

2018

Compressed air leak Survey



RPC (Market Rasen)

Company -	RPC (Market Rasen)
Address -	Gallamore Lane Market Rasen Lincolnshire LN8 3HZ
Contact -	Brian Carter

Bryan Elwick
ELTEC
30 July 2018

Compressed air leak survey

ELTEC were contracted to perform a compressed air leak survey.

The basis of the survey is as follows;

Run hours are based on the expected running hours for a calendar year plus an arbitrary 4 hours for each time the compressor is started before production starts and the continued losses after production has stopped.

The cost per Kw has been supplied by the site Manager; all costs are calculated in the local currency and include all extra charges but exclude tax.

Measurements are taken with in SDT Ultrasonic detection device specifically designed for this type of application. The survey consists of walking around each hall / bay listening for air leaks on each plant item. When identified, a reading is displayed on the instrument, that value is then recorded and a digital image taken for identification.

The value displayed on the instrument relates to liters of compressed air per hour as supplied by SDT, this is then converted into approximate kW to generate that same quantity of compressed air.

The table has been sorted in descending cost priority with a total at the end, the estimates are based on the same conditions at the time of the survey for a calendar year, and the conditions include cost of energy, run hours and the fact that all pressure systems will leak at the weakest point, meaning when leaks are repaired it is inevitable new ones will arise at different locations.

Leaks that only occur when a valve, actuator or cylinder is operated have been treated as an annual leak so it is shown in the appropriate position on the table otherwise there is a risk it would be considered inconsequential.

Some of the leaks cannot be positively identified due to access restrictions or multiple fittings, the use of leak detection fluids or aerosols enable confirmation of the leak location at the repair stage.

When a find and fix survey is undertaken the fixed items are shown along with the estimated savings in the same format before.

Trending information is provided with the summary report.

After the tables are the individual items, these are presented in a convenient work order format that can be issued, signed when complete and filed to satisfy parts of the management of energy sections of 14001 & 50001.

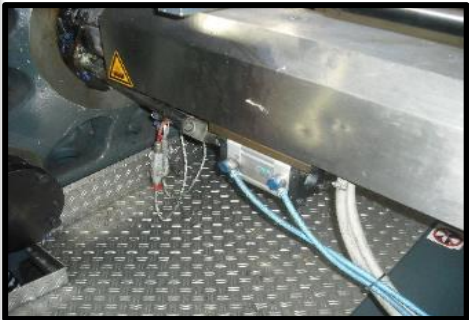
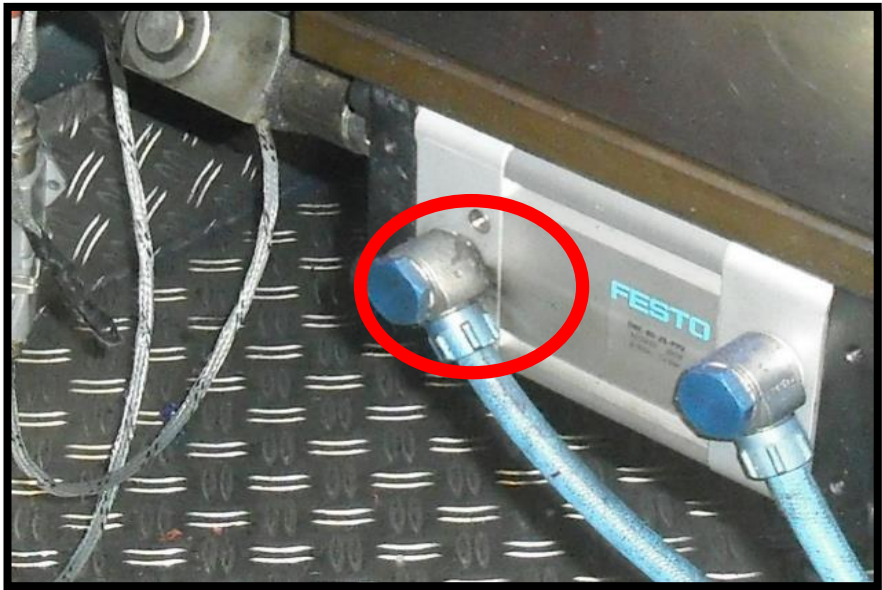


RPC - Market Rasen

Running hours	8,400	Per year
Cost per Kwhr	0.0700	Local currency
Estimated load	99.7	Kw
Estimated leakage	16.44	Kw
Leakage %	16.5%	%
Estimated losses	9,668	Local currency
Qty Leaks	36	Qty

No	Location	Equipment	Estimated m3	Estimated kW	Estimated Cost	Estimated Repair ROI (wks)
36	Print - PR4	Air blast	0.305	2.405	£1,414	9.2
13	SM 4 - loader	Air blast	0.171	1.353	£795	1.6
10	b3 - Loader	Inside??	0.128	1.014	£596	2.4
23	HC 5	Hose	0.128	1.014	£596	6.5
3	IM 9 - Print jig	Gauge	0.115	0.904	£532	2.2
29	HC 9 - Blender	Fitting	0.108	0.853	£502	5.2
1	IM 2	Fitting	0.086	0.678	£399	2.3
25	HC 6 Sorter	Gauge	0.077	0.604	£355	7.3
6	IM 11	Valve	0.068	0.538	£317	24.6
11	B5	Air blast	0.061	0.480	£282	23.0
12	SM 4 - loader	Fitting	0.061	0.480	£282	4.6
7	IM 13 - Robot	Inside??	0.054	0.428	£251	11.4
17	UB 4 - Blender	Regulator	0.054	0.428	£251	7.8
19	HC 1	Regulator	0.054	0.428	£251	62.0
34	UC 3 - labeller	Fitting	0.054	0.428	£251	31.0
21	HC 3	Fitting	0.051	0.404	£237	21.9
32	UC 7	Fitting	0.051	0.404	£237	10.9
18	UB 2	Valve	0.046	0.360	£212	6.1
16	UB 4	Valve	0.043	0.340	£200	6.5
4	IM 11	Valve	0.041	0.321	£189	26.2
14	SM 1	Vacuum generator	0.041	0.321	£189	6.9
9	B3	Bowl	0.036	0.286	£168	3.9
28	HC 9 - Blender	Fitting	0.036	0.286	£168	46.4
31	UC 10	Valve	0.036	0.286	£168	15.5
5	IM 11	Bungs	0.034	0.270	£159	32.8
27	HC 10	Bowl	0.034	0.270	£159	16.4
8	B 2	Drain	0.030	0.241	£141	13.8
35	UC 5	Regulator	0.029	0.227	£134	14.6
22	HC 5	Fitting	0.027	0.214	£126	12.4
20	HC 1	Bowl	0.023	0.180	£106	14.7
24	HC 5	Fitting	0.023	0.180	£106	49.0
26	HC 8 Sorter	Gauge	0.023	0.180	£106	24.5
15	UB 6	Bowl	0.022	0.170	£100	45.4
2	IM 6 Blender	Fitting	0.019	0.152	£89	32.1
30	UC 11	Fitting	0.013	0.101	£60	196.1
33	UC 3	Fitting	0.013	0.101	£60	87.2

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Record Number	1
Location	IM 2
Equipment	Fitting
Estimated air loss m3/min	0.086
Estimated Kw loss	0.678
Estimated annual Cost	£ 398.52
Estimated repair cost	£ 17.50

Surveyors Comments

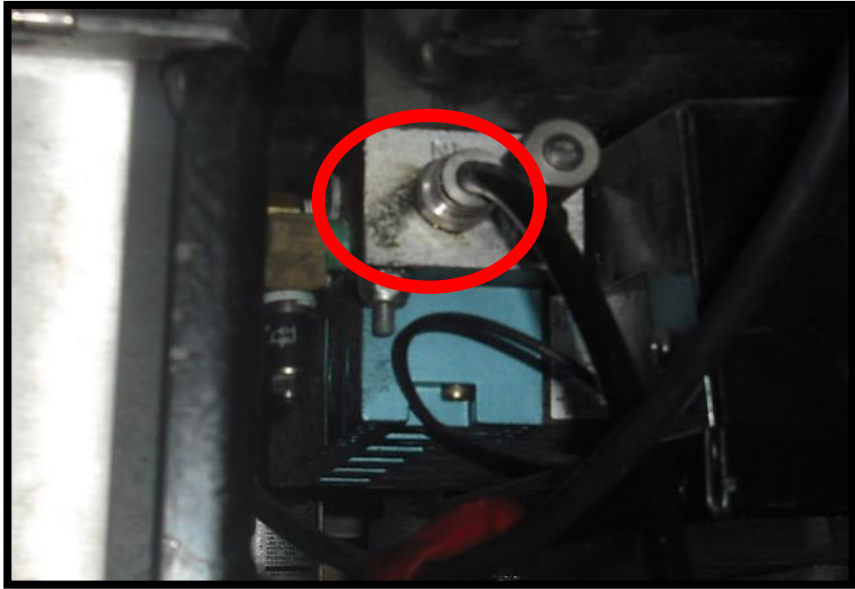
The fitting is leaking

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	2
Location	IM 6 Blender
Equipment	Fitting
Estimated air loss m3/min	0.019
Estimated Kw loss	0.152
Estimated annual Cost	£ 89.21
Estimated repair cost	£ 55.00

Surveyors Comments

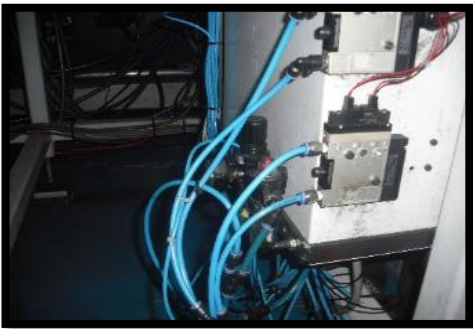
The fitting is leaking

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	3
Location	IM 9 - Print jig
Equipment	Gauge
Estimated air loss m3/min	0.115
Estimated Kw loss	0.904
Estimated annual Cost	£ 531.52
Estimated repair cost	£ 22.50

Surveyors Comments

The gauge is leaking

Completed by

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Comments

RPC - Market Rasen



Record Number	4	
Location	IM 11	
Equipment	Valve	
Estimated air loss m3/min	0.041	
Estimated Kw loss	0.321	
Estimated annual Cost	£	188.55
Estimated repair cost	£	95.00

Surveyors Comments

The exhaust is leaking continually

Completed by

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Comments

RPC - Market Rasen



Record Number	5	
Location	IM 11	
Equipment	Bungs	
Estimated air loss m3/min	0.034	
Estimated Kw loss	0.270	
Estimated annual Cost	£	158.68
Estimated repair cost	£	100.00

