CAPEX Business Report

POL Scanning Machine – Business Case

By

James Scorgie

Student Number: 2113853

Student Email: 2113853@student.uwtsd.ac.uk

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A Business Case

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1 Introduction

Image stitching has been a relatively recent photographic development, with a large proportion of development taking place during the past twenty years as digital technology has become cheaper and more widespread. The process involves digitally 'stitching' (or combining) multiple images (see Appendix Fig. 1) together to form a larger image, this process is now commonplace in digital photography as in-camera processing has become more widely available. This has been applied to geological thin-section samples to create a complete high-resolution 'stitched-image' of thin sections.

This report will briefly outline how image stitches are currently corrected, and how this process could be improved by the purchase of a Glissando POL automated scanner & subsequent cost saving/payback.

1.1 Strategic Case

In 2019, PetroStrat LTD's Reservoir Geology Department (formerly RPS Specialist Geology), has worked internally to develop a method to capture stitches using existing hardware that is provided by Petrog (Conwy Valley Systems). The process involves using the Petrog Automatic Stepper (usually used for point counting) to automatically capture a set number of images of a thin-section in a grid shaped pattern (Appendix Fig. 2), these images are manually focussed by a scientific operator. These images are then digitally stitched together using a digital image stitching software and processed using a digital image processing software (e.g. Gimp, Photoshop, CorelPhoto, etc). This was rolled out to clients in 2020, with pricing set at: £35 for x2-5 image stitches, £55 for x5, £90 for x10 (where x# refers to the magnification objective used for each image tile) – profit margins per sample can be seen in Appendix Table 2, Page 5. Currently, only x5 and x10 image stitches are offered to clients. An example of an image stitch can be seen in Appendix Fig. 3.

Whilst the process is relatively simple, the process currently can only be performed on sedimentological samples, which leaves the Biostratigraphy Departments (Nanno and Paly Depts.) unable to achieve the sample results as the Reservoir Geology (Sedimentological) Department.

Another factor to consider is that as well as this, there is currently missed opportunities for additional project revenue streams to be made during a tendering process (as only sedimentological samples are eligible to be stitched). With an average of 50 samples per project, this could represent a minimum additional revenue of £2750 per project (based of

50 x5 image stitch samples). As over 5000 thin-section samples have been prepared within Petrostrat in the last 10 years, this represents a potential lost revenue of £296,000 - £762,000 (based off x2.5, x5 & x10 stitches) – see Appendix Table 1.

Furthermore, the process is currently extremely manual, with an operator being required to 'babysit' the automated capture to set focus where needed (although this is largely dependent on the samples and sample quality – poorer samples require more refocusing), whilst stitching and further digital processing takes further time and requires a large digital processing power.

1.2 Proposal

The Glissando scanners by Objective Imaging offer versatility and automation to a process that is currently very tedious as outlined above. The purchase of an automated scanner will improve the process and allow for non-technical staff to operate the machine, whereas previously technically staff would be required for manual focus adjustments of each image.

Two scanners currently are available through Objective Imaging, with various specifications offers available. However, it is deemed the POL scanner is best for the company as it can scan two samples per scan. A previous presentation to board (Ford 2022) outlined costs of: £37,800 base price, £3,200 for x40 objective (equivalent to x4/x5 current process), £15,590 for raid-configured server, £2,750 per year subscription for image sharing software – this totals a CAPEX outlay of £56,590[1]. Alternative hardware was explored through Zeiss and Leica, however, these options were discounted due to a large cost of over £200,000.

2 Financial Appraisal

The following scenarios are modelled as part of the financial appraisal of the purchase of scanner: Purchase with 1000 sales per year & scientist operator (Scenario 1); Purchase with average historic sales used for future modelling & scientist operator (Scenario 2); Purchase with historic sales used for future modelling & scientist operator (Scenario 3). Profitability calculations for each scenario are summarised in the table below.

[1] This is as software subscription/licensing costs are accounted for as an IT Dept. expense as opposed to being included within CAPEX spends.

Key assumptions: WACC (interest/discount rate) set internally at 7.5%; a post 2023 increase in Corporation Tax from 19% to 25%[2].

Scenario	1	2	3
NPV	673	3763	26538
Rate of Return*	8%	9%	17%
Pre-Tax Payback	5.4	5.1	3.6
Discounted Payback	11	11	8
Profitibility Index	1.01	1.07	1.47
Recommendation	Reject Investment Proposals due to low PI & ROR		Proceed with investment.

3 Procurement Process

Internal procedures were followed during this process, obtaining prices from three independent suppliers (Zeiss, Objective Imaging and Leica). Objective Imaging selected due to cost and features. Objective Imaging were found to be the best value based on cost and features.

4 Recommendation

Recommendation is given to the Board to proceed with the purchase of the Glissando POL scanning machine subject to Scenario 3 being followed, due to the high scoring rate of return (17%), positive profitability index (1.47) and a relatively short pre-tax payback of 3.6 years.

Further cost analysis of training/upskill cost may be required prior to proceeding with the purchase, whilst further efforts should be made to establish the requirement for further scanning in the current market conditions (the British Geological Survey alone currently has a library of 175,000 thin sections, many of which are not scanned digitally to high-resolution). Furthermore, historically the company (PetroStrat) has prepared over 10,000 samples (many of which have not been digitally scanned), if clients were interested in digitising their archives, this could represent a client-value to the company of up to £500,000 (based of x5 stitches).

[2] Although this has been reversed in the past two weeks, current political instability has meant that Corporation Tax Rise post-2023 remains included.

5 Appendix

Please find attached all financial calculations within the attached appendix.

