

CAPEX Business Report

POL Scanning Machine – Business Case

By

James Scorgie

Student Number: 2113853

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

Course Number: ACPA7002

A Business Case

Submitted to

The University of Wales Trinity Saint David

in partial fulfilment of the requirements

for the degree of

Master of International Innovation Management

02/10/2022

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 £56,590¹. 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
Profitability Index	1.01	1.07	1.47
BCR Rate	1.87	1.98	2.97
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), BCR Ratio (2.97) 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
Total Samples Prepped Per Year	1878	494	577	530	1026	1496	1261	1206
								Historic Average 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 acquisition 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

CAPEX FORM

Page 1

COMPANY: Petrostrat (MADE) Department 12. MADE Course		CAPEX Number MADE	Date: 13-Sep-22																																																									
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 tedious and menotonous task that is stitching.																																																												
Start Date: Sep-22		Finish Date: Dec-23																																																										
COST OF PROJECT Exchange rate: = £1 £ 1.00		GBP £																																																										
Asset Type Property Office Equipment Furniture & Fixtures Computer Equipment Scientific Equipment Lab Equipment Invesment Total Fixed Assets Working capital Associated cost expenditure Total Gross Cost Less: Proceeds of sale Grants receivable NET PROJECT COST		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Proposal</th> <th>Budget</th> <th>Variance</th> </tr> </thead> <tbody> <tr><td></td><td></td><td></td></tr> <tr><td>(15,590)</td><td></td><td>(15,590)</td></tr> <tr><td>(41,000)</td><td></td><td>(41,000)</td></tr> <tr><td>(56,590)</td><td></td><td>(56,590)</td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td>(56,590)</td><td></td><td>(56,590)</td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td>(56,590)</td><td></td><td>(56,590)</td></tr> </tbody> </table>	Proposal	Budget	Variance				(15,590)		(15,590)	(41,000)		(41,000)	(56,590)		(56,590)							(56,590)		(56,590)							(56,590)		(56,590)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Local currency</th> </tr> <tr> <th>Proposal</th> <th>Budget</th> </tr> </thead> <tbody> <tr><td></td><td></td></tr> <tr><td></td><td>(15,590)</td></tr> <tr><td></td><td>(41,000)</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </tbody> </table>	Local currency		Proposal	Budget				(15,590)		(41,000)														
Proposal	Budget	Variance																																																										
(15,590)		(15,590)																																																										
(41,000)		(41,000)																																																										
(56,590)		(56,590)																																																										
(56,590)		(56,590)																																																										
(56,590)		(56,590)																																																										
Local currency																																																												
Proposal	Budget																																																											
	(15,590)																																																											
	(41,000)																																																											
PROJECT PROFITABILITY																																																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Net present value</td> <td>Discount rate</td> <td>7.5%</td> <td>673</td> </tr> <tr> <td>Internal Rate of Return</td> <td></td> <td></td> <td>8%</td> </tr> <tr> <td>Payback pre Tax</td> <td>Years</td> <td></td> <td>5.4</td> </tr> <tr> <td>Discounted payback</td> <td>Years</td> <td></td> <td>11</td> </tr> <tr> <td>BCR</td> <td></td> <td></td> <td>1.87</td> </tr> <tr> <td>Profitability Index</td> <td></td> <td></td> <td>1.01</td> </tr> </table>		Net present value	Discount rate	7.5%	673	Internal Rate of Return			8%	Payback pre Tax	Years		5.4	Discounted payback	Years		11	BCR			1.87	Profitability Index			1.01																																			
Net present value	Discount rate	7.5%	673																																																									
Internal Rate of Return			8%																																																									
Payback pre Tax	Years		5.4																																																									
Discounted payback	Years		11																																																									
BCR			1.87																																																									
Profitability Index			1.01																																																									
Requestor James Scorgie Departmental Director Gary Aillud Finance Director Paul Johnson Managing Director Paul Cornick		Date: 13-Sep-22 Date: TBC Date: TBC Date: TBC																																																										



CASH FLOW SUMMARY

Page 2

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

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



IN CONFIDENCE LIMITED
CIRCULATION

Uncontrolled When Printed

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	10,556	10,556	10,556	10,556	10,556	10,556	10,556	10,556	10,556	10,556	105,556
Tax	19%	(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	25%	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