Surveyors Comments

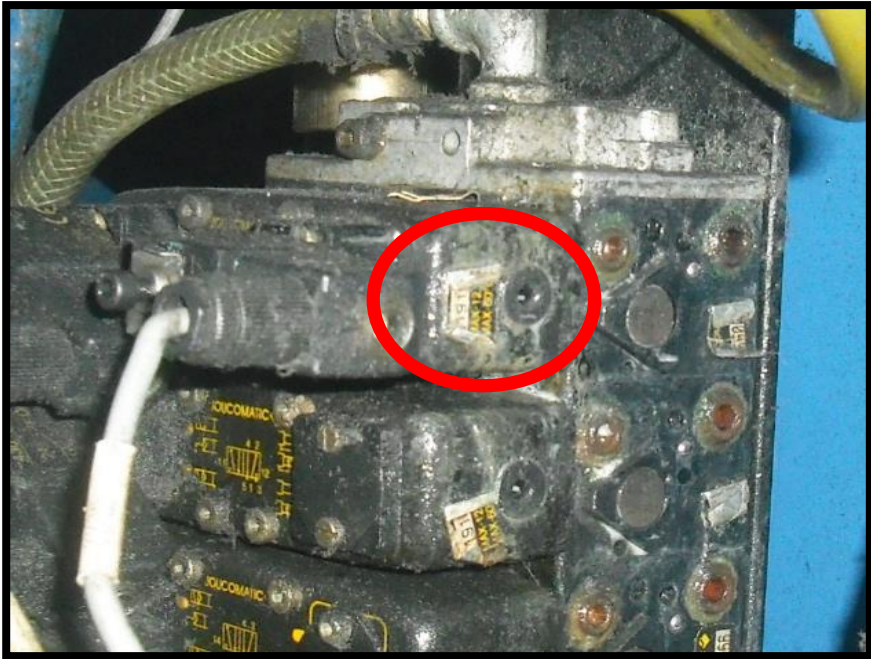
The bungs on the tool are leaking continually

Completed by

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Comments

RPC - Market Rasen



Record Number	6
Location	IM 11
Equipment	Valve
Estimated air loss m3/min	0.068
Estimated Kw loss	0.538
Estimated annual Cost	£ 316.59
Estimated repair cost	£ 150.00

Surveyors Comments

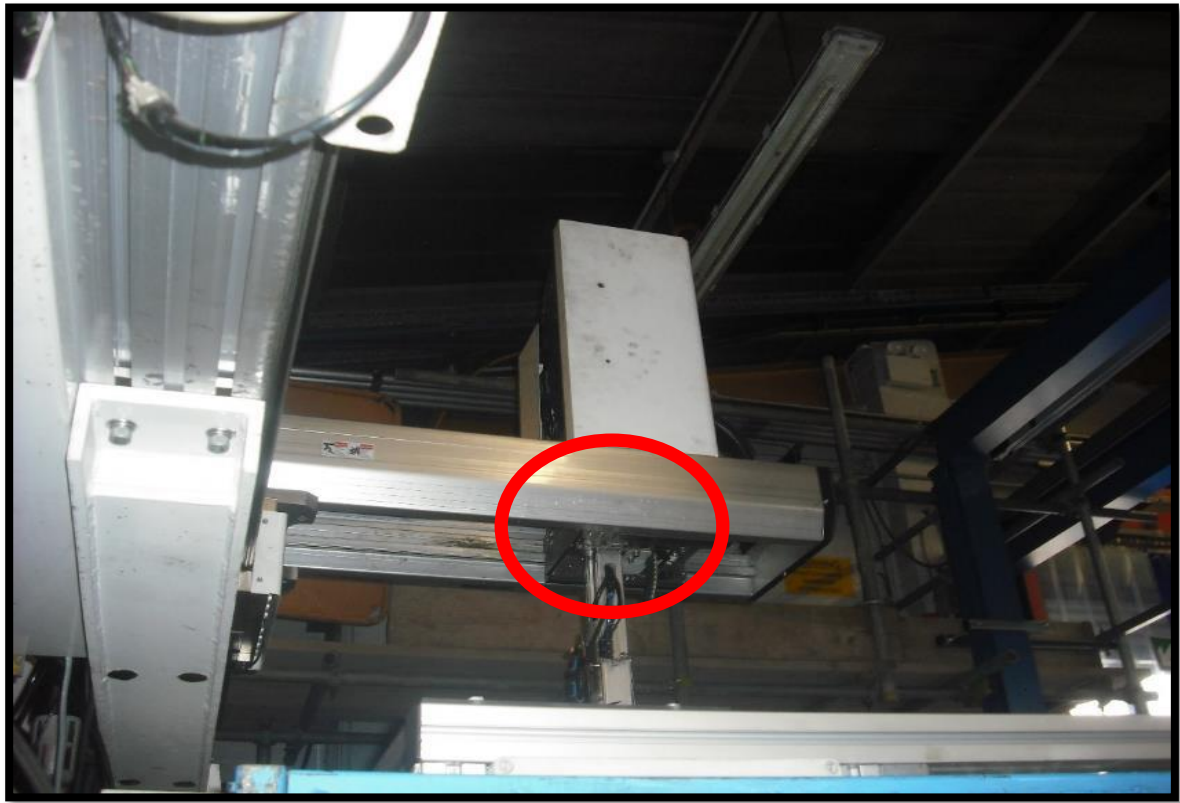
The valve base is leaking

Completed by

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Comments

RPC - Market Rasen



Record Number	7
Location	IM 13 - Robot
Equipment	Inside??
Estimated air loss m3/min	0.054
Estimated Kw loss	0.428
Estimated annual Cost	£ 251.45
Estimated repair cost	£ 55.00

Surveyors Comments

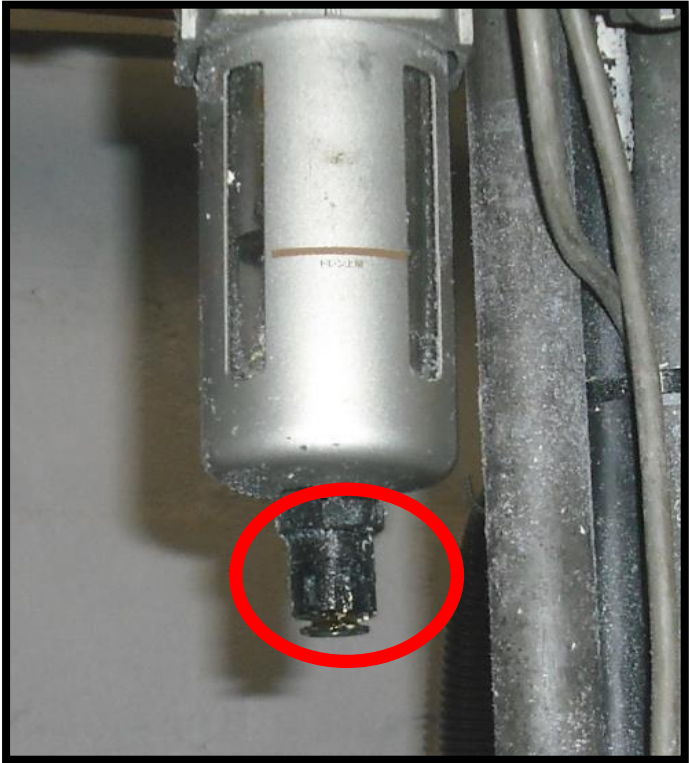
There is a leak inside the robot housing

Completed by

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Comments

RPC - Market Rasen



Record Number	8	
Location	B 2	
Equipment	Drain	
Estimated air loss m3/min	0.030	
Estimated Kw loss	0.241	
Estimated annual Cost	£	141.43
Estimated repair cost	£	37.50

Surveyors Comments

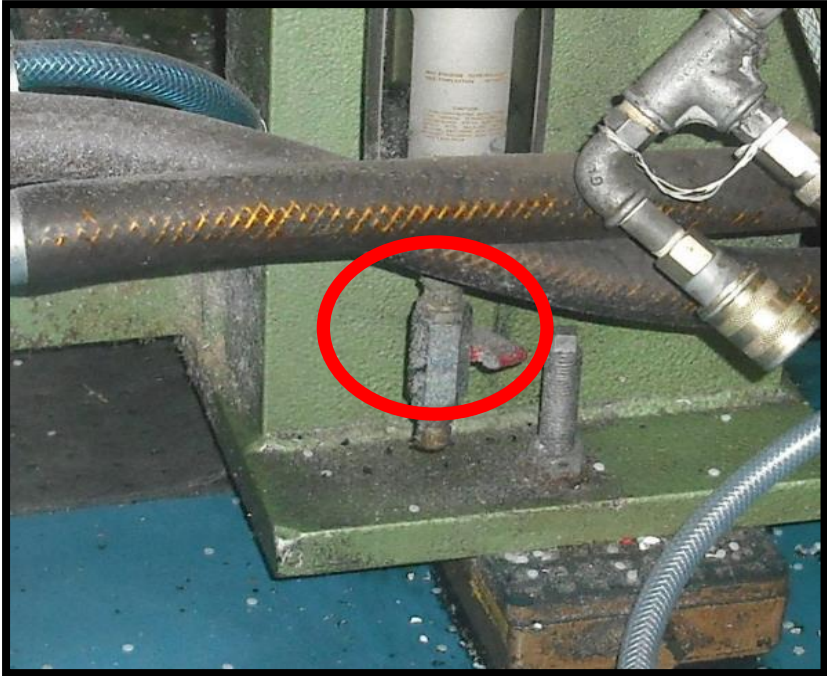
The fitting is leaking

Completed by

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Comments

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Record Number	9
Location	B3
Equipment	Bowl
Estimated air loss m3/min	0.036
Estimated Kw loss	0.286
Estimated annual Cost	£ 168.04
Estimated repair cost	£ 12.50

Surveyors Comments

The pipe is leaking

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	10
Location	b3 - Loader
Equipment	Inside??
Estimated air loss m3/min	0.128
Estimated Kw loss	1.014
Estimated annual Cost	£ 596.36
Estimated repair cost	£ 28.00