For Excel Files, please email **2113853@student.uwtsd.ac.uk.**

Appendix Table 1

Historic Thin Section Samples

Historic Thin-Section Sample Amounts (Per Year)									
Year	**(Pre 2016)**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	
Internal Samples Prepared (Cumulative)	1478	1572	1749	1879	2505	3601	4462	5268	
Internal Samples Prepped Per Year *1,2	1478	94	177	130	626	1096	861	806	
External Samples Prepped Per Year (estimate)*3	400	400	400	400	400	400	400	400	Historic Average
Total Samples Prepped Per Year	1878	494	577	530	1026	1496	1261	1206	1059

*1 this includes all samples prepared in the company history up to 2016 when better record keeping started

*2 This reflects only figures up to September 2022.

*3 Legacy data reflected from recent acquitision in 2020 of RPS Specialist Geology

	Lost Revenue								**Total Lost Revenue**
x10 Stitches	£169,020.00	£44,460.00	£51,930.00	£47,700.00	£92,340.00	£134,640.00	£113,490.00	£108,540.00	£762,120.00
x5 Stitches	£103,290.00	£27,170.00	£31,735.00	£29,150.00	£56,430.00	£82,280.00	£69,355.00	£66,330.00	£465,740.00
x2-5 Stitches	£65,730.00	£17,290.00	£20,195.00	£18,550.00	£35,910.00	£52,360.00	£44,135.00	£42,210.00	£296,380.00

Appendix Table 2

Scenario 1 - Purchase with sales assumed at 1000 per annum & scientist operator

Page 1 – Capital Proposal Summary

Page 2 – Cash Flow Summary

Page 3 – Profit Summary

Page 4 – Cost Saving Summary

Page 5 – Stitching Time Calculations

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CAPEX FORM

COMPANY:	**Petrostrat (MADE)**	**CAPEX Number**	**MADE**	**Date:**	**13-Sep-22**
Department	**12. MADE Course**				

PROJECT: Thin Section Image Scanner Purchase **Project Type** **Cost Saving**

Project Description :

Purchase of a Glissando POL 2 Slide scanner. This CAPEX form is calculated for X5 stitches.
The project will examine whether the cost-saving factor of automating a currently manual process will be worth the investment required.

Project Justification: **7.5%**

The machine will increase the output of stitched images and free staff members up from a currently tedicous and menotonous task that is stitching.

Start Date: **Sep-22** **Finish Date:** **Dec-23**

COST OF PROJECT		GBP £			Local currency	
Exchange rate: = £1	£ 1.00					
Asset Type		Proposal	Budget	Variance	Proposal	Budget
Property						
Office Equipment						
Furniture & Fixtures						
Computer Equipment		(15,590)		(15,590)		(15,590)
Scientific Equipment		(41,000)		(41,000)		(41,000)
Lab Equipment						
Invesment						
Total Fixed Assets		(56,590)		(56,590)		
Working capital						
Associated cost expenditure						
Total Gross Cost		(56,590)		(56,590)		
Less: Proceeds of sale						
Grants receivable						
NET PROJECT COST		(56,590)		(56,590)		

PROJECT PROFITABILITY

Net present value	Discount rate	7.5%	673
Internal Rate of Return			8%
Payback pre Tax	Years		5.4
Discounted payback	Years		11
Profitability Index			1.01

Requestor	James Scorgie	Date:	13-Sep-22
Departmental Director	Gary Aillud	Date:	TBC
Finance Director	Paul Johnson	Date:	TBC
Managing Director	Paul Cornick	Date:	TBC

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CASH FLOW SUMMARY

COMPANY:	Petrostrat (MADE)	0		
Department	12. MADE Course	0	Local currency:	GBP

Cash Flow

FINANCIAL YEAR

	Current Year	CY +1	CY +2	CY +3	CY +4	CY +5	CY +6	CY +7	CY +8	CY +9	CY +10	Total
Operating profit		10,556	10,556	10,556	10,556	10,556	10,556	10,556	10,556	10,556	10,556	**105,556**
Depreciation												
Capital expenditure	(56,590)											**(56,590)**
Working capital												
Other												
Taxation		(2,006)	(2,639)	(2,639)	(2,639)	(2,639)	(2,639)	(2,639)	(2,639)	1,000	(2,639)	**(22,117)**
Terminal value											1,000	**1,000**
NET CASH FLOW	(56,590)	8,550	7,917	7,917	7,917	7,917	7,917	7,917	7,917	11,556	8,917	**27,849**
Cumulative cash flow	**(56,590)**	**(48,040)**	**(40,123)**	**(32,207)**	**(24,290)**	**(16,373)**	**(8,457)**	**(540)**	**7,377**	**18,932**	**27,849**	
Pre Tax Payback	**(56,590)**	**(46,034)**	**(35,479)**	**(24,923)**	**(14,368)**	**(3,812)**	**6,743**	**17,299**	**27,854**	**38,410**		

Discount rate at 7.5%

NPV	**673**										
IRR	**8%**										
Discounted Payback	**(52,642)**	**(45,243)**	**(38,871)**	**(32,943)**	**(27,428)**	**(22,299)**	**(17,527)**	**(13,088)**	**(8,959)**	**(3,352)**	**673**