Page 4

Stitching cost per slide current

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

Stitching cost after purchase of POL Scanner

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

[illegible][illegible]

x4 Stitching

[illegible][illegible]

x5 Stitching

[illegible][illegible]

x10 Stitching

[illegible][illegible]



IN CONFIDENCE LIMITED
CIRCULTAION

Uncontrolled When Printed

Current Stitching Time Summary

Current Stitching Methodology and Costings								Charging Rate Per Sample		
Stitch Mag	Capture Time Required (~average mins)	Processing (~ mins)	Total (mins)	Total Hours	Cost Per Sample (dayrate)	1000 Sample Cost (Dayrate)	Profit Per Sample	Internal Costs		Magnification Rate Samples Analysed
x2-5	15	5	20	0.33	£11.11	£11,111.11	£18.89	Day rate	£250	X2-5 £30 1000
x4	30	10	40	0.67	£22.22	£22,222.22	£32.78	Hourly Equivalant	£33.33	x4 £55
x5	35	15	50	0.83	£27.78	£27,777.78	£27.22	Actual hourly £33		x5 £55
x10	90	20	110	1.83	£61.11	£61,111.11	£28.89			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

CAPEX FORM

Page 1

COMPANY: Petrostrat (MADE) Department 12. MADE Course		CAPEX Number MADE	Date: 13-Sep-22																																										
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 tedious and menotonous task that is stitching.																																													
Start Date: Sep-22		Finish Date: Dec-23																																											
COST OF PROJECT Exchange rate: = £1 £ 1.00		GBP £																																											
Asset Type Property Office Equipment Furniture & Fixtures Computer Equipment Scientific Equipment Lab Equipment Invesment Total Fixed Assets Working capital Associated cost expenditure Total Gross Cost Less: Proceeds of sale Grants receivable NET PROJECT COST		<table border="1"> <thead> <tr> <th>Proposal</th> <th>Budget</th> <th>Variance</th> </tr> </thead> <tbody> <tr> <td>(15,590)</td> <td></td> <td>(15,590)</td> </tr> <tr> <td>(41,000)</td> <td></td> <td>(41,000)</td> </tr> <tr> <td>(56,590)</td> <td></td> <td>(56,590)</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>(56,590)</td> <td></td> <td>(56,590)</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>(56,590)</td> <td></td> <td>(56,590)</td> </tr> </tbody> </table>	Proposal	Budget	Variance	(15,590)		(15,590)	(41,000)		(41,000)	(56,590)		(56,590)				(56,590)		(56,590)				(56,590)		(56,590)	<table border="1"> <thead> <tr> <th colspan="2">Local currency</th> </tr> <tr> <th>Proposal</th> <th>Budget</th> </tr> </thead> <tbody> <tr> <td></td> <td>(15,590)</td> </tr> <tr> <td></td> <td>(41,000)</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	Local currency		Proposal	Budget		(15,590)		(41,000)										
Proposal	Budget	Variance																																											
(15,590)		(15,590)																																											
(41,000)		(41,000)																																											
(56,590)		(56,590)																																											
(56,590)		(56,590)																																											
(56,590)		(56,590)																																											
Local currency																																													
Proposal	Budget																																												
	(15,590)																																												
	(41,000)																																												
PROJECT PROFITABILITY <table border="1"> <tr> <td>Net present value</td> <td>Discount rate</td> <td>7.5%</td> <td>3,763</td> </tr> <tr> <td>Internal Rate of Return</td> <td></td> <td></td> <td>9%</td> </tr> <tr> <td>Payback pre Tax</td> <td>Years</td> <td></td> <td>5.1</td> </tr> <tr> <td>Discounted payback</td> <td>Years</td> <td></td> <td>11</td> </tr> <tr> <td>BCR Rate</td> <td></td> <td></td> <td>1.98</td> </tr> <tr> <td>Profitability Index</td> <td></td> <td></td> <td>1.07</td> </tr> </table>				Net present value	Discount rate	7.5%	3,763	Internal Rate of Return			9%	Payback pre Tax	Years		5.1	Discounted payback	Years		11	BCR Rate			1.98	Profitability Index			1.07																		
Net present value	Discount rate	7.5%	3,763																																										
Internal Rate of Return			9%																																										
Payback pre Tax	Years		5.1																																										
Discounted payback	Years		11																																										
BCR Rate			1.98																																										
Profitability Index			1.07																																										
Requestor James Scorgie Departmental Director Gary Aillud Finance Director Paul Johnson Managing Director Paul Cornick		Date: 13-Sep-22 Date: TBC Date: TBC Date: TBC																																											



