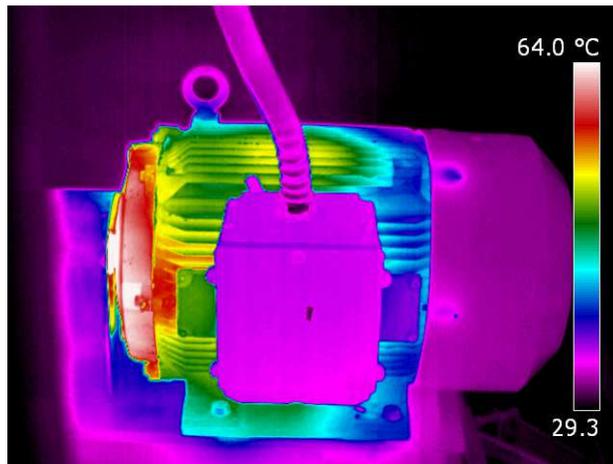


Mechanical Thermographic Survey

SAMPLE REPORT

By

Pixel Thermographics Ltd



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INFORMATION

This sample report has been produced to provide an example of the types of defect we are able to identify along with example images and recommendations when conducting a mechanical thermal imaging survey of rotating equipment.

A FLIR Thermacam SC640 thermal imaging camera was used to capture the images.

Where items were inspected and no abnormalities were found then no image data is recorded i.e. individual reports are generated by exception. Some areas of particular interest may be included which the Thermographic Engineer feels may be of particular interest to the client.

Descriptions of equipment and locations have been noted as those in common usage within the client's premises.

Follow up work including remedial work and investigations into causation etc. or any other factors outside the control of Pixel Thermographics Ltd are not the responsibility of Pixel Thermographics Ltd and are not covered by this contract.

Where Pixel Thermographics Ltd have been unable to inspect equipment or plant which is covered, unexposed or inaccessible, we are therefore unable to report that any such system components are free from defect. Areas un-inspected are highlighted in the scope pages of this report.

To assist the Engineering Management to maintain plant efficiency, it is recommended that the survey is repeated on an annual basis.

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*Certified Level 2 Thermographer
Pixel Thermographics Ltd*

Disclaimer

Please note that the report contained herein represents the observed conditions at the time of inspection. Pixel Thermographics Ltd accepts no liability for faults that have occurred during or after the completion of the inspection.

The recommendations given in this report are intended as a guide only. By issuing this report neither Pixel Thermographics Ltd or any of its employees make any warranty, expressed or implied, concerning the contents of this report. Pixel Thermographics cannot accept responsibility for inappropriate actions taken as a result of this report.

SCOPE OF SURVEY

The scope of this survey was to carry out a thermographic inspection of motor drive / gearbox units throughout the site.

A detailed schedule of all equipment inspected can be found at the back of this report.

REPORT DATA

A summary of all thermographic data is contained in the report pages that follow. The pages in the report have been designed as single page entries, each of which carries its own information so that individual pages can be given to the relevant professions in order that they may carry out any remedial repairs that may be necessary.

FAULT SITE CONDITIONS

The pages contained within this report have been designed so that the thermal images show temperature differences across the equipment. These differences typically represent the early or late stages of a fault site. The temperature relationship between a fault site and the external measurable surfaces will be determined by the nature of heat transfer paths, which may contain conducting materials, insulating materials or even air gaps. All of these must be considered during the image analysis process.

INSPECTION POLICY

Consequently, due to the varying standards, many methods for evaluating faults and their severity have evolved, all of which use a combination of temperature and load values. It is our policy to use a maximum operating surface temperature of 80°C to ensure that all anomalies are found without causing unnecessary alarm.

FAULT CONDITIONS AND RATINGS

This inspection has been designed to assess the performance of the equipment on site and to highlight any areas which require attention. Once the analysis of each image in the report has taken place we apply a fault rating system with a recommended course of action to each anomaly found.

We base our fault severity classification on difference in temperature between the suspected fault area and a section of equipment deemed to be of a normal temperature.

Fault classification is split into 3 classes:

Class 1 – Temperature Differential greater than 35°C

Class 2 – Temperature Differential of between 25°C and 35°C

Class 3 – Temperature Differential of between 10°C and 25°C

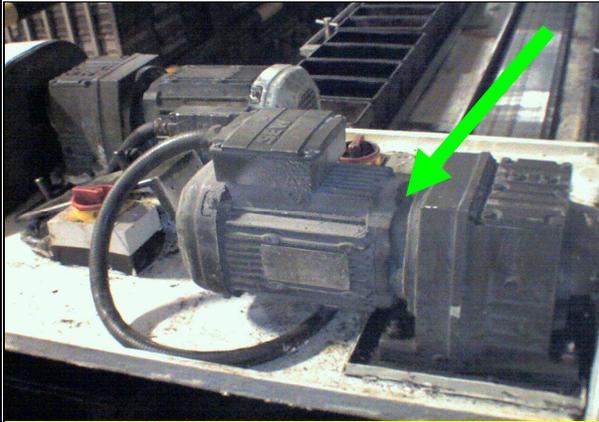
High risk of equipment failure, loss of production and safety of personnel	Class 1	Urgent attention required
Medium risk of equipment failure, loss of production and safety of personnel	Class 2	Investigation or corrective action is necessary at the earliest opportunity
Low risk of equipment failure, loss of production and safety of personnel	Class 3	Plan repair at next natural outage. Non urgent.

INDEX OF IMAGES

Location	Equipment	Type	Priority	Page Number
A Plant Tin Return System (Oven Side)	Prior to Moulder	SEW Motor Gearbox	2	4
A Plant Oven	Main Circulation Fan (Inlet End)	Fan Motor	2	5
A Plant Tin Return System	Tin Cleaner	SEW Motor Gearbox	2	6
A Plant Tin Return System	Conveyor Under LEV Extract	SEW Motor Gearbox	2	8
A Plant Lid Return System	Lid Take Off Drive	SEW Motor Gearbox	2	9
A Plant Crustless Slicer	Infeed Conveyor	SEW Motor Gearbox	2	10
B Plant Tin Return System	Diverter Conveyor	SEW Motor Gearbox	2	11
B Plant Tin Return System	Conveyor Under Moulder B257	SEW Motor Gearbox	2	12

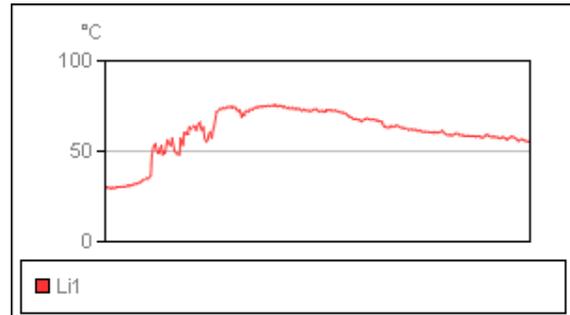
High risk of equipment failure, loss of production and safety of personnel	Class 1	Urgent attention required
Medium risk of equipment failure, loss of production and safety of personnel	Class 2	Investigation or corrective action is necessary at the earliest opportunity
Low risk of equipment failure, loss of production and safety of personnel	Class 3	Plan repair at next natural outage. Non urgent.
No risk of plant failure but thermal anomalies noted which client should be aware of	Class 0	Provided for information only

VISUAL IMAGE

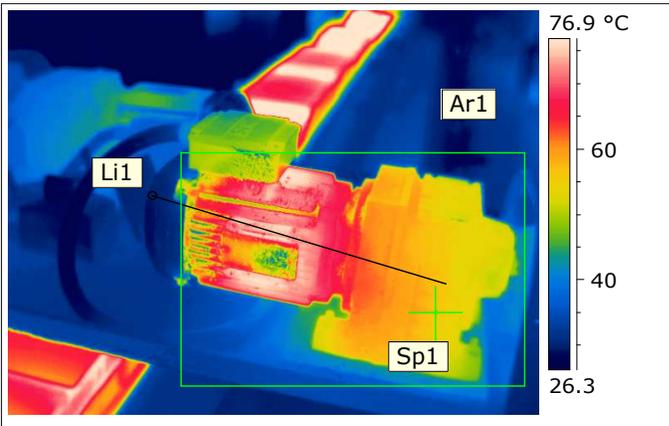


EQUIPMENT INFORMATION

Location	A Plant Tin Return System (Oven Side)
Equipment	Prior to Moulder
Type	SEW Motor Gearbox



THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	21.0 °C
Sp1 Temperature	56.0 °C
Ar1 Max. Temperature	77.1 °C
Emissivity	0.95
Object Distance	1.2 m
Reflected Apparent Temperature	21.0 °C
Image File name	IR_14696.jpg

Difference Ar1 - Sp1	21.1 °C
Fault Rating	Priority 2

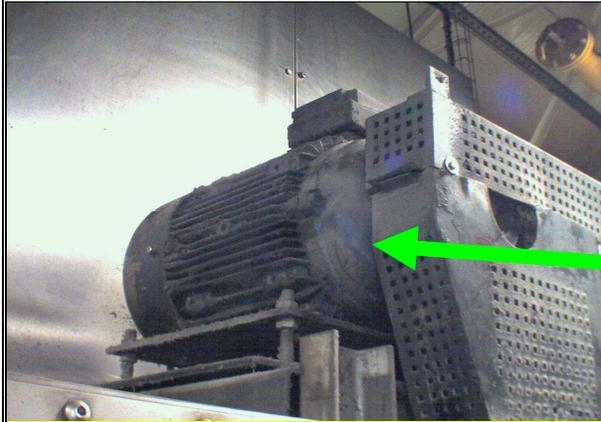
ANALYSIS & OBSERVATIONS

Elevated temperature noted on motor surfaces.

Check current loading on this drive.

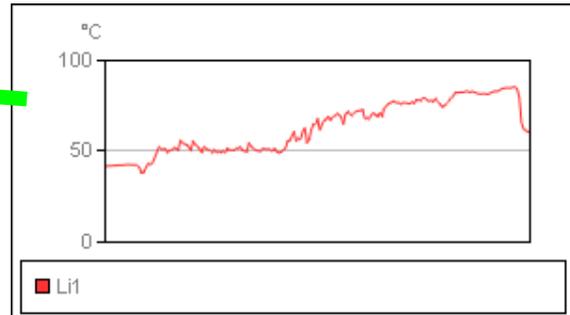
It was noted that this lane at the time of the survey was permanently loaded with trays which were not being loaded into the prover.

VISUAL IMAGE

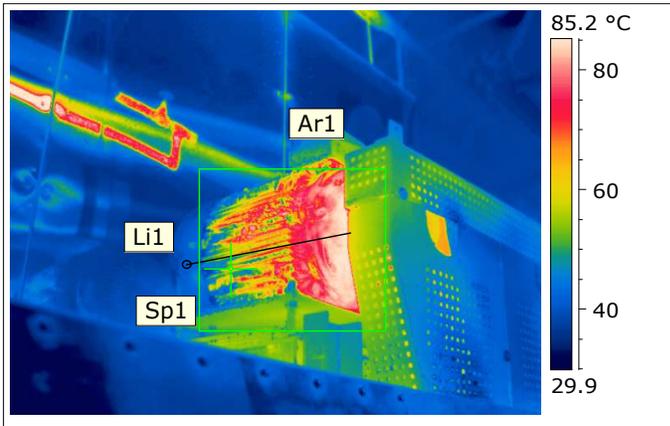


EQUIPMENT INFORMATION

Location	A Plant Oven
Equipment	Main Circulation Fan (Inlet End)
Type	Fan Motor



THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	21.0 °C
Sp1 Temperature	58.0 °C
Ar1 Max. Temperature	86.2 °C
Emissivity	0.95
Object Distance	1.2 m
Reflected Apparent Temperature	21.0 °C
Image File name	IR_14698.jpg

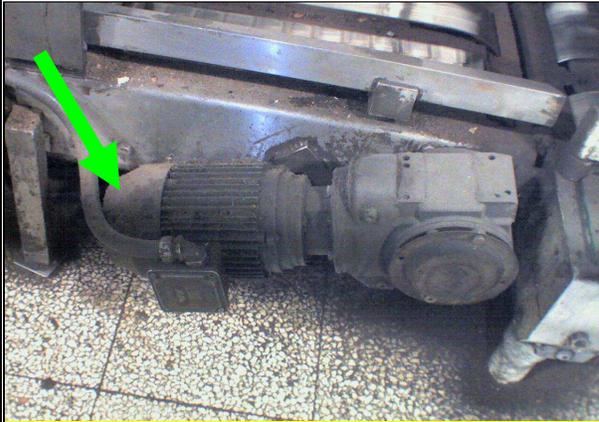
Difference Ar1 - Sp1	28.2 °C
Fault Rating	Priority 2

ANALYSIS & OBSERVATIONS

Elevated temperature noted on NDE bearing housing on this drive.

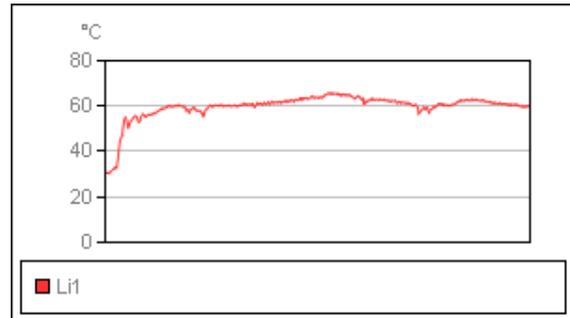
Recommendation is to check bearing performance on this motor – utilise vibration analysis.

VISUAL IMAGE

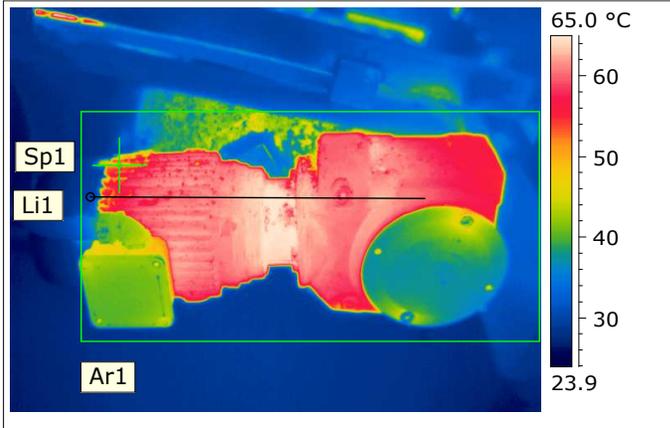


EQUIPMENT INFORMATION

Location	A Plant Tin Return System
Equipment	Tin Cleaner
Type	SEW Motor Gearbox



THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	21.0 °C
Sp1 Temperature	52.9 °C
Ar1 Max. Temperature	66.2 °C
Emissivity	0.95
Object Distance	1.2 m
Reflected Apparent Temperature	21.0 °C
Image File name	IR_14700.jpg

Difference Ar1 - Sp1	13.3 °C
Fault Rating	Priority 2

ANALYSIS & OBSERVATIONS

Elevated temperatures noted on motor gearbox surfaces.

Likely cause of heat rise is poor air movement / cooling across the unit.

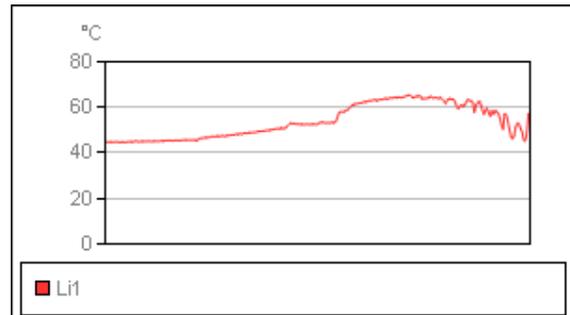
Check / clean the fan cowling to ensure maximum air movement & cooling.

VISUAL IMAGE

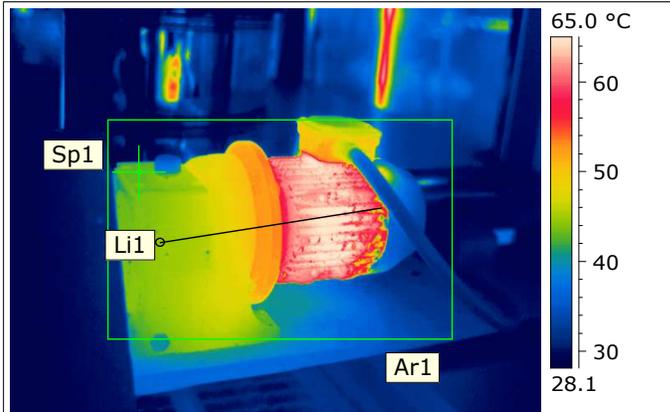


EQUIPMENT INFORMATION

Location	A Plant Tin Return System
Equipment	Conveyor Under LEV Extract
Type	SEW Motor Gearbox



THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	21.0 °C
Sp1 Temperature	42.9 °C
Ar1 Max. Temperature	66.7 °C
Emissivity	0.95
Object Distance	1.2 m
Reflected Apparent Temperature	21.0 °C
Image File name	IR_14702.jpg

Difference Ar1 - Sp1	23.9 °C
Fault Rating	Priority 2

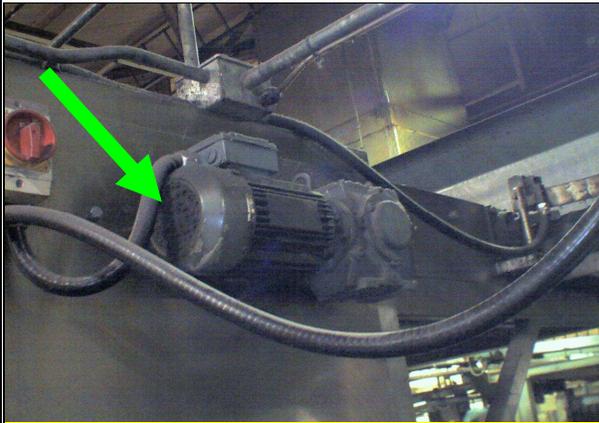
ANALYSIS & OBSERVATIONS

Elevated temperatures noted on motor gearbox surfaces.

Likely cause of heat rise is poor air movement / cooling across the unit.

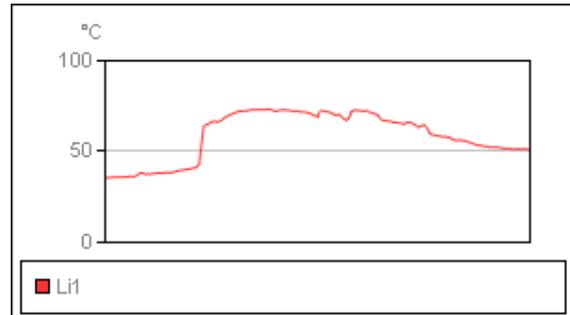
Check / clean the fan cowling to ensure maximum air movement & cooling.

VISUAL IMAGE