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PROFIT SUMMARY

Page 3

COMPANY:	Petrostrat (MA	0		
Department	12. MADE Cou	0	Local currency:	GBP

P&L

			FINANCIAL YEAR											
			CY	CY +1	CY +2	CY +3	CY +4	CY +5	CY +6	CY +7	CY +8	CY +9	CY +10	**Total**
Sales														
Operating profit (before depn)				10,556	10,556	10,556	10,556	10,556	10,556	10,556	10,556	10,556	10,556	**105,556**
Depreciation														
Total P&L	**Until 2023**	**Post 2023**		**10,556**	**10,556**	**10,556**	**10,556**	**10,556**	**10,556**	**10,556**	**10,556**	**10,556**	**10,556**	**105,556**
Tax	19%	25%		(2,006)	(2,639)	(2,639)	(2,639)	(2,639)	(2,639)	(2,639)	(2,639)	1,000	(2,639)	**(22,117)**
Profit after tax				**8,550**	**7,917**	**7,917**	**7,917**	**7,917**	**7,917**	**7,917**	**7,917**	**11,556**	**7,917**	**83,439**

7.5%

Cost Saving Summary

Stitching cost per slide current

	x2-5 Stitch	x4 Stitch	X5 Stitch	x10 Stitch
Scientific time/hr	**0.3**	**0.7**	**0.8**	**1.8**
Scientist cost	£33.33	£33.33	£33.33	£33.33
Total cost	**£11.11**	**£22.22**	**£27.78**	**£61.11**
Charge to client	£35.00	£55.00	£55.00	£90.00
Profit in house project	£23.89	£32.78	£27.22	£28.89

Stitiching cost after purchase of POL Scanner

	x2-5 Stitch	x4 Stitch	X5 Stitch	X10 Stitch
Scientific time/hr	**0.4**	**0.4**	**0.4**	**0.4**
Scientist cost	£33.33	£33.33	£33.33	£33.33
Total cost	**£11.67**	**£11.67**	**£11.67**	**£11.67**
Cost Saving per slide	**-£0.56**	**£10.56**	**£16.11**	**£49.44**

Scientific Staff Cost

Department	Average Per Dept £ per Day	Hourly Rate Average Per Dept £ per Hour
Micropaleontology	250	33.33
	250	33.33
	250	33.33
	250	33.33
	250	33.33
Nannopaleontology	250	33.33
	250	33.33
	250	33.33
	250	33.33
Palynology	250	33.33
	250	33.33
	250	33.33
	250	33.33
Reservoir Geology	250	33.33
	250	33.33
	250	33.33
	250	33.33
Laboratory	150	20.95
	150	20.95
	150	20.95
	150	20.95
	150	20.95

x2-5 Stitching	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Slides per Year	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Cost Saving per Slide	-£0.56	-£0.56	-£0.56	-£0.56	-£0.56	-£0.56	-£0.56	-£0.56	-£0.56	-£0.56
Cost Saving	**-£556**	**-£556**	**-£556**	**-£556**	**-£556**	**-£556**	**-£556**	**-£556**	**-£556**	**-£556**

x4 Stitching	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Slides per Year	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Cost Saving per Slide	£10.56	£10.56	£10.56	£10.56	£10.56	£10.56	£10.56	£10.56	£10.56	£10.56
Cost Saving	**£10,556**	**£10,556**	**£10,556**	**£10,556**	**£10,556**	**£10,556**	**£10,556**	**£10,556**	**£10,556**	**£10,556**

x5 Stitching	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Slides per Year	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Cost Saving per Slide	£16.11	£16.11	£16.11	£16.11	£16.11	£16.11	£16.11	£16.11	£16.11	£16.11
Cost Saving	**£16,111**	**£16,111**	**£16,111**	**£16,111**	**£16,111**	**£16,111**	**£16,111**	**£16,111**	**£16,111**	**£16,111**

x10 Stitching	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Slides per Year	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Cost Saving per Slide	£49.44	£49.44	£49.44	£49.44	£49.44	£49.44	£49.44	£49.44	£49.44	£49.44
Cost Saving	**£49,444**	**£49,444**	**£49,444**	**£49,444**	**£49,444**	**£49,444**	**£49,444**	**£49,444**	**£49,444**	**£49,444**

Current Stitching Time Summary

Current Stitching Methodology and Costings

Stitch Mag	Capture Time Required (~average mins)	Processing (~ mins)	Total (mins)	Total Hours	Cost Per Sample (dayrate)	1000 Sample Cost (Dayrate)	Profit Per Sample
x2-5	15	5	20	0.33	£11.11	£11,111.11	£18.89
x4	30	10	40	0.67	£22.22	£22,222.22	£32.78
x5	35	15	50	0.83	£27.78	£27,777.78	£27.22
x10	90	20	110	1.83	£61.11	£61,111.11	£28.89

Internal Costs	
Day rate	£250
Hourly Equivlalant	£33.33
Actual hourly	£33

Charging Rate Per Sample		
Magnification	Rate	Samples Analysed
X2-5	£30	1000
x4	£55	
x5	£55	
x10	£90	

Objective Imaging Scanner							
Stitch Mag Equivalent	Capture Time Required (mins)	Processing (~ mins)	Total (mins)	Total Hours	Cost Per Sample (dayrate)	1000 Samples (Dayrate)	Profit Per Sample
x2-5 (x25) (Two Samples)	16	5	21	0.35	£11.67	£11,666.67	£18.33
x4 (x40)	16	5	21	0.35	£11.67	£11,666.67	£43.33
x5 (x50)	16	5	21	0.35	£11.67	£11,666.67	£43.33
x4 (5 Z-Stack)	80	15	95	1.58	£52.78	£52,777.78	?