CASH FLOW SUMMARY

Page 2

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

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



IN CONFIDENCE LIMITED
CIRCULATION

Uncontrolled When Printed

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		11,178	11,178	11,178	11,178	11,178	11,178	11,178	11,178	11,178	11,178	111,783
Operating profit (before depn)												
Depreciation												
Total P&L	Until 2023	Post 2023										
Tax	19%	25%										
Profit after tax												

7.5%

Cost Saving Summary

Page 4

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

Stitching 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
------------------------------	---------------	---------------	---------------	---------------

		Hourly Rate	
Scientific Staff Cost	Average	Average	
	Department	Per Dept £ per Day	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	
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	

[illegible][illegible][illegible][illegible][illegible][illegible][illegible][illegible]



Current Stitching Time Summary

Current Stitching Methodology and Costings								Charging Rate Per Sample		
Stitch Mag	Capture Time Required (~average mins)	Processing (~ mins)	Total (mins)	Total Hours	Cost Per Sample (dayrate)	1000 Sample Cost (Dayrate)	Profit Per Sample	Internal Costs		Magnification Rate Samples Analysed
x2-5	15	5	20	0.33	£11.11	£11,111.11	£18.89	Day rate	£250	X2-5 £30 1000
x4	30	10	40	0.67	£22.22	£22,222.22	£32.78	Hourly Equivalant	£33.33	x4 £55
x5	35	15	50	0.83	£27.78	£27,777.78	£27.22	Actual hourly	£33	x5 £55
x10	90	20	110	1.83	£61.11	£61,111.11	£28.89			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 4

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

CAPEX FORM

Page 1

COMPANY: Petrostrat (MADE) Department 12. MADE Course		CAPEX Number MADE	Date: 13-Sep-22																																																									
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 tedious and monotonous task that is stitching.																																																												
Start Date: Sep-22		Finish Date: Dec-23																																																										
COST OF PROJECT Exchange rate: = £1 £ 1.00		GBP £																																																										
Asset Type Property Office Equipment Furniture & Fixtures Computer Equipment Scientific Equipment Lab Equipment Investment Total Fixed Assets Working capital Associated cost expenditure Total Gross Cost Less: Proceeds of sale Grants receivable NET PROJECT COST		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Proposal</th> <th>Budget</th> <th>Variance</th> </tr> </thead> <tbody> <tr><td></td><td></td><td></td></tr> <tr><td>(15,590)</td><td></td><td>(15,590)</td></tr> <tr><td>(41,000)</td><td></td><td>(41,000)</td></tr> <tr><td>(56,590)</td><td></td><td>(56,590)</td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td>(56,590)</td><td></td><td>(56,590)</td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td>(56,590)</td><td></td><td>(56,590)</td></tr> </tbody> </table>	Proposal	Budget	Variance				(15,590)		(15,590)	(41,000)		(41,000)	(56,590)		(56,590)							(56,590)		(56,590)							(56,590)		(56,590)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Local currency</th> </tr> <tr> <th>Proposal</th> <th>Budget</th> </tr> </thead> <tbody> <tr><td></td><td></td></tr> <tr><td></td><td>(15,590)</td></tr> <tr><td></td><td>(41,000)</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </tbody> </table>	Local currency		Proposal	Budget				(15,590)		(41,000)														
Proposal	Budget	Variance																																																										
(15,590)		(15,590)																																																										
(41,000)		(41,000)																																																										
(56,590)		(56,590)																																																										
(56,590)		(56,590)																																																										
(56,590)		(56,590)																																																										
Local currency																																																												
Proposal	Budget																																																											
	(15,590)																																																											
	(41,000)																																																											
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																																																										
BCR Rate		2.79																																																										
Profitability Index		1.47																																																										
Requestor Departmental Director Finance Director Managing Director		James Scorgie Gary Aillud Paul Johnson Paul Cornick																																																										
		Date: 13-Sep-22 Date: TBC Date: TBC Date: TBC																																																										