Surveyors Comments

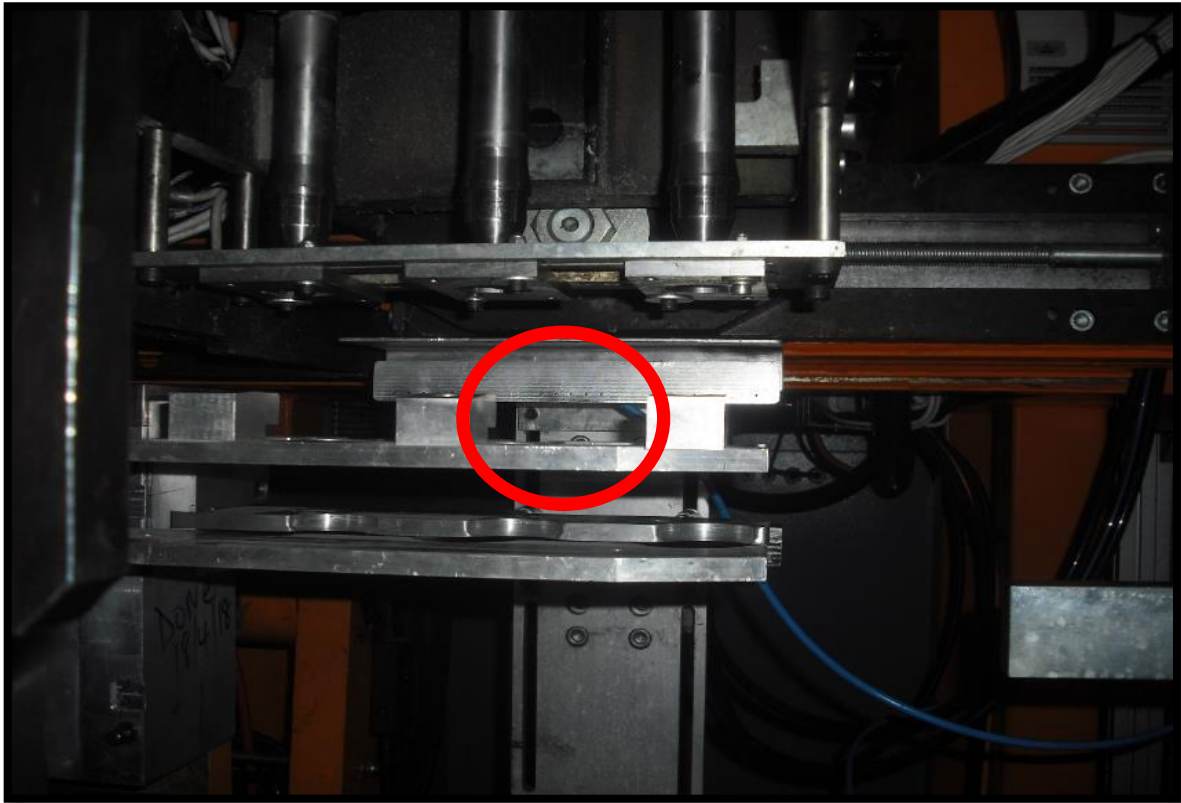
There is a leak from within the housing

Completed by

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Comments

RPC - Market Rasen



Record Number	11
Location	B5
Equipment	Air blast
Estimated air loss m3/min	0.061
Estimated Kw loss	0.480
Estimated annual Cost	£ 282.16
Estimated repair cost	£ 125.00

Surveyors Comments

The air blast is running continually even with the machine idle

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	12
Location	SM 4 - loader
Equipment	Fitting
Estimated air loss m3/min	0.061
Estimated Kw loss	0.480
Estimated annual Cost	£ 282.16
Estimated repair cost	£ 25.00

Surveyors Comments

The fitting is leaking

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Comments

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Record Number	13
Location	SM 4 - loader
Equipment	Air blast
Estimated air loss m3/min	0.171
Estimated Kw loss	1.353
Estimated annual Cost	£ 795.27
Estimated repair cost	£ 25.00

Surveyors Comments

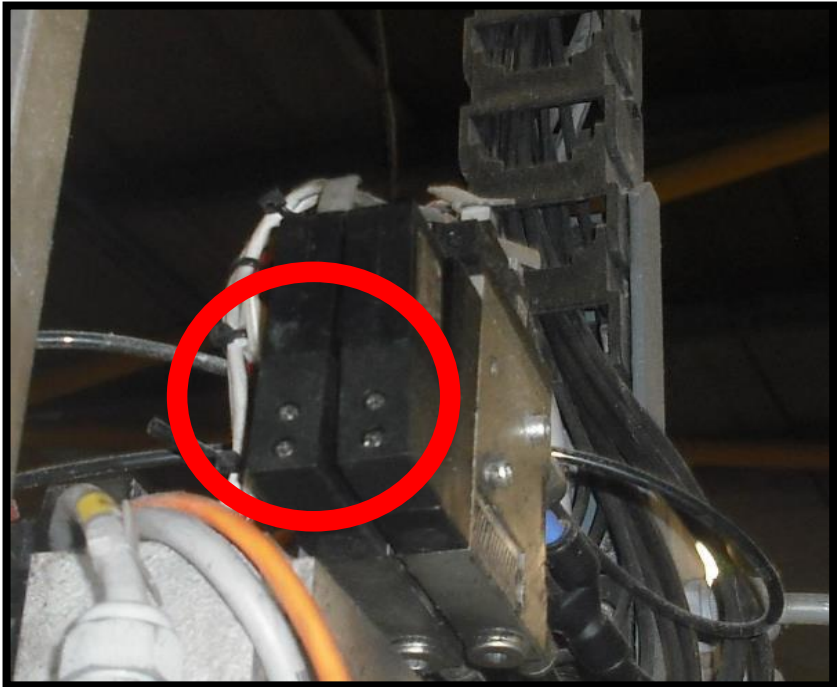
The method used for product movement could be modified

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	14
Location	SM 1
Equipment	Vacuum generator
Estimated air loss m3/min	0.041
Estimated Kw loss	0.321
Estimated annual Cost	£ 188.55
Estimated repair cost	£ 25.00

Surveyors Comments

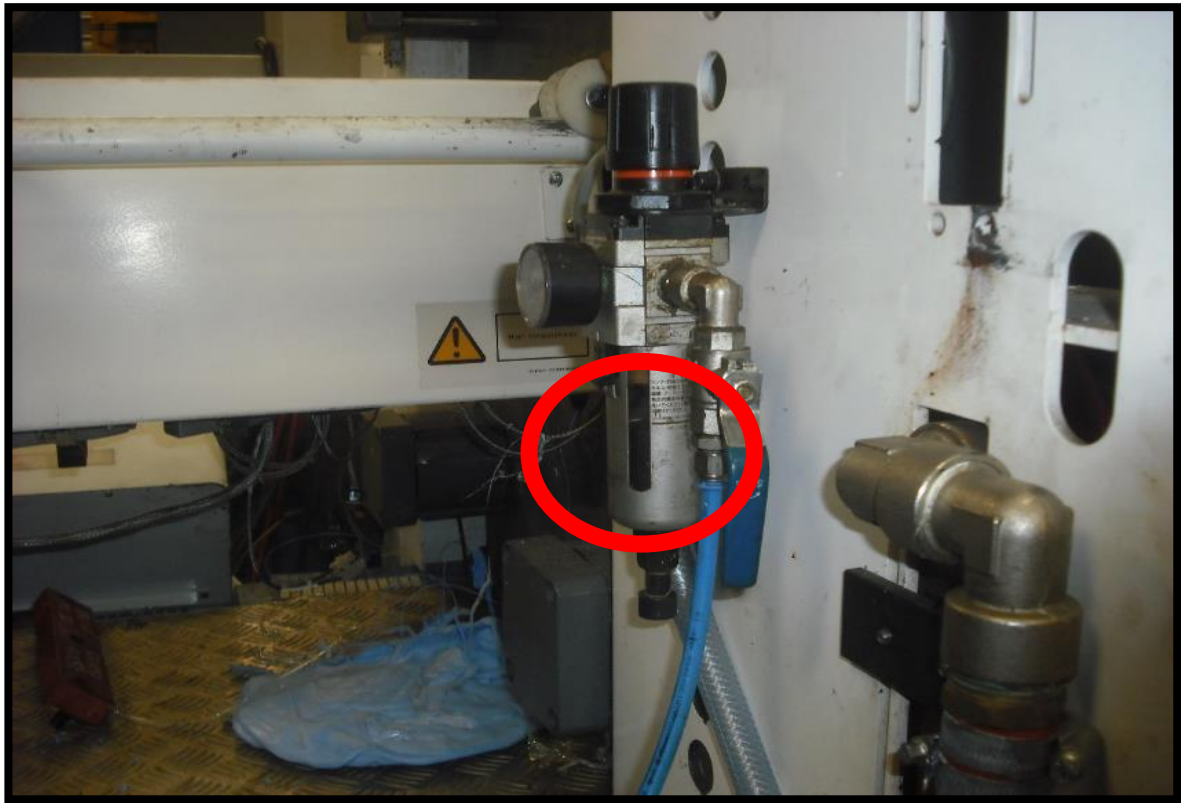
The vacuum is running with machine stopped

Completed by

Print name _____ Signature _____ Date _____

Comments

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Record Number	15
Location	UB 6
Equipment	Bowl
Estimated air loss m3/min	0.022
Estimated Kw loss	0.170
Estimated annual Cost	£ 100.11
Estimated repair cost	£ 87.50

Surveyors Comments

Bowl is leaking

Completed by

Print name _____ Signature _____ Date _____

Comments

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Record Number	16	
Location	UB 4	
Equipment	Valve	
Estimated air loss m3/min	0.043	
Estimated Kw loss	0.340	
Estimated annual Cost	£	199.77
Estimated repair cost	£	25.00

Surveyors Comments

The stem of the valve is leaking

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	17
Location	UB 4 - Blender
Equipment	Regulator
Estimated air loss m3/min	0.054
Estimated Kw loss	0.428
Estimated annual Cost	£ 251.45
Estimated repair cost	£ 37.50

Surveyors Comments

The regulator is leaking

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	18
Location	UB 2
Equipment	Valve
Estimated air loss m3/min	0.046
Estimated Kw loss	0.360
Estimated annual Cost	£ 211.60
Estimated repair cost	£ 25.00

Surveyors Comments

The fittings on this valve is leaking

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	19
Location	HC 1
Equipment	Regulator
Estimated air loss m3/min	0.054
Estimated Kw loss	0.428
Estimated annual Cost	£ 251.45
Estimated repair cost	£ 300.00

Surveyors Comments

The regulator is leaking

Completed by

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Comments

RPC - Market Rasen



Record Number	20
Location	HC 1
Equipment	Bowl
Estimated air loss m3/min	0.023
Estimated Kw loss	0.180
Estimated annual Cost	£ 106.07
Estimated repair cost	£ 30.00

