissues are left on the hot plate longer to prevent any creases.

Validation Outcomes and Practice Improvements

Trimming - Changes to trimming and processing to keep tissue smaller so that there is a gap between the tissue and edge of the cassette and checking block QR code is printed correctly.

Processing- New fatty program- Introduced to help with better quality sections and allow for better adhesion of section onto the slides

Embedding – To place embedding beads used to identify the embedder in the corner of the cassette and to embed tissue flat and orientated correctly

Main laboratory – Staff not selecting the suitable tissue types for the autosectioner such as haemorrhagic and calcified tissues.

Autosectioner- Glass slides sticking together and breaking due to moisture interfering with the robotics of the machine

*Store slides in a dry place

Benefits of autosectioner

Staff wellbeing - Reduces manual microtomy burden

Better use of skilled staff allowing them to focus on complex tissues

Night run

Reduced backlog and improved turnaround time

Standardised section thickness and quality utilising blade mark software

Supports service expansion and cross-site collaboration

No tissue carry over or cross contamination

Validation and working towards accreditation

Collaboration between Dedalus, University Hospitals Birmingham, and Axlab to develop the interface has progressed from initial planning and testing to implementation.

Documents typed up including –SOP's, Validation report, risk assessment, change control, training and competency, maintenance log and stock checklist.

Shift introduced

Staff training commenced and competencies completed

Demand vs Capacity: Manual vs Autosectioner

Microtomy - Biopsy			
	BHH	QEHB	Total
Blocks Received	211	150	361
Hours required (based on 4.70 minutes/sample)	16.53	11.75	28.28
Daily Staffing Requirement (based on 6 hrs) - BMS	**2.8**	**2.0**	**4.7**
Microtomy - Routine			
	BHH	**QEHB**	**Total**
Blocks Received	389	347	736
Hours required 20 blocks per hour	20	18.80	38.80
Daily Staffing Requirement (based on 6 hrs) - MLA	**3.2**	**2.8**	**6**

Blocks cut	**228**
Number of blocks per run/4 hrs	96 (24 blocks an hour)
Daily staffing required **1 BMS** **1 MLA**	**9.5 hours in total**

Manual Microtomy

- Staffing dependent
- Several BMS + MLAs required
- Limited by shift hours – No overnight run

Automation

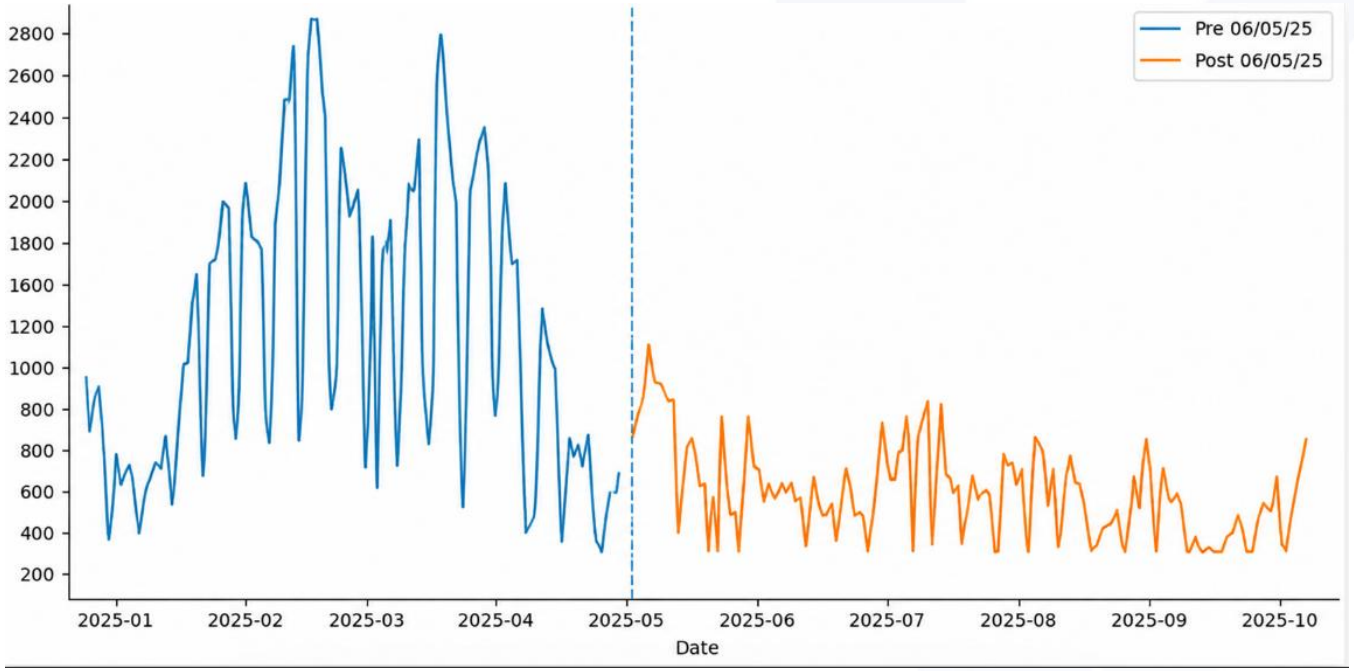
- Significantly reduces staffing demand
- Increasing output
- Allows staff to focus on biopsy cutting.