CASH FLOW SUMMARY

Page 2

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

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



IN CONFIDENCE LIMITED
CIRCULTAION

Uncontrolled When Printed

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		15,768	15,768	15,768	15,768	15,768	15,768	15,768	15,768	15,768	15,768	157,682
Operating profit (before depn)												
Depreciation												
Total P&L	Until 2023	Post 2023										
Tax	19%	25%										
Profit after tax												

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

Stitching 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
-----------------------	-------	--------	--------	--------

Scientific Staff Cost	Average		Hourly Rate
	Department	Per Dept £ per Day	Per Dept £ per Hour
	Micropaleontology	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	

[illegible][illegible][illegible][illegible]



Current Stitching Time Summary

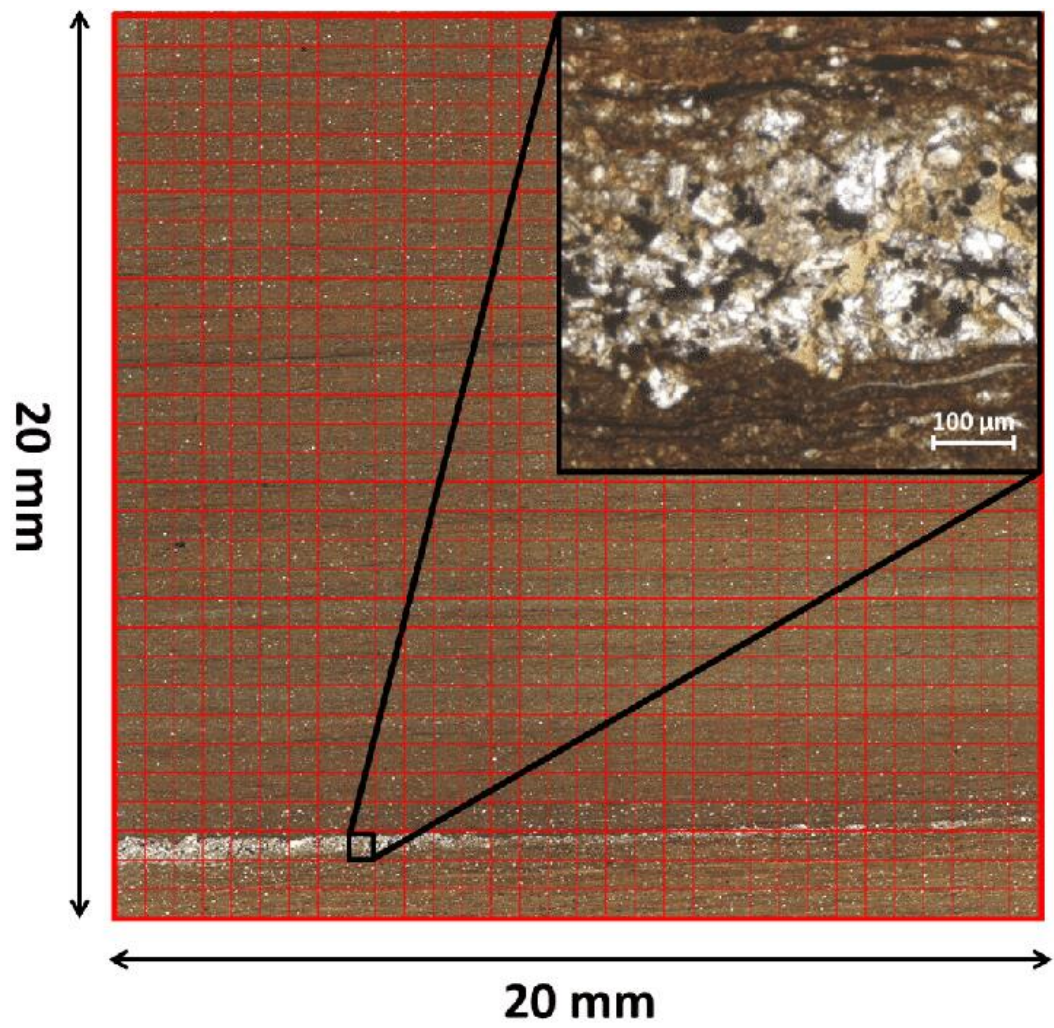
Current Stitching Methodology and Costings								Charging Rate Per Sample		
Stitch Mag	Capture Time Required (~average mins)	Processing (~ mins)	Total (mins)	Total Hours	Cost Per Sample (dayrate)	1000 Sample Cost (Dayrate)	Profit Per Sample	Internal Costs		Magnification Rate Samples Analysed
x2-5	15	5	20	0.33	£6.67	£6,666.67	£23.33	Day rate	£150	X2-5 £30 1000
x4	30	10	40	0.67	£13.33	£13,333.33	£41.67	Hourly Equivalant	£20.00	x4 £55
x5	35	15	50	0.83	£16.67	£16,666.67	£38.33	Actual hourly £33		x5 £55
x10	90	20	110	1.83	£36.67	£36,666.67	£53.33			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	?