Surveyors Comments

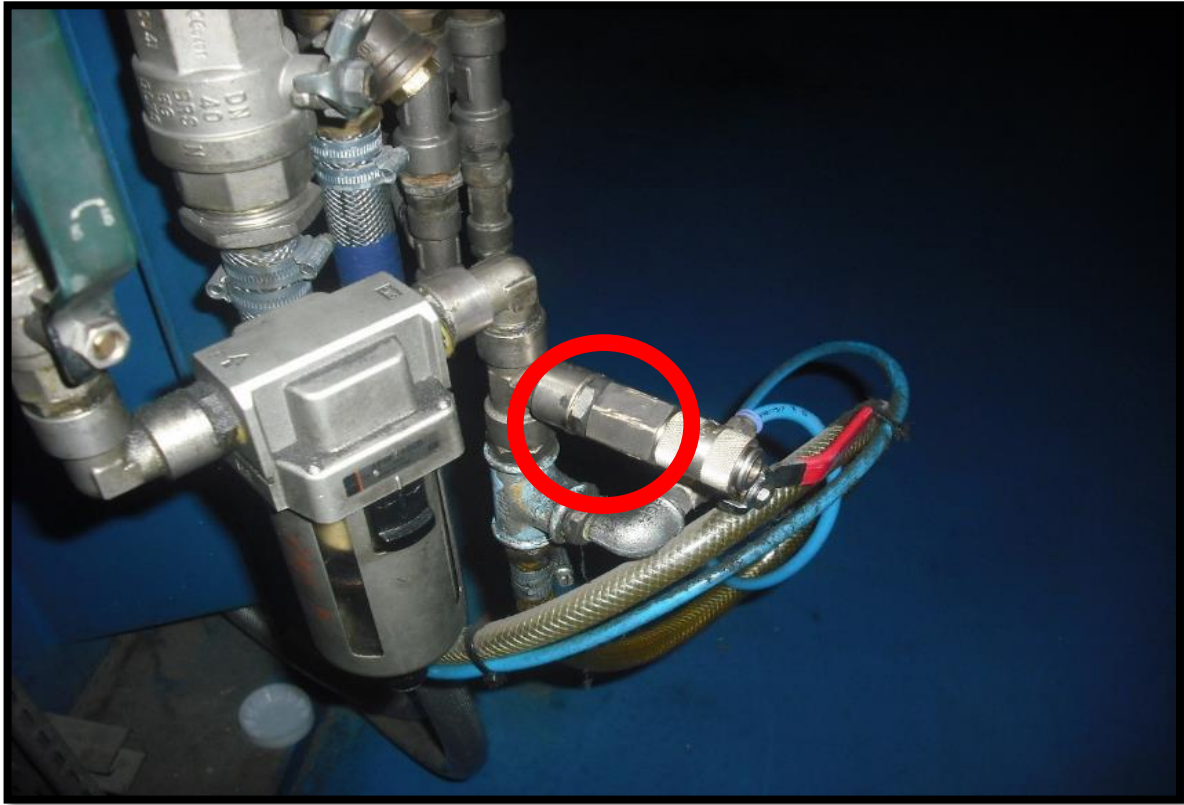
The bowl is leaking

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	21
Location	HC 3
Equipment	Fitting
Estimated air loss m3/min	0.051
Estimated Kw loss	0.404
Estimated annual Cost	£ 237.44
Estimated repair cost	£ 100.00

Surveyors Comments

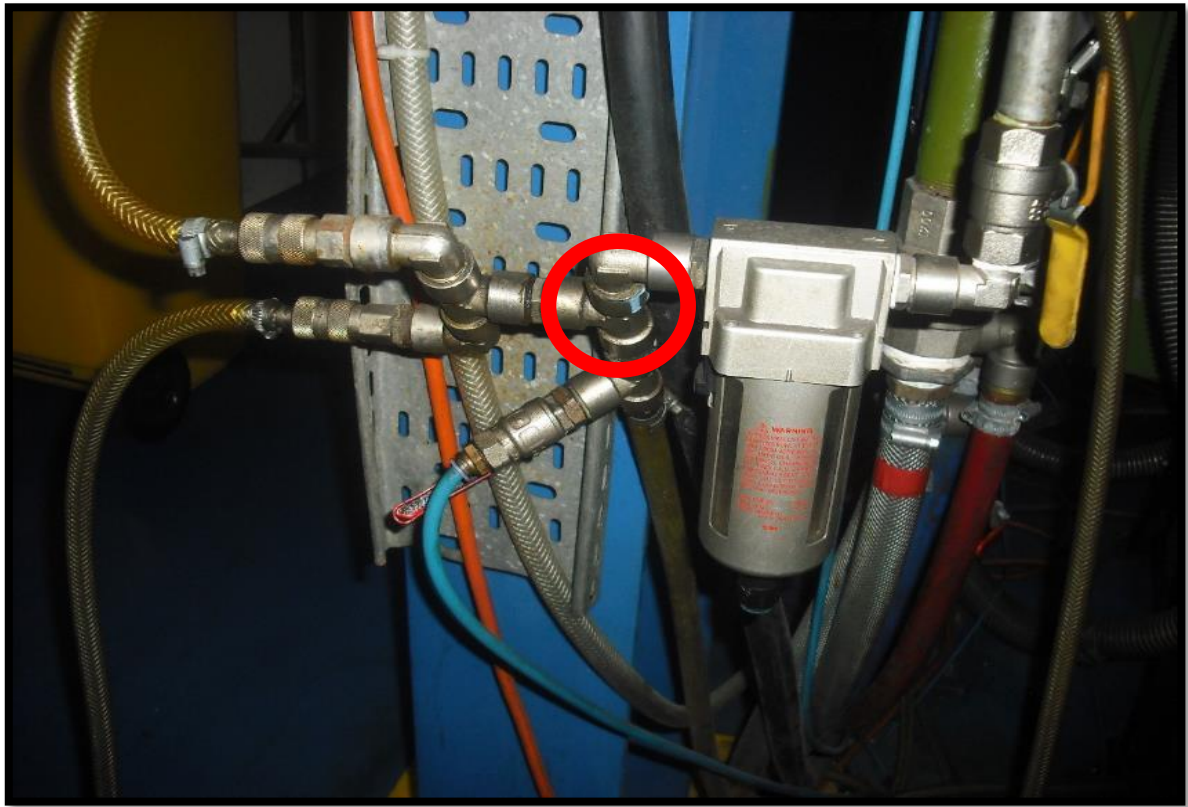
The fitting needs stripping back and re-taping

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	22
Location	HC 5
Equipment	Fitting
Estimated air loss m3/min	0.027
Estimated Kw loss	0.214
Estimated annual Cost	£ 126.03
Estimated repair cost	£ 30.00

Surveyors Comments

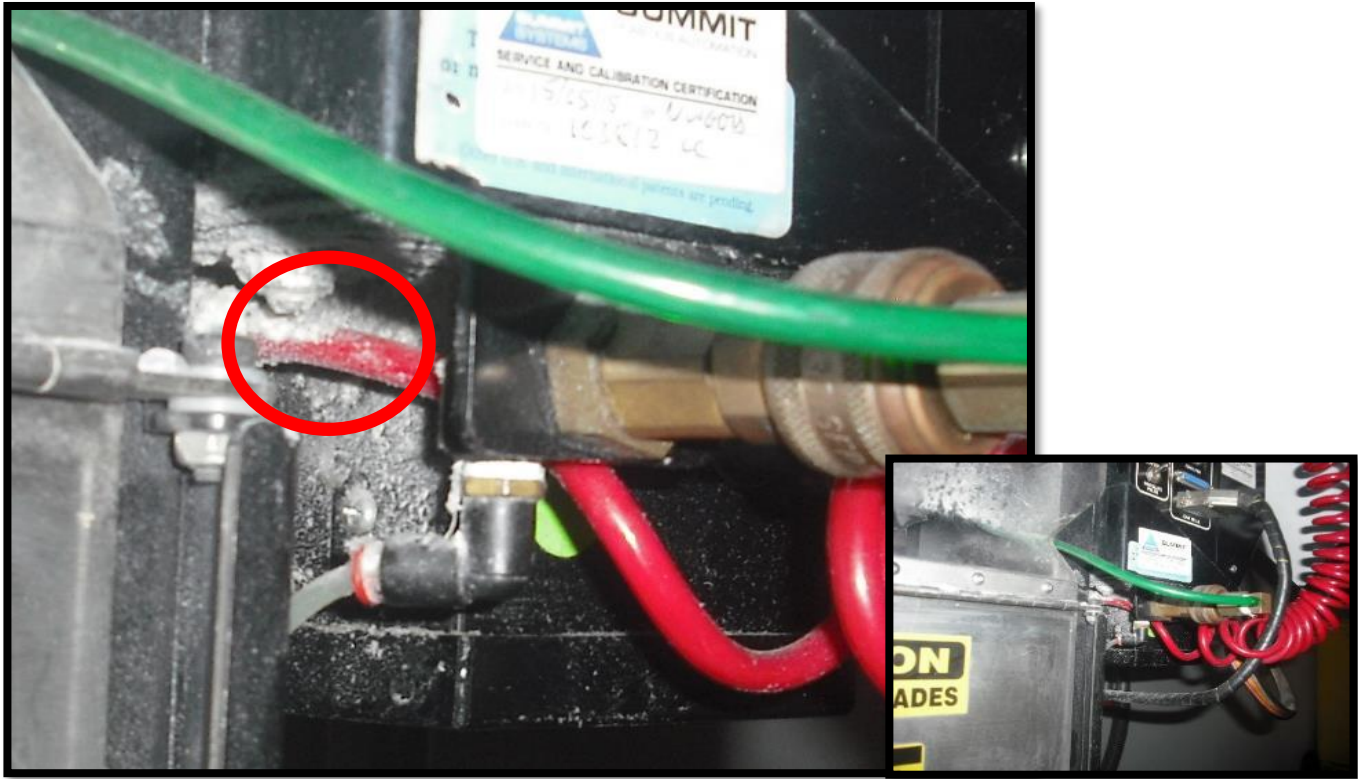
The fitting is leaking

Completed by

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Comments

RPC - Market Rasen



Record Number	23
Location	HC 5
Equipment	Hose
Estimated air loss m3/min	0.128
Estimated Kw loss	1.014
Estimated annual Cost	£ 596.36
Estimated repair cost	£ 75.00

Surveyors Comments

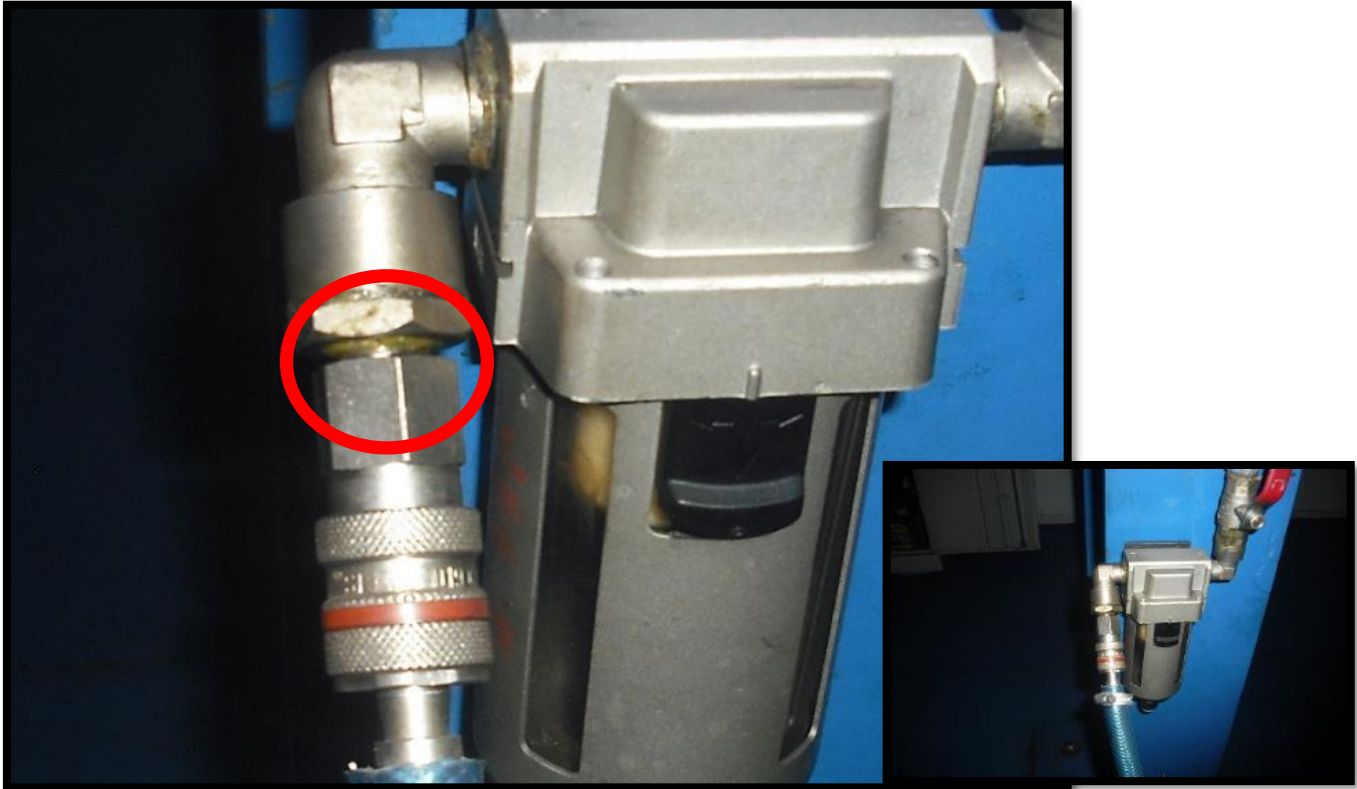
The fitting for the hose appears to be leaking