Appendix Table 3

Scenario 2 - Purchase with average historic sales used for future modelling & scientist operator

Page 1 – Capital Proposal Summary

Page 2 – Cash Flow Summary

Page 3 – Profit Summary

Page 4 – Cost Saving Summary

Page 5 – Stitching Time Calculations

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CAPEX FORM

COMPANY:	**Petrostrat (MADE)**	**CAPEX Number**	**MADE**	**Date:**	**13-Sep-22**
Department	**12. MADE Course**				

PROJECT: Thin Section Image Scanner Purchase **Project Type** **Cost Saving**

Project Description :

Purchase of a Glissando POL 2 Slide scanner. This CAPEX form is calculated for X5 stitches.
The project will examine whether the cost-saving factor of automating a currently manual process will be worth the investment required.

Project Justification: **7.5%**

The machine will increase the output of stitched images and free staff members up from a currently tedicous and menotonous task that is stitching.

Start Date: **Sep-22** **Finish Date:** **Dec-23**

COST OF PROJECT			GBP £			Local currency	
Exchange rate:	= £1	£ 1.00					
Asset Type			Proposal	Budget	Variance	Proposal	Budget
Property							
Office Equipment							
Furniture & Fixtures							
Computer Equipment			(15,590)		(15,590)		(15,590)
Scientific Equipment			(41,000)		(41,000)		(41,000)
Lab Equipment							
Invesment							
Total Fixed Assets			(56,590)		(56,590)		
Working capital							
Associated cost expenditure							
Total Gross Cost			(56,590)		(56,590)		
Less: Proceeds of sale							
Grants receivable							
NET PROJECT COST			(56,590)		(56,590)		

PROJECT PROFITABILITY

Net present value	Discount rate	7.5%	3,763
Internal Rate of Return			9%
Payback pre Tax	Years		5.1
Discounted payback	Years		11
Profibility Index			1.07

Requestor	James Scorgie	Date:	13-Sep-22
Departmental Director	Gary Aillud	Date:	TBC
Finance Director	Paul Johnson	Date:	TBC
Managing Director	Paul Cornick	Date:	TBC

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CASH FLOW SUMMARY

COMPANY:	Petrostrat (MADE)	0		
Department	12. MADE Course	0	Local currency:	GBP

Cash Flow

FINANCIAL YEAR

	Current Year	CY +1	CY +2	CY +3	CY +4	CY +5	CY +6	CY +7	CY +8	CY +9	CY +10	**Total**
Operating profit		11,178	11,178	11,178	11,178	11,178	11,178	11,178	11,178	11,178	11,178	**111,783**
Depreciation												
Capital expenditure	(56,590)											**(56,590)**
Working capital												
Other												
Taxation		(2,124)	(2,795)	(2,795)	(2,795)	(2,795)	(2,795)	(2,795)	(2,795)	1,000	(2,795)	**(23,481)**
Terminal value											1,000	**1,000**
NET CASH FLOW	(56,590)	9,054	8,384	8,384	8,384	8,384	8,384	8,384	8,384	12,178	9,384	**32,713**
Cumulative cash flow	**(56,590)**	**(47,536)**	**(39,152)**	**(30,768)**	**(22,384)**	**(14,001)**	**(5,617)**	**2,767**	**11,151**	**23,329**	**32,713**	
Pre Tax Payback	**(56,590)**	**(45,412)**	**(34,233)**	**(23,055)**	**(11,877)**	**(698)**	**10,480**	**21,658**	**32,837**	**44,015**		

Discount rate at 7.5%

NPV	**3,763**										
IRR	**9%**										
Discounted Payback	**(52,642)**	**(44,807)**	**(38,058)**	**(31,780)**	**(25,941)**	**(20,508)**	**(15,455)**	**(10,754)**	**(6,381)**	**(472)**	**3,763**

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PROFIT SUMMARY

Page 3

COMPANY:	Petrostrat (MA	0		
Department	12. MADE Cou	0	Local currency:	GBP

P&L

			FINANCIAL YEAR											
			CY	CY +1	CY +2	CY +3	CY +4	CY +5	CY +6	CY +7	CY +8	CY +9	CY +10	**Total**
Sales														
Operating profit (before depn)				11,178	11,178	11,178	11,178	11,178	11,178	11,178	11,178	11,178	11,178	**111,783**
Depreciation														
Total P&L	**Until 2023**	**Post 2023**		**11,178**	**11,178**	**11,178**	**11,178**	**11,178**	**11,178**	**11,178**	**11,178**	**11,178**	**11,178**	**111,783**
Tax	19%	25%		(2,124)	(2,795)	(2,795)	(2,795)	(2,795)	(2,795)	(2,795)	(2,795)	1,000	(2,795)	**(23,481)**
Profit after tax				**9,054**	**8,384**	**8,384**	**8,384**	**8,384**	**8,384**	**8,384**	**8,384**	**12,178**	**8,384**	**88,303**

7.5%

Cost Saving Summary

Stitching cost per slide current

	x2-5 Stitch	x4 Stitch	X5 Stitch	x10 Stitch
Scientific time/hr	**0.3**	**0.7**	**0.8**	**1.8**
Scientist cost	£33.33	£33.33	£33.33	£33.33
Total cost	**£11.11**	**£22.22**	**£27.78**	**£61.11**
Charge to client	£35.00	£55.00	£55.00	£90.00
Profit in house project	£23.89	£32.78	£27.22	£28.89

Stitiching cost after purchase of POL Scanner

	x2-5 Stitch	x4 Stitch	X5 Stitch	X10 Stitch
Scientific time/hr	**0.4**	**0.4**	**0.4**	**0.4**
Scientist cost	£33.33	£33.33	£33.33	£33.33
Total cost	**£11.67**	**£11.67**	**£11.67**	**£11.67**
Cost Saving per slide	**-£0.56**	**£10.56**	**£16.11**	**£49.44**