Error rates Autosectioner vs Manual Cutting

Autosectioner			Manual cutting	
Total blocks cut (inc QE)	**13055**		Total blocks cut (inc QE)	**13055**
Blocks cut on AS-410M	**5415**		**Blocks cut manually**	**7640**
% of blocks cut on AS-410M	41%		% of blocks cut manually	59%
Total blocks sent back for recut from AS-410M	79		Total blocks sent back for recut from manual cutting	53
Recuts for poor section quality only (not due to poor processing/damaged QR code)	59		Recuts for poor section quality only	53
AS-410M blocks recut for poor section quality as % of total blocks	0.45%		Manually cut blocks recut for poor section quality as % of total blocks	0.41%
AS-410M blocks recut for poor section quality as % of total autosectioner blocks	1.09%		Manually cut blocks recut for poor section quality as % of total manually cut blocks blocks	0.69%

- When comparing the error rates between autosectioner and manual cutting the autosectioner showed a 1.09% error rate for poor-quality sections which is within the acceptable 2% threshold.
- Several staff members are still relatively new to microtomy, and with continued practice and experience, these issues are expected to improve over time.

AS-410M backlog comparison



The autosectioner on average cuts 41% of the work.

Pre AS410 machine - Average backlog was higher and often reached large spikes of over 2,000 blocks.

Post AS410 machine - Backlog mostly remained steady below 1,000 blocks.

Improved efficiency

Enhanced operational stability

Reduced cutting backlog

Collaboration

01

Cross-site working - Support for QE workload

02

Capacity sharing – bank shifts availability to help with backlog

03

QE blocks are not linked to telepath – label limitations

Expectations vs Reality

While the autosectioner improves efficiency, in practice it introduces new workflow pressures, particularly around block checking and case selection, and requires ongoing optimisation and it takes time to implement approximately 3-6 month

Validation 3-6 month

Training

Physical Space

Challenging tissues: biopsies, some fatty, haemorrhagic, calcified are not suitable