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	24
Location	HC 5
Equipment	Fitting
Estimated air loss m3/min	0.023
Estimated Kw loss	0.180
Estimated annual Cost	£ 106.07
Estimated repair cost	£ 100.00

Surveyors Comments

Fitting leaking

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	25
Location	HC 6 Sorter
Equipment	Gauge
Estimated air loss m3/min	0.077
Estimated Kw loss	0.604
Estimated annual Cost	£ 355.20
Estimated repair cost	£ 50.00

Surveyors Comments

The gauge is damaged an needs replacing

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	26
Location	HC 8 Sorter
Equipment	Gauge
Estimated air loss m3/min	0.023
Estimated Kw loss	0.180
Estimated annual Cost	£ 106.07
Estimated repair cost	£ 50.00

Surveyors Comments

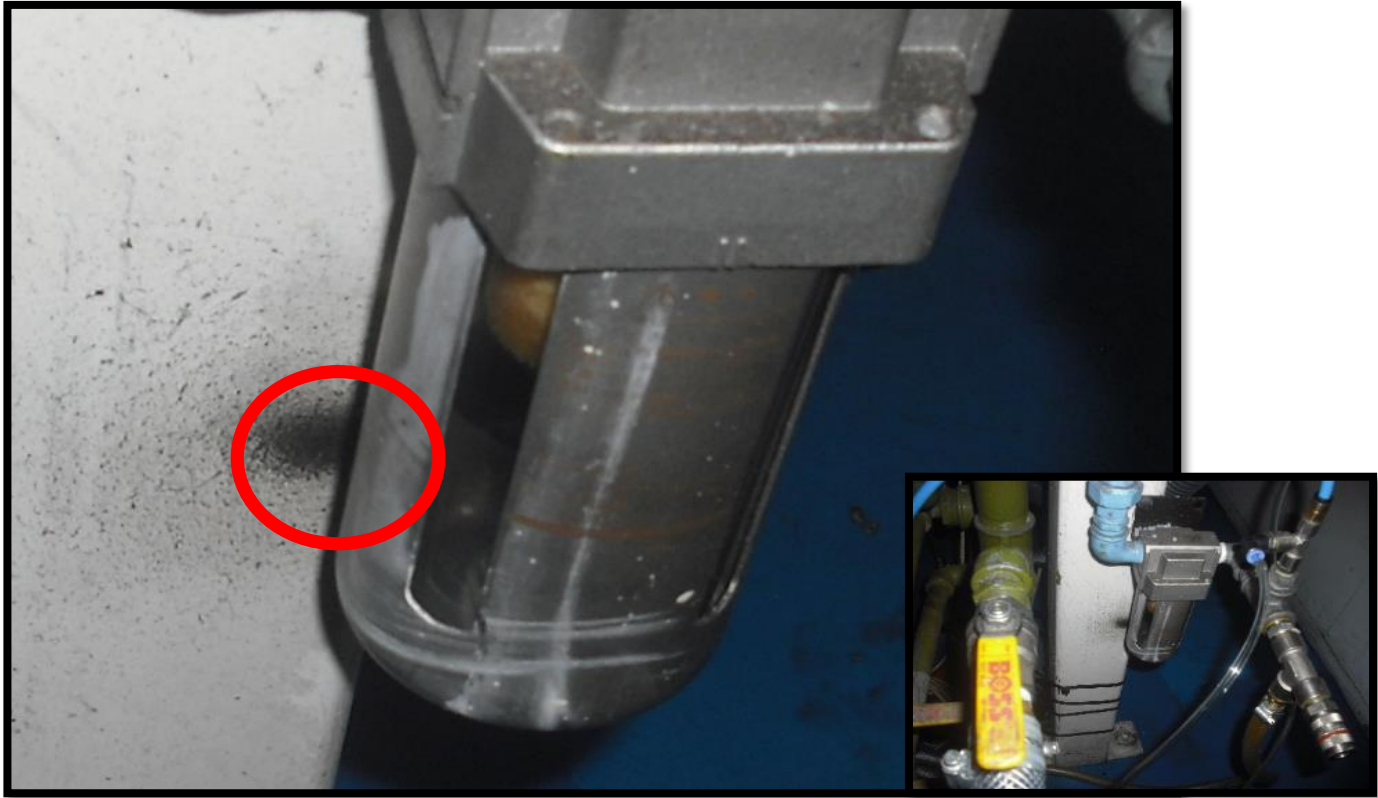
The gauge is leaking

Completed by

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Comments

RPC - Market Rasen



Record Number	27	
Location	HC 10	
Equipment	Bowl	
Estimated air loss m3/min	0.034	
Estimated Kw loss	0.270	
Estimated annual Cost	£	158.68
Estimated repair cost	£	50.00

Surveyors Comments

The bowl is leaking and needs replacing

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	28
Location	HC 9 - Blender
Equipment	Fitting
Estimated air loss m3/min	0.036
Estimated Kw loss	0.286
Estimated annual Cost	£ 168.04
Estimated repair cost	£ 150.00

Surveyors Comments

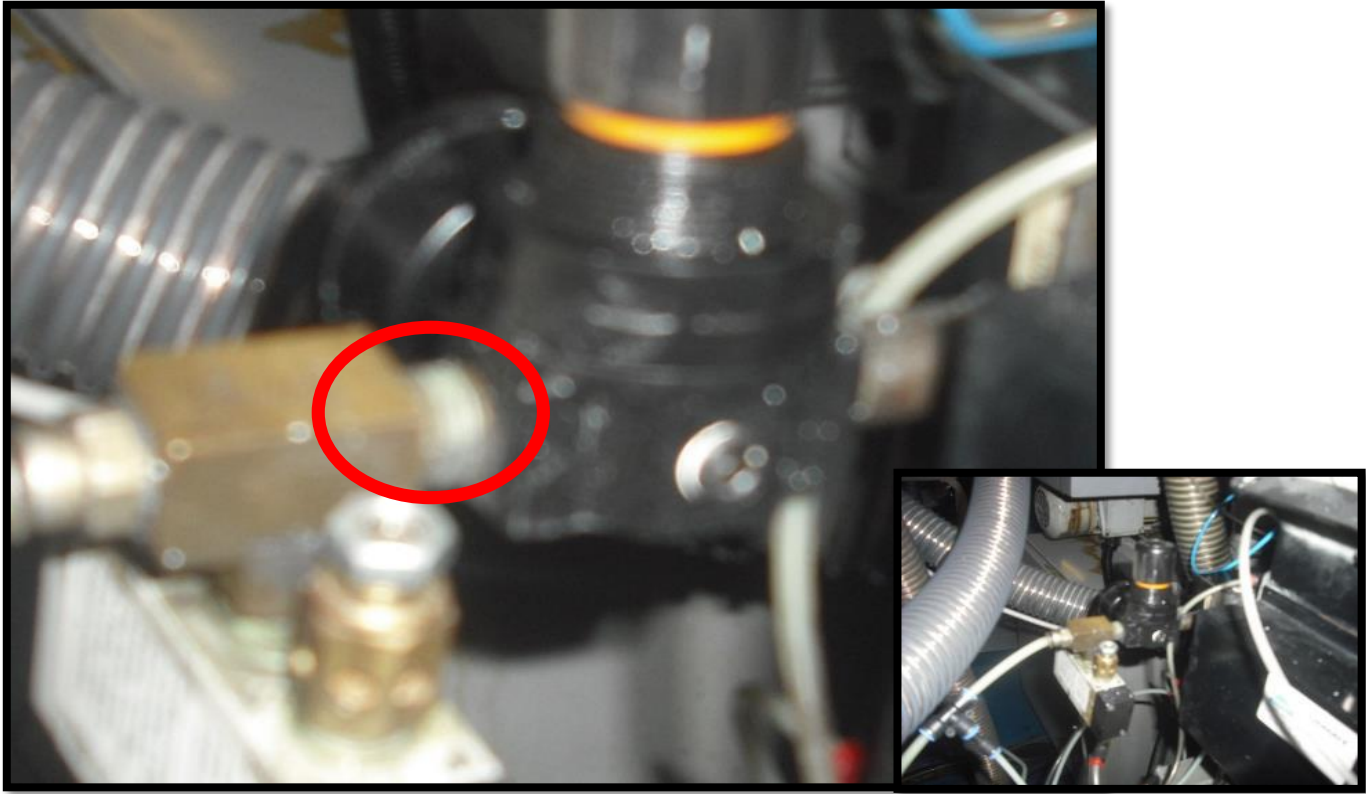
The rotating fitting is leaking

Completed by

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Comments

RPC - Market Rasen



Record Number	29
Location	HC 9 - Blender
Equipment	Fitting
Estimated air loss m3/min	0.108
Estimated Kw loss	0.853
Estimated annual Cost	£ 501.73
Estimated repair cost	£ 50.00