Scientific Staff Cost	Department	Average Per Dept £ per Day	Hourly Rate Average Per Dept £ per Hour
	Micropaleontology	250	33.33
		250	33.33
		250	33.33
		250	33.33
		250	33.33
	Nannopaleontology	250	33.33
		250	33.33
		250	33.33
		250	33.33
	Palynology	250	33.33
		250	33.33
		250	33.33
		250	33.33
	Reservoir Geology	250	33.33
		250	33.33
		250	33.33
		250	33.33
	Laboratory	150	20.95
		150	20.95
		150	20.95
		150	20.95
		150	20.95

x2-5 Stitching	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Slides per Year	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059
Cost Saving per Slide	-£0.56	-£0.56	-£0.56	-£0.56	-£0.56	-£0.56	-£0.56	-£0.56	-£0.56	-£0.56
Cost Saving	**-£588**	**-£588**	**-£588**	**-£588**	**-£588**	**-£588**	**-£588**	**-£588**	**-£588**	**-£588**

x4 Stitching	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Slides per Year	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059
Cost Saving per Slide	£10.56	£10.56	£10.56	£10.56	£10.56	£10.56	£10.56	£10.56	£10.56	£10.56
Cost Saving	**£11,178**	**£11,178**	**£11,178**	**£11,178**	**£11,178**	**£11,178**	**£11,178**	**£11,178**	**£11,178**	**£11,178**

x5 Stitching	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Slides per Year	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059
Cost Saving per Slide	£16.11	£16.11	£16.11	£16.11	£16.11	£16.11	£16.11	£16.11	£16.11	£16.11
Cost Saving	**£17,062**	**£17,062**	**£17,062**	**£17,062**	**£17,062**	**£17,062**	**£17,062**	**£17,062**	**£17,062**	**£17,062**

x10 Stitching	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Slides per Year	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059
Cost Saving per Slide	£49.44	£49.44	£49.44	£49.44	£49.44	£49.44	£49.44	£49.44	£49.44	£49.44
Cost Saving	**£52,362**	**£52,362**	**£52,362**	**£52,362**	**£52,362**	**£52,362**	**£52,362**	**£52,362**	**£52,362**	**£52,362**

Current Stitching Time Summary

Current Stitching Methodology and Costings

Stitch Mag	Capture Time Required (~average mins)	Processing (~ mins)	Total (mins)	Total Hours	Cost Per Sample (dayrate)	1000 Sample Cost (Dayrate)	Profit Per Sample
x2-5	15	5	20	0.33	£11.11	£11,111.11	£18.89
x4	30	10	40	0.67	£22.22	£22,222.22	£32.78
x5	35	15	50	0.83	£27.78	£27,777.78	£27.22
x10	90	20	110	1.83	£61.11	£61,111.11	£28.89

Internal Costs	
Day rate	£250
Hourly Equivlalant	£33.33
Actual hourly	£33

Charging Rate Per Sample		
Magnification	Rate	Samples Analysed
X2-5	£30	1000
x4	£55	
x5	£55	
x10	£90	

Objective Imaging Scanner							
Stitch Mag Equivalent	Capture Time Required (mins)	Processing (~ mins)	Total (mins)	Total Hours	Cost Per Sample (dayrate)	1000 Samples (Dayrate)	Profit Per Sample
x2-5 (x25) (Two Samples)	16	5	21	0.35	£11.67	£11,666.67	£18.33
x4 (x40)	16	5	21	0.35	£11.67	£11,666.67	£43.33
x5 (x50)	16	5	21	0.35	£11.67	£11,666.67	£43.33
x4 (5 Z-Stack)	80	15	95	1.58	£52.78	£52,777.78	?

Appendix Table 2

Scenario 3 - Purchase with average historic sales used for future modelling & lab-tech operator

Page 1 – Capital Proposal Summary

Page 2 – Cash Flow Summary

Page 3 – Profit Summary

Page 4 – Cost Saving Summary

Page 5 – Stitching Time Calculations

petrostrat applied stratigraphy

CAPEX FORM

COMPANY:	**Petrostrat (MADE)**	**CAPEX Number**	**MADE**	**Date:**	**13-Sep-22**
Department	**12. MADE Course**				
PROJECT:	Thin Section Image Scanner Purchase	**Project Type**	**Cost Saving**		

Project Description :

Purchase of a Glissando POL 2 Slide scanner. This CAPEX form is calculated for X5 stitches.
The project will examine whether the cost-saving factor of automating a currently manual process will be worth the investment required.

Project Justification: **7.5%**

The machine will increase the output of stitched images and free staff members up from a currently tedicous and menotonous task that is stitching.

Start Date: **Sep-22** **Finish Date:** **Dec-23**

COST OF PROJECT			GBP £			Local currency	
Exchange rate:	= £1	£ 1.00					
Asset Type			Proposal	Budget	Variance	Proposal	Budget
Property							
Office Equipment							
Furniture & Fixtures							
Computer Equipment			(15,590)		(15,590)		(15,590)
Scientific Equipment			(41,000)		(41,000)		(41,000)
Lab Equipment							
Invesment							
Total Fixed Assets			(56,590)		(56,590)		
Working capital							
Associated cost expenditure							
Total Gross Cost			(56,590)		(56,590)		
Less: Proceeds of sale							
Grants receivable							
NET PROJECT COST			(56,590)		(56,590)		

PROJECT PROFITABILITY

Net present value	Discount rate	7.5%	26,538
Internal Rate of Return			17%
Payback pre Tax	Years		3.6
Discounted payback	Years		8
Profitibility Index			1.47

Requestor	James Scorgie	Date:	13-Sep-22
Departmental Director	Gary Aillud	Date:	TBC
Finance Director	Paul Johnson	Date:	TBC
Managing Director	Paul Cornick	Date:	TBC