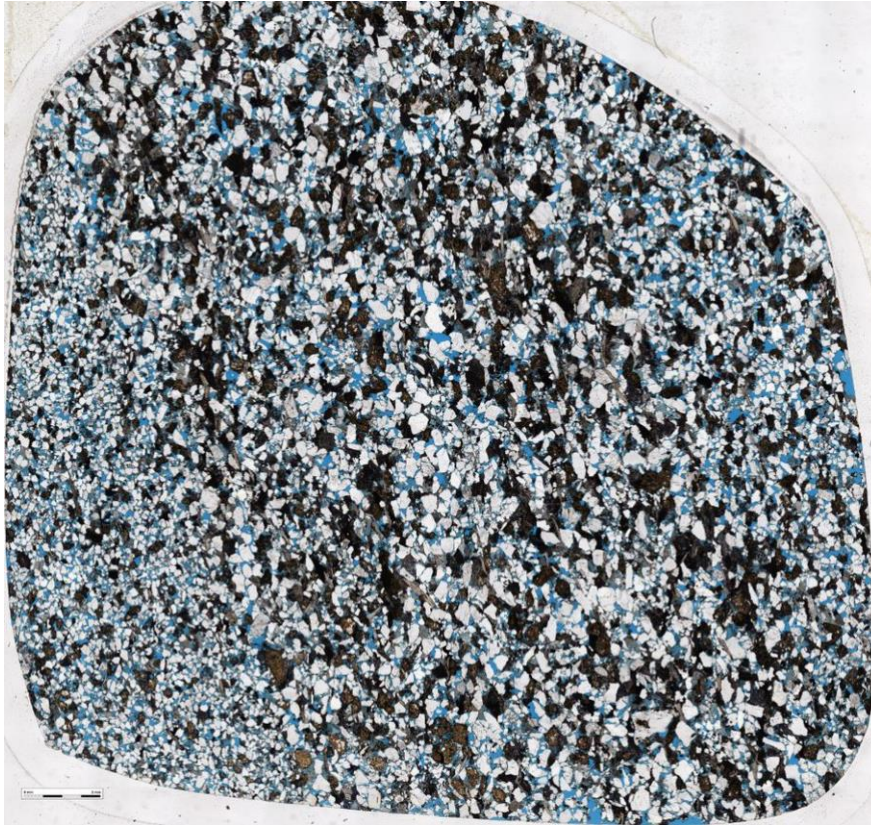
5.2 Figures



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

Ford, J, June 2022. New Ventures: Digital Platform Strategy plan. *A strategy presentation to the Board of Directors of Petrostrat. Internal.*

Hussain, M., Minhas, N.U.R., Saad, B. and Nair, A., 2017, March. Rock Texture Characterization from Automated Petrographic Analysis. In *SPE Middle East Oil & Gas Show and Conference. OnePetro.*

Saif, T., Lin, Q., Bijeljic, B. and Blunt, M.J., 2017. Microstructural imaging and characterization of oil shale before and after pyrolysis. *Fuel*, **197**, pp.562-574.

Zahid*, M.A., Chunmei, D., Golab, A.N., Knuefing, L., Lin, C., Munawar, M.J., Zhang, X. and Ma, C., 2017, May. Characterization of Petrographic and Petrophysical Properties from 3D Digital Rock Images: A Case Study on Beach-bar Sandstone of Boxing Sag, East China. In *International Geophysical Conference, Qingdao, China, 17-20 April 2017* (pp. 1206-1208). Society of Exploration Geophysicists and Chinese **Petroleum Society.**