Surveyors Comments

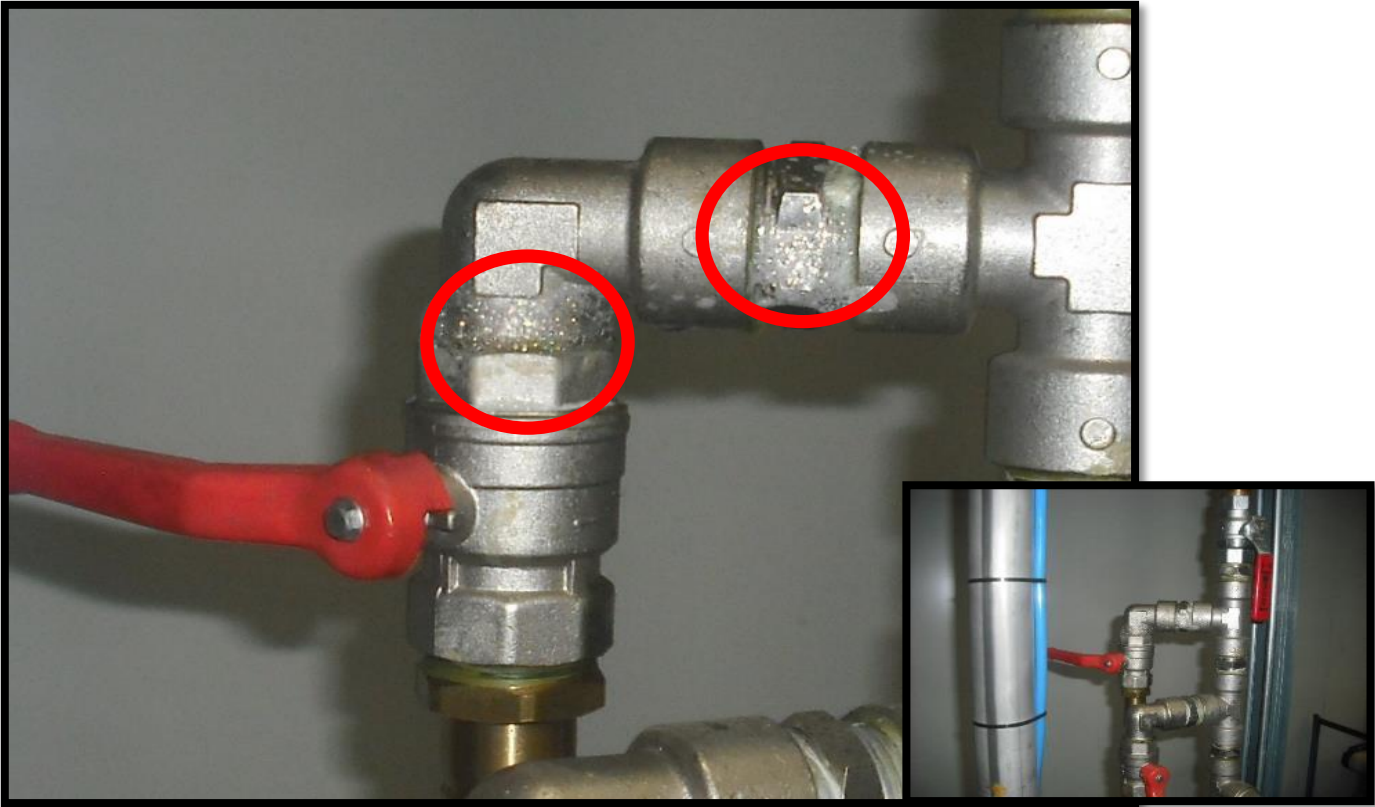
Fitting leaking

Completed by

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Comments

RPC - Market Rasen



Record Number	30
Location	UC 11
Equipment	Fitting
Estimated air loss m3/min	0.013
Estimated Kw loss	0.101
Estimated annual Cost	£ 59.65
Estimated repair cost	£ 225.00

Surveyors Comments

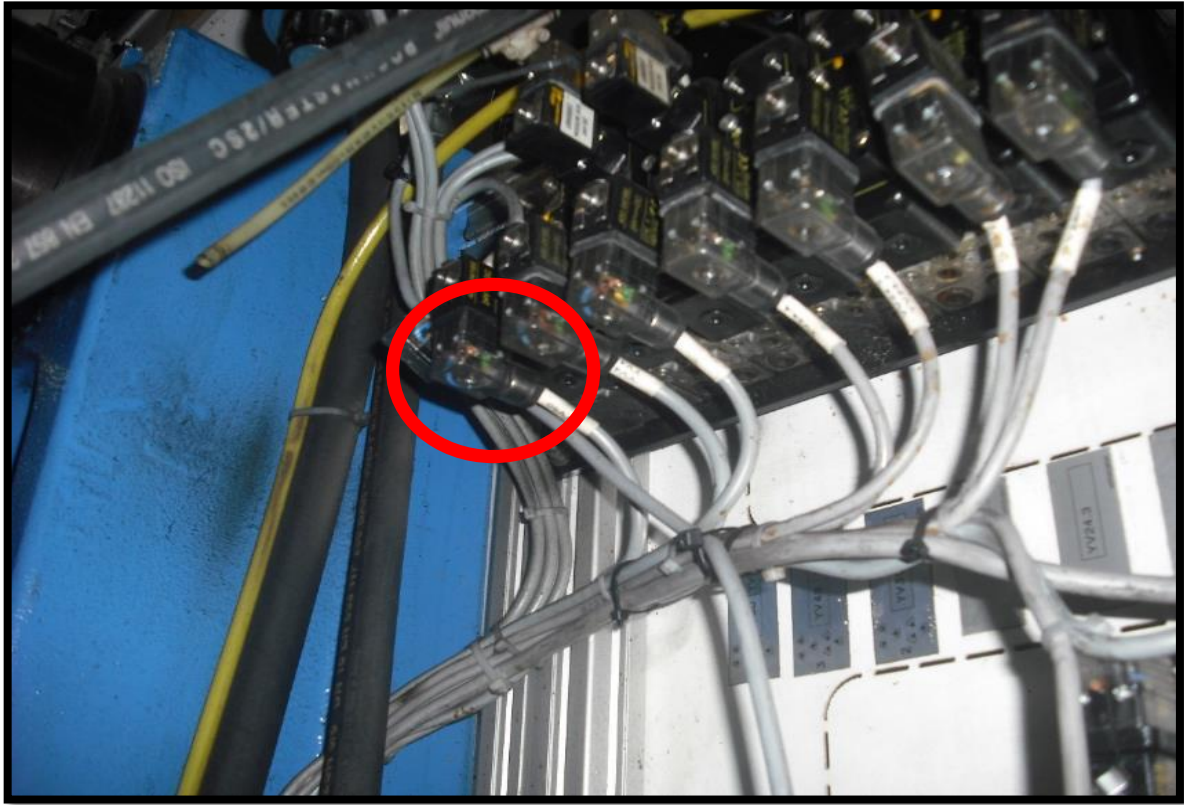
Fitting

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	31
Location	UC 10
Equipment	Valve
Estimated air loss m3/min	0.036
Estimated Kw loss	0.286
Estimated annual Cost	£168.04
Estimated repair cost	£50.00

Surveyors Comments

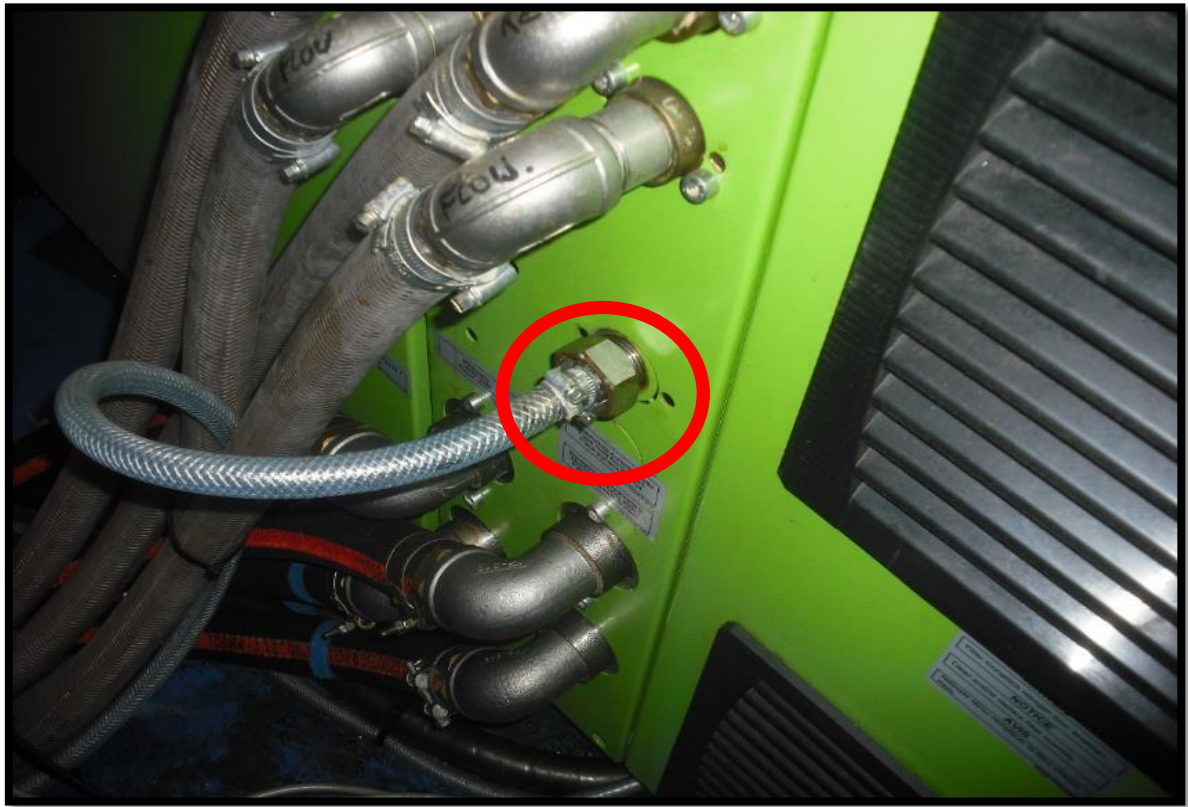
There is leak around the indicated valve

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	32
Location	UC 7
Equipment	Fitting
Estimated air loss m3/min	0.051
Estimated Kw loss	0.404
Estimated annual Cost	£ 237.44
Estimated repair cost	£ 50.00

Surveyors Comments

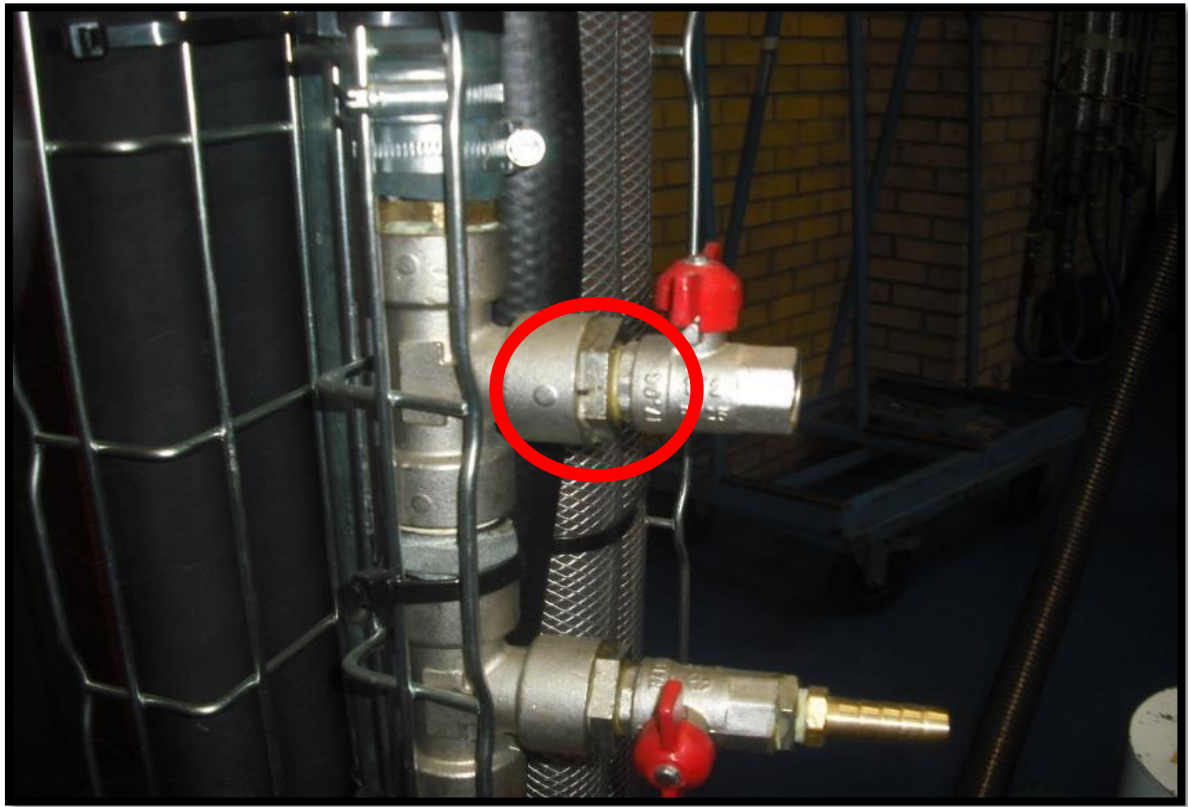
The fitting is leaking, unable to access the otherside of the guard to check security