CASH FLOW SUMMARY

COMPANY:	Petrostrat (MADE)	0		
Department	12. MADE Course	0	Local currency:	GBP

Cash Flow

FINANCIAL YEAR

	Current Year	CY +1	CY +2	CY +3	CY +4	CY +5	CY +6	CY +7	CY +8	CY +9	CY +10	**Total**
Operating profit		15,768	15,768	15,768	15,768	15,768	15,768	15,768	15,768	15,768	15,768	**157,682**
Depreciation												
Capital expenditure	(56,590)											**(56,590)**
Working capital												
Other												
Taxation		(2,996)	(3,942)	(3,942)	(3,942)	(3,942)	(3,942)	(3,942)	(3,942)	1,000	(3,942)	**(33,532)**
Terminal value											1,000	**1,000**
NET CASH FLOW	(56,590)	12,772	11,826	11,826	11,826	11,826	11,826	11,826	11,826	16,768	12,826	**68,560**
Cumulative cash flow	**(56,590)**	**(43,818)**	**(31,992)**	**(20,165)**	**(8,339)**	**3,487**	**15,313**	**27,139**	**38,965**	**55,733**	**68,560**	
Pre Tax Payback	**(56,590)**	**(40,822)**	**(25,054)**	**(9,285)**	**6,483**	**22,251**	**38,019**	**53,787**	**69,555**	**85,324**		

Discount rate at 7.5%

NPV	**26,538**										
IRR	**17%**										
Discounted Payback	**(52,642)**	**(41,590)**	**(32,070)**	**(23,215)**	**(14,977)**	**(7,314)**	**(186)**	**6,445**	**12,613**	**20,749**	**26,538**

[redacted]

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PROFIT SUMMARY

Page 3

COMPANY:	Petrostrat (MA	0	Local currency:	GBP
Department	12. MADE Cou	0		

P&L

			FINANCIAL YEAR											
			CY	CY +1	CY +2	CY +3	CY +4	CY +5	CY +6	CY +7	CY +8	CY +9	CY +10	**Total**
Sales														
Operating profit (before depn)				15,768	15,768	15,768	15,768	15,768	15,768	15,768	15,768	15,768	15,768	**157,682**
Depreciation														
Total P&L	**Until 2023**	**Post 2023**		**15,768**	**15,768**	**15,768**	**15,768**	**15,768**	**15,768**	**15,768**	**15,768**	**15,768**	**15,768**	**157,682**
Tax	19%	25%		(2,996)	(3,942)	(3,942)	(3,942)	(3,942)	(3,942)	(3,942)	(3,942)	1,000	(3,942)	**(33,532)**
Profit after tax				**12,772**	**11,826**	**11,826**	**11,826**	**11,826**	**11,826**	**11,826**	**11,826**	**16,768**	**11,826**	**124,150**

7.5%

Cost Saving Summary

Stitching cost per slide current

	x2-5 Stitch	x4 Stitch	X5 Stitch	x10 Stitch
Scientific time/hr	**0.3**	**0.7**	**0.8**	**1.8**
Scientist cost	£33.33	£33.33	£33.33	£33.33
Total cost	**£11.11**	**£22.22**	**£27.78**	**£61.11**
Charge to client	£35.00	£55.00	£55.00	£90.00
Profit in house project	£23.89	£32.78	£27.22	£28.89

Stitiching cost after purchase of POL Scanner

	x2-5 Stitch	x4 Stitch	X5 Stitch	X10 Stitch
Scientific time/hr	**0.4**	**0.4**	**0.4**	**0.4**
Scientist cost	£20.95	£20.95	£20.95	£20.95
Total cost	**£7.33**	**£7.33**	**£7.33**	**£7.33**
Cost Saving per slide	**£3.78**	**£14.89**	**£20.45**	**£53.78**

	Department	Average Per Dept £ per Day	Hourly Rate Average Per Dept £ per Hour
Scientific Staff Cost	Micropaleontology	250	33.33
		250	33.33
		250	33.33
		250	33.33
		250	33.33
	Nannopaleontology	250	33.33
		250	33.33
		250	33.33
		250	33.33
	Palynology	250	33.33
		250	33.33
		250	33.33
		250	33.33
	Reservoir Geology	250	33.33
		250	33.33
		250	33.33
		250	33.33
	Laboratory	150	20.95
		150	20.95
		150	20.95
		150	20.95
		150	20.95

x2-5 Stitching	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Slides per Year	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059
Cost Saving per Slide	£3.78	£3.78	£3.78	£3.78	£3.78	£3.78	£3.78	£3.78	£3.78	£3.78
Cost Saving	**£4,002**	**£4,002**	**£4,002**	**£4,002**	**£4,002**	**£4,002**	**£4,002**	**£4,002**	**£4,002**	**£4,002**

x4 Stitching	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Slides per Year	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059
Cost Saving per Slide	£14.89	£14.89	£14.89	£14.89	£14.89	£14.89	£14.89	£14.89	£14.89	£14.89
Cost Saving	**£15,768**	**£15,768**	**£15,768**	**£15,768**	**£15,768**	**£15,768**	**£15,768**	**£15,768**	**£15,768**	**£15,768**

x5 Stitching	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Slides per Year	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059
Cost Saving per Slide	£20.45	£20.45	£20.45	£20.45	£20.45	£20.45	£20.45	£20.45	£20.45	£20.45
Cost Saving	**£21,652**	**£21,652**	**£21,652**	**£21,652**	**£21,652**	**£21,652**	**£21,652**	**£21,652**	**£21,652**	**£21,652**

x10 Stitching	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Slides per Year	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059
Cost Saving per Slide	£53.78	£53.78	£53.78	£53.78	£53.78	£53.78	£53.78	£53.78	£53.78	£53.78
Cost Saving	**£56,952**	**£56,952**	**£56,952**	**£56,952**	**£56,952**	**£56,952**	**£56,952**	**£56,952**	**£56,952**	**£56,952**