Downtime

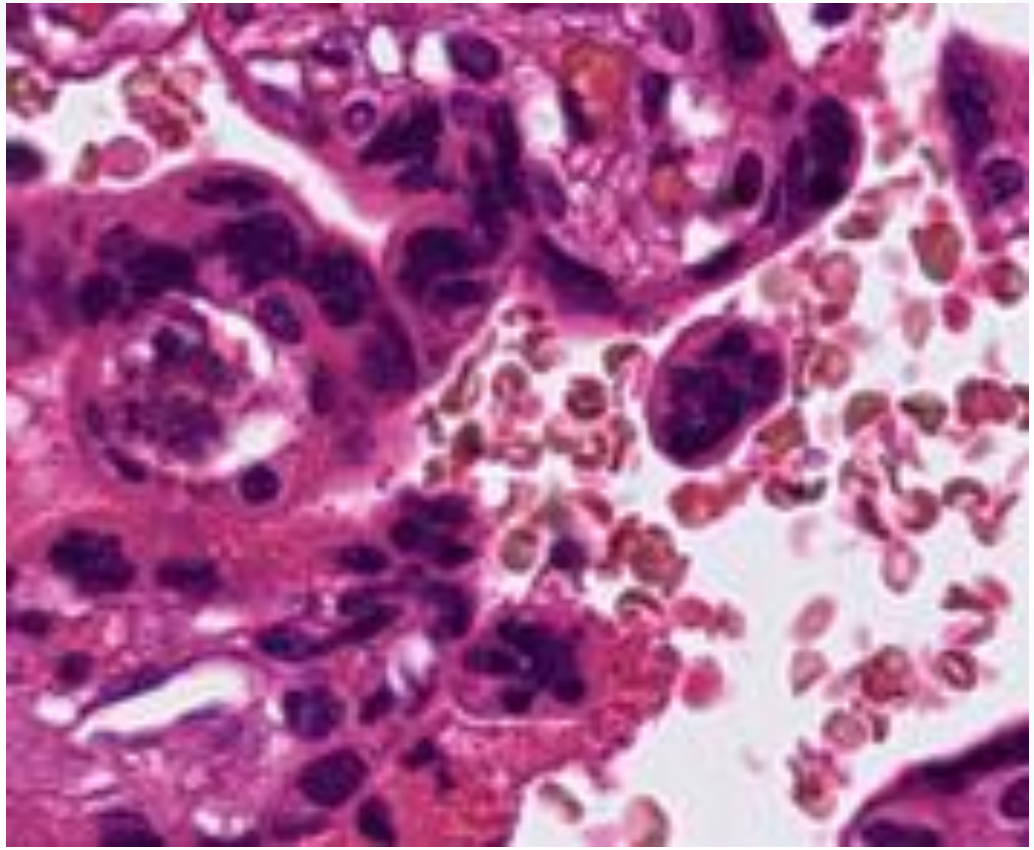
Capacity – 96 blocks every 4 hours

Expectation: Full automation

Reality: Requires supervision and tissue selection

Proof of concept using one AS-410M

- While one autosectioner proved effective in managing workload post-implementation, increasing demand particularly with cross-site input highlights the need to consider getting another machine.



With increasing workload demand there is a potential need for second machine.

Verification and UKAS scope

1789159	2.1	Recommended Actions	Unscored	It is recommended that the lab continues to review the Axlab AS-410M Autosectioner IQC data separately from manual microtomy to assure itself that error rates are not consistently going above the 2% trigger point.	Saeeda kauser	16/Jan/2026	DRAFT
1789170	2.1	Recommended Actions	Unscored	It is recommended that the lab chases up the manufacturer for a completed sign-off acceptance testing documented for the Axlab AS-410M Autosectioner.	Saeeda kauser	16/Jan/2026	DRAFT

To address this, a separate repeat code was created within Telepath to provide a clear audit trail.

We had to chase up the axlab team for the sign off acceptance testing documents on the autosectioner.

Assessor looked at:

- Update Validation SOP
- Risk assessment
- Staff competency records

These findings were raised as CAPA and actioned within the same week. All laboratory staff were informed of the changes, and departmental communication was circulated via email.
Following successful completion of all the findings of the UKAS Extension to Scope, the AS-410M workflow was incorporated into the laboratory's accreditation.

Cellular Pathology UKAS accredited medical laboratory reference number: 10141

The Future of Autosectioning

CHANGES WE WOULD LIKE TO SEE -

- Better handling of challenging tissues - Ability to cut small biopsies and cores as levels
- Ability to take sections on charged TOMO slides for IHC staining
- Ability to section MACRO blocks
- Higher capacity
- Faster cutting of sections whilst still maintaining good quality
- Improved troubleshooting prompts – to reduce reliance on engineer
- An integrated rough cutter as part of the machine
- No downtime particularly relating to technical blademark interruptions

Autosectioner Go-live at BHH May 2025

THANK YOU FOR LISTENING

ANY QUESTIONS?