Completed by

Print name _____ Signature _____ Date _____

Comments

RPC - Market Rasen



Record Number	33
Location	UC 3
Equipment	Fitting
Estimated air loss m3/min	0.013
Estimated Kw loss	0.101
Estimated annual Cost	£ 59.65
Estimated repair cost	£ 100.00

Surveyors Comments

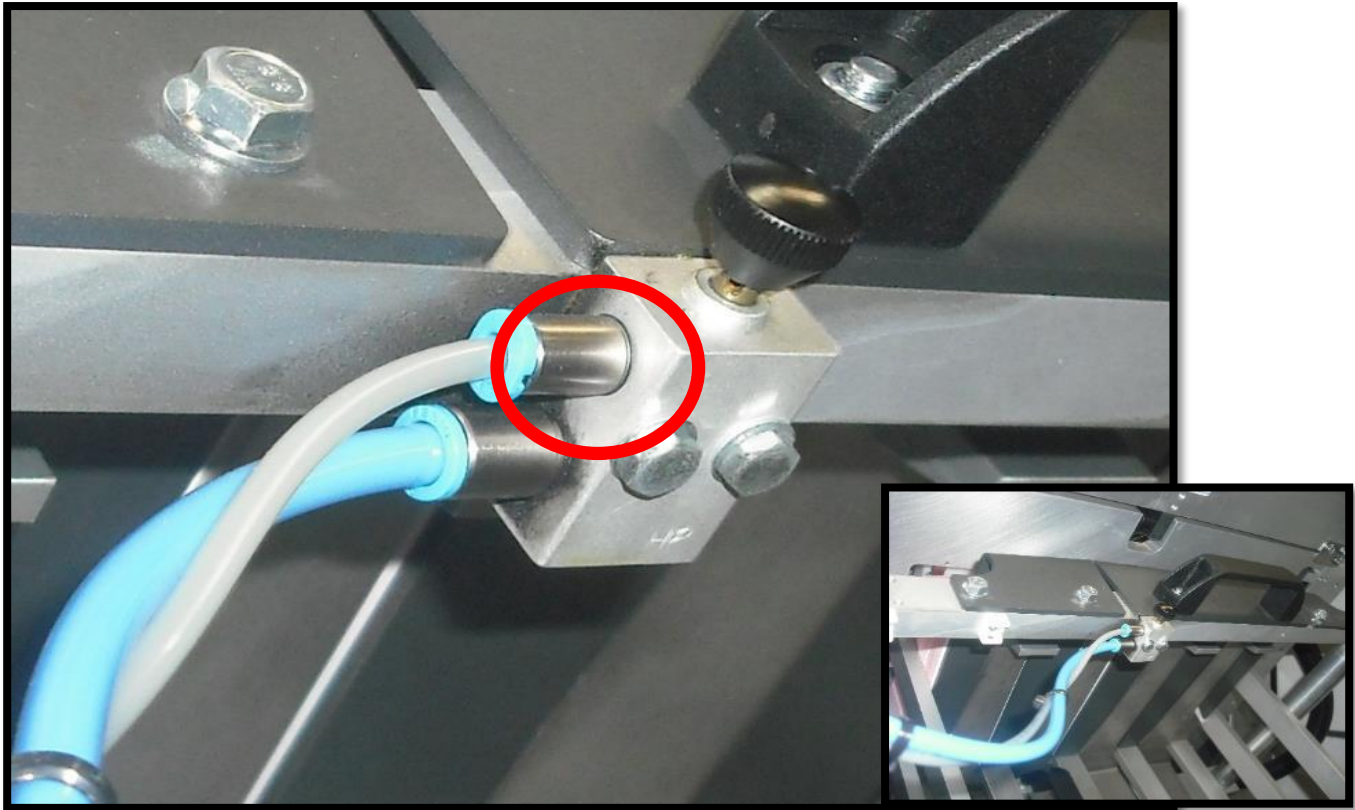
Tried tightening without success, needs stripping when machine stopped

Completed by

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Comments

RPC - Market Rasen



Record Number	34
Location	UC 3 - labeller
Equipment	Fitting
Estimated air loss m3/min	0.054
Estimated Kw loss	0.428
Estimated annual Cost	£ 251.45
Estimated repair cost	£ 150.00

Surveyors Comments

The valve is leaking continually from the indicated position

Completed by

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Comments

RPC - Market Rasen



Record Number	35	
Location	UC 5	
Equipment	Regulator	
Estimated air loss m3/min	0.029	
Estimated Kw loss	0.227	
Estimated annual Cost	£	133.54
Estimated repair cost	£	37.50

Surveyors Comments

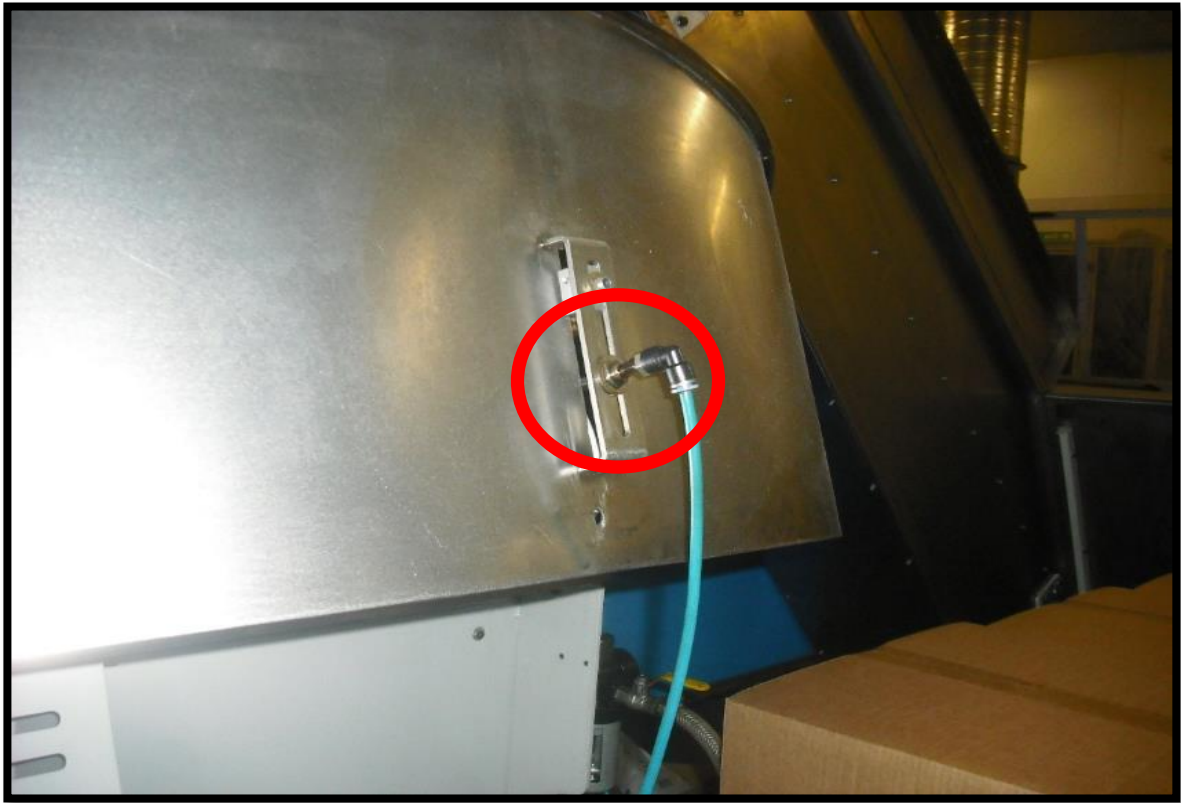
The regulator is leaking

Completed by

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Comments

RPC - Market Rasen



Record Number	36
Location	Print - PR4
Equipment	Air blast
Estimated air loss m3/min	0.305
Estimated Kw loss	2.405
Estimated annual Cost	£ 1,414.14
Estimated repair cost	£ 250.00

Surveyors Comments

The air blast is running continually

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Comments

RPC - Market Rasen



Record Number	37
Location	0
Equipment	0
Estimated air loss m3/min	0.000
Estimated Kw loss	0.000
Estimated annual Cost	£ -
Estimated repair cost	£ 150.00