Current Stitching Time Summary

Current Stitching Methodology and Costings

Stitch Mag	Capture Time Required (~average mins)	Processing (~ mins)	Total (mins)	Total Hours	Cost Per Sample (dayrate)	1000 Sample Cost (Dayrate)	Profit Per Sample
x2-5	15	5	20	0.33	£6.67	£6,666.67	£23.33
x4	30	10	40	0.67	£13.33	£13,333.33	£41.67
x5	35	15	50	0.83	£16.67	£16,666.67	£38.33
x10	90	20	110	1.83	£36.67	£36,666.67	£53.33

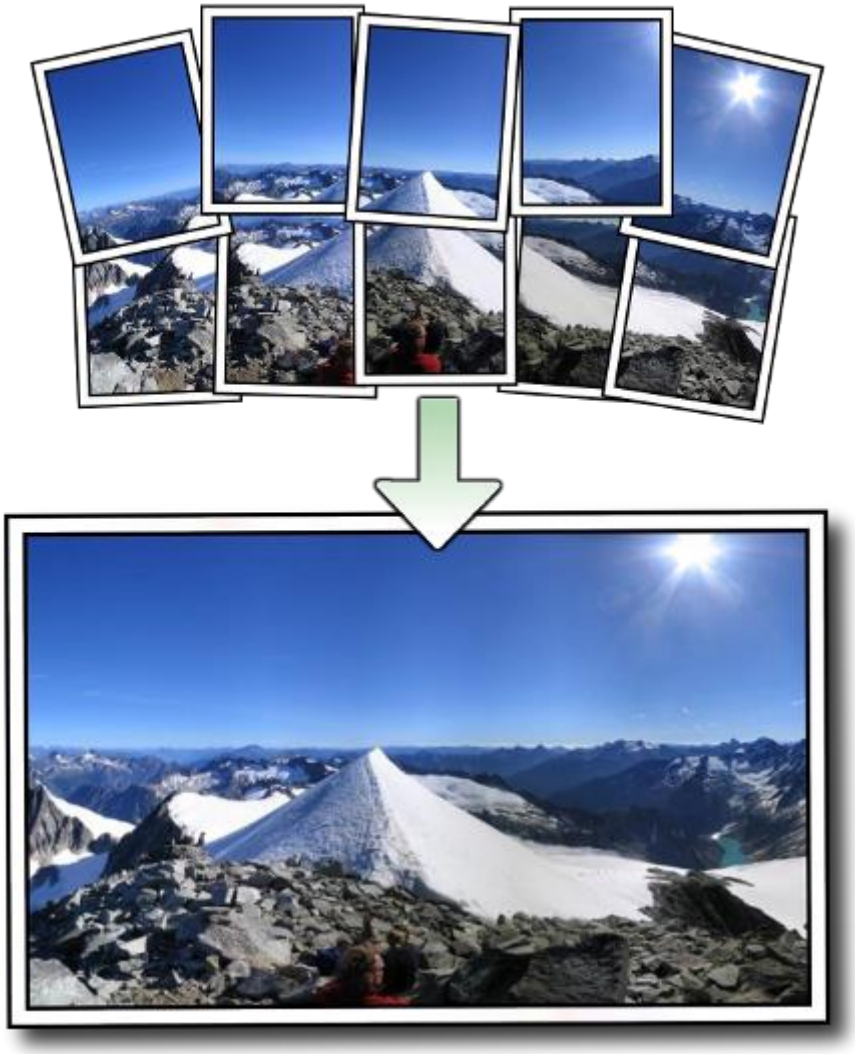
Internal Costs	
Day rate	£150
Hourly Equivlalant	£20.00
Actual hourly	£33

Charging Rate Per Sample

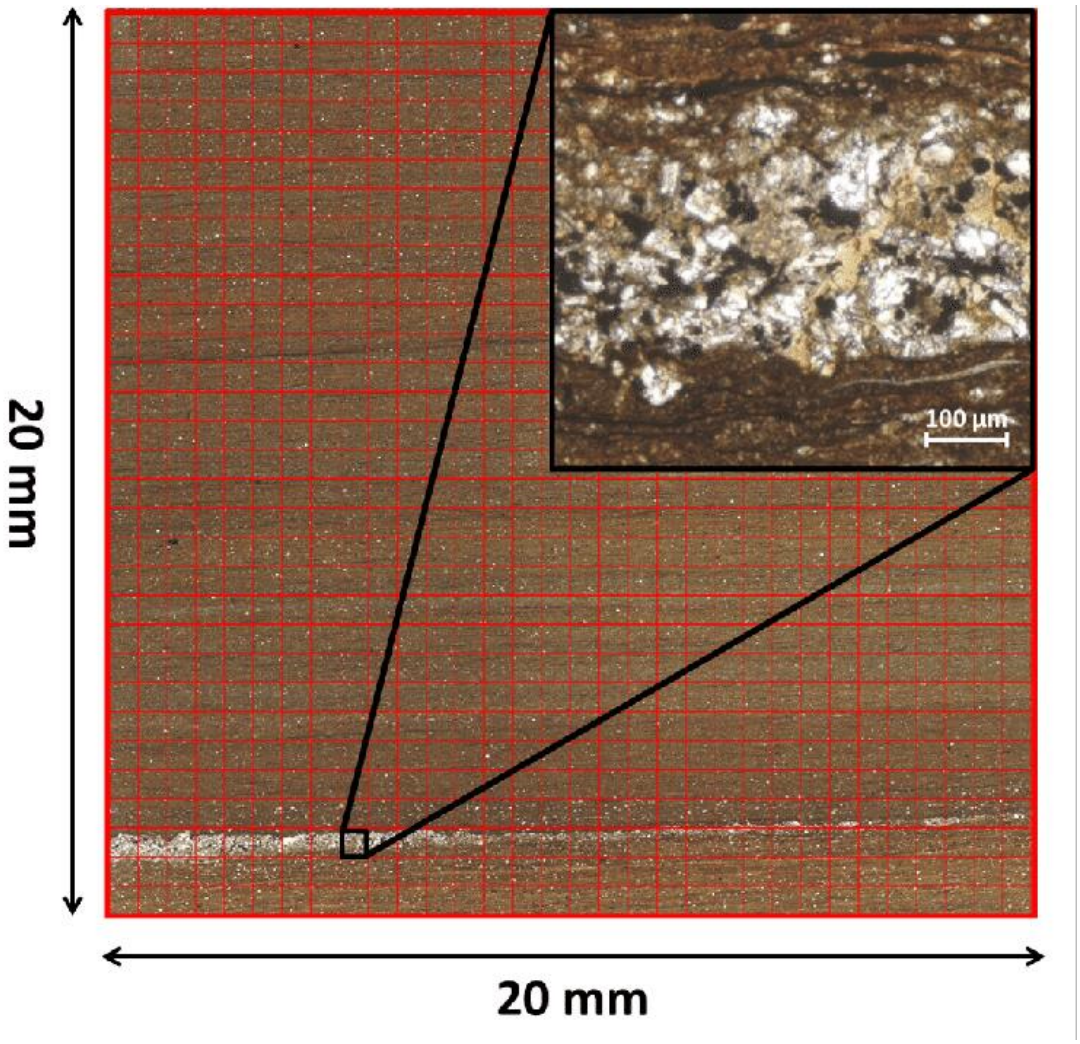
Magnification	Rate	Samples Analysed
X2-5	£30	1000
x4	£55	
x5	£55	
x10	£90	

Objective Imaging Scanner							
Stitch Mag Equivalent	**Capture Time Required (mins)**	**Processing (~ mins)**	**Total (mins)**	**Total Hours**	**Cost Per Sample (dayrate)**	**1000 Samples (Dayrate)**	**Profit Per Sample**
x2-5 (x25) (Two Samples)	16	5	21	0.35	£7.00	£7,000.00	£23.00
x4 (x40)	16	5	21	0.35	£7.00	£7,000.00	£48.00
x5 (x50)	16	5	21	0.35	£7.00	£7,000.00	£48.00
x4 (5 Z-Stack)	80	15	95	1.58	£31.67	£31,666.67	?

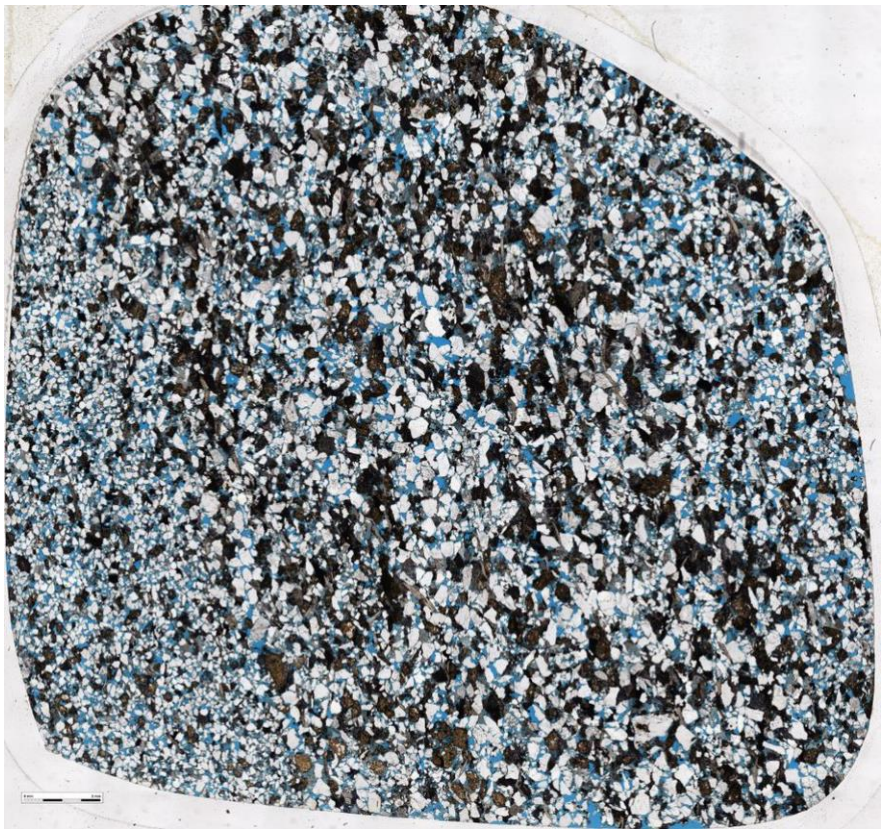
5.2 Figures



Appendix Figure 1 – An example of a stitched panorama of a mountain range (Source www.medium.com)



Appendix Figure 2 – An example of a stitched image mosaic created from the digital combination of multiple images across a sample (Source: Saif et al. 2017).



Appendix Figure 3 – An example of a recent stitch by the Reservoir Geology Department (using x5 objectives).

5.3 References

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