Surveyors Comments

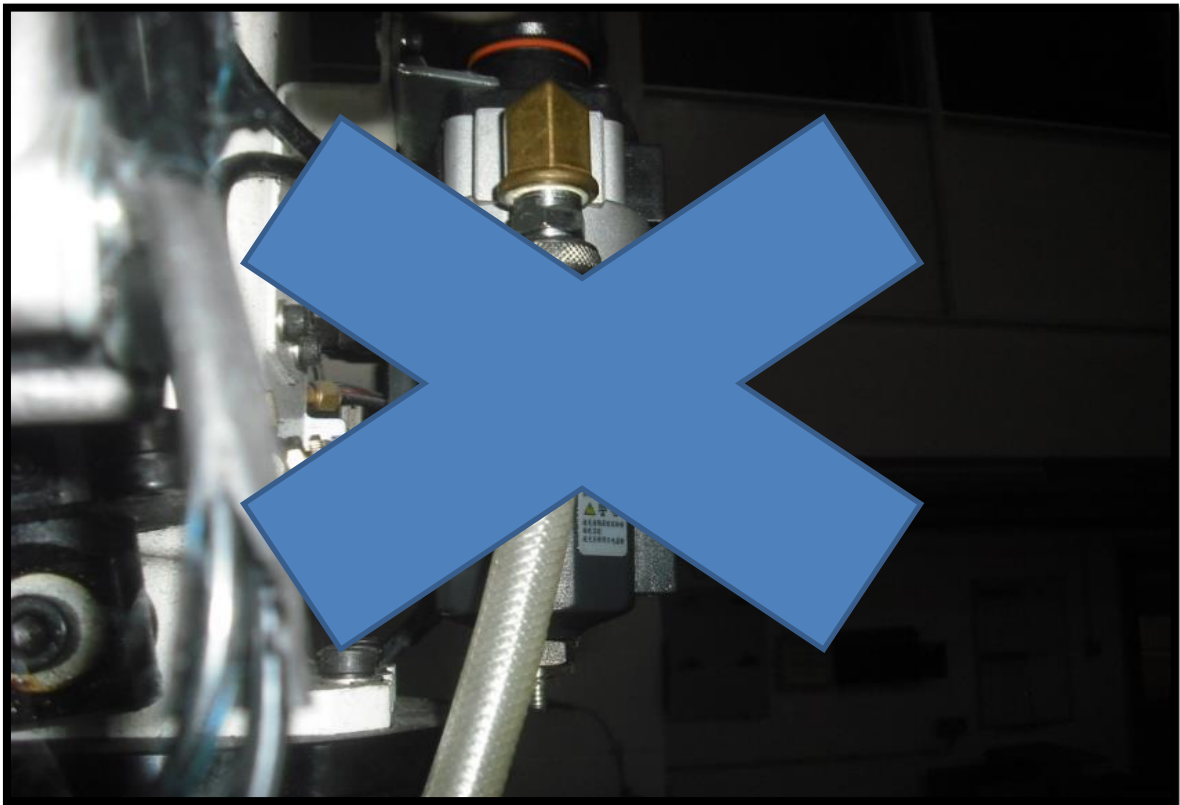
The air blast is running continually

Completed by

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RPC - Market Rasen



Record Number	38
Location	0
Equipment	0
Estimated air loss m3/min	0.000
Estimated Kw loss	0.000
Estimated annual Cost	£ -
Estimated repair cost	£ 25.00

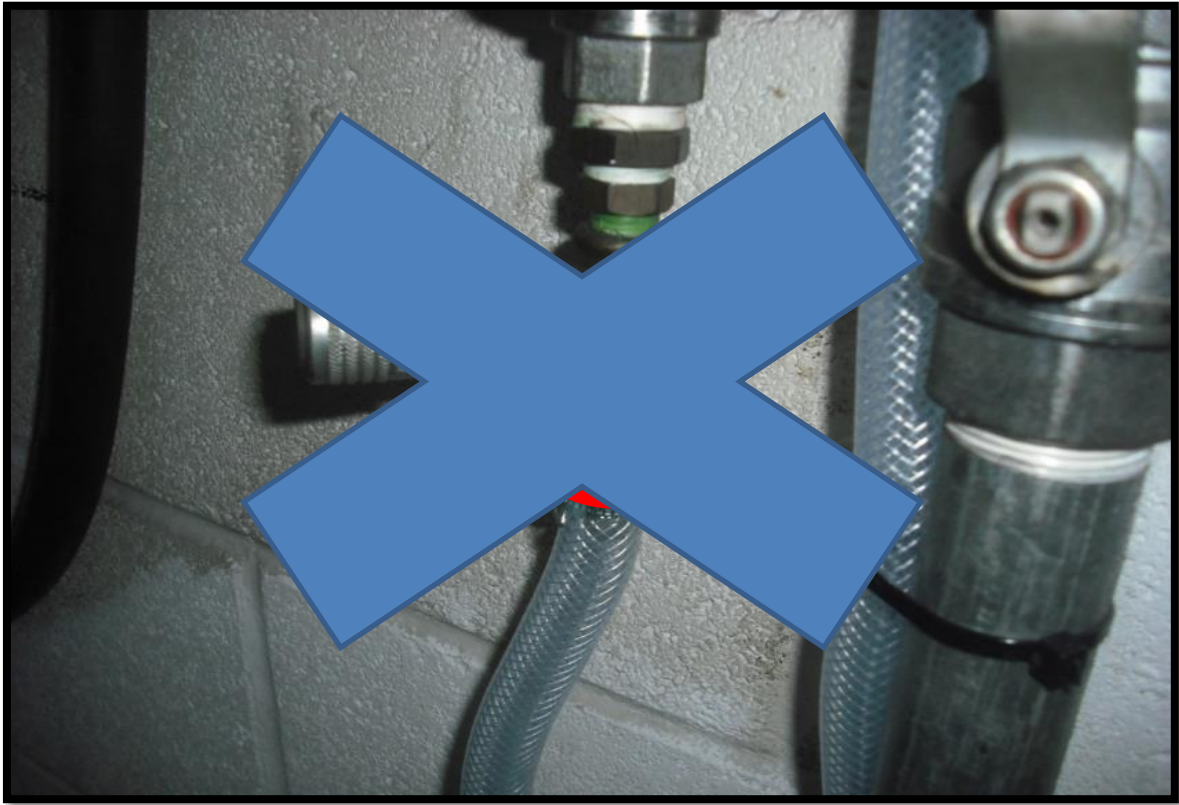
Surveyors Comments

Completed by

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Comments

RPC - Market Rasen



Record Number	39
Location	0
Equipment	0
Estimated air loss m3/min	0.000
Estimated Kw loss	0.000
Estimated annual Cost	£ -
Estimated repair cost	£ 25.00

Surveyors Comments

Completed by

Print name _____ Signature _____ Date _____

Comments

West House
Osgodby
Market Rasen
LN8 3PA

bryan@elwicks.co.uk

Tel – 07961 033715 / 01673 828614



29 July 2018

Mr Brian Carter
Engineering Manager
RPC (Market Rasen)
Gallamore Lane
Market Rasen
Lincolnshire

LN8 3HZ

Dear Mr Carter,

Thank you the opportunity for ELTEC to conduct a find & fix air leak survey.

The survey was limited to the moulding department and comprised of repairing leaks where possible and reporting other air leaks as before, no replacement parts were fitted on this occasion.

More detail is attached but to summarize, 62 moulding machines & their ancillaries were surveyed with 83 new leaks identified, of these 41 were repaired saving an estimated £6,9k.

Attached is a compressed air leak report as well several graphs summarizing the results.

If you have any questions please do not hesitate to contact me.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Bryan Elwick', with a stylized flourish at the end.

Bryan Elwick

Based on the running hours of the compressors at the time of the survey;

Compressor C1 55kW (variable)	63% load – estimated
Compressor C2 55kW (fixed)	43% load – calculated
Compressor C3 55kW (fixed)	55% load – calculated
Compressor C4 30kW (variable)	32% load – calculated
Compressor C5 30kW (fixed)	5% load – calculated
Compressor C5 30kW (fixed)	1% load – calculated

Based on 8,400 running hours a year @ £0.07 per kWhr leakage equates to a pro-rata £9,6k per year.

Given an approximate total air load of 99kW/hr, 100% of machines were surveyed giving a pro-rata leakage rate of 17% (16kW).

The pro-rata figure is based on the amount of machines surveyed during a visit.

During this visit;

A total of 62 Moulding machines were surveyed including the surrounding ancillaries

A total of 7 print machines were surveyed

A total of 36 leaks were repaired with a total saving of £6,9k & 10,3kW

A total of 36 leaks required parts or were not accessible with a cost of £9,6k & 16,4kW

The carbon trust suggests 10% leakage rate should be a realistic target and recommends ongoing monitoring & repair.



Other observations:

Air blasts;

There are several uses of uncontrolled air blasts to move parts.



On SM3 there is an air blast on the vibration bowls that is operating virtually all the time, a little bit of testing (crimping the pipes to the air blasts) showed that air is not needed all the time, even it is pulsed to operate ½ the time it will save a considerable amount of energy.

I would estimate the running costs for approx. £800 per year.



On PR4 there is an air blast operating all the time with an estimated cost of >£1,500 per year.

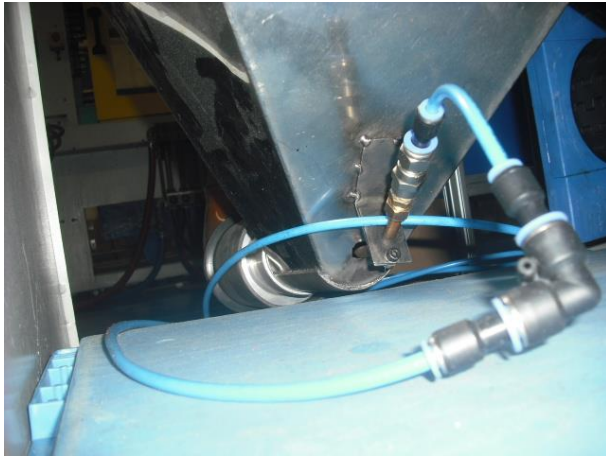
It is thought that a form of automated to detect a misaligned part would reduce the running costs by an estimated 50%



The new assembly machine from DB automation has 10 air blasts on 2 bowls that continue running when the machine is stopped.

Presuming each nozzle is 1,5mm with air pressure at 4 bar each nozzle costs approx. £400 each = £4,000 per year.

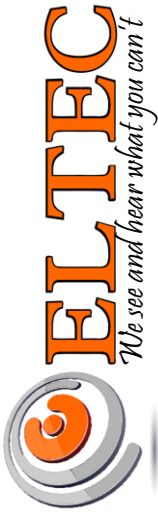
Interlocking with a running signal of machine and bowl will reduce running costs conversably.



Also on SM3 there is an air blast to move a part approx. 1m, I would estimate this is costing ~£7k per year

Fitting a detection system would reduce air consumption considerably; fitting an air amplifier would reduce it further again.

A dedicated bespoke conveyor would also be an alternative cost-effective solution



On the main granulator there is an air blast into the base of the granulator, the estimated cost for this is ~ £7,5k per year.

Automating this would reduce costs considerably.

Part of an air leak survey is to take the meter readings to give an estimate of air consumption, on load and off load meter readings are taken at the beginning of the survey and again at the end long with the time they were taken.

		Controller		Local		Comments
		Run time	Load time	Run time	Load time	
VSD	LP C1	96	0	100	0	Running time variation
Fixed	LP C2	103	38	102	64	On load time variation
Fixed	LP C3	92	10	92	82	On load variation
VSD	HP C1	92	2	71	0	Running time variation
Fixed	HP C2	50	8	49	8	Running long period off load
Fixed	HP C3	139	1	135	1	Running long period off load
Total running hours between readings				148.7		



These figures then show running times and running on load times, on this occasion it seems to show that the HP compressors 2 & 3 are running for long periods with no load, I would suggest that the programming if the control system is checked.

There also seems to be a discrepancy between the controller run hours and the local readings on each machine.

ELTEC has developed a pneumatic autostop device that can be retrofitted to virtually any piece of equipment that will isolate the air through a soft start / dump or solenoid valve after a predetermined time when the conveyor is empty or when parts stop passing through the throat or when the motor of a granulator stops.

I would estimate that with automation on these items some £8,000 could be saved on compressed air usage.

A solution could also be investigated for SM3, DB automation, PR4 if required, please let me know if you would like a proposal.

The next visit provisionally planned for w/c 21st January 2019 (week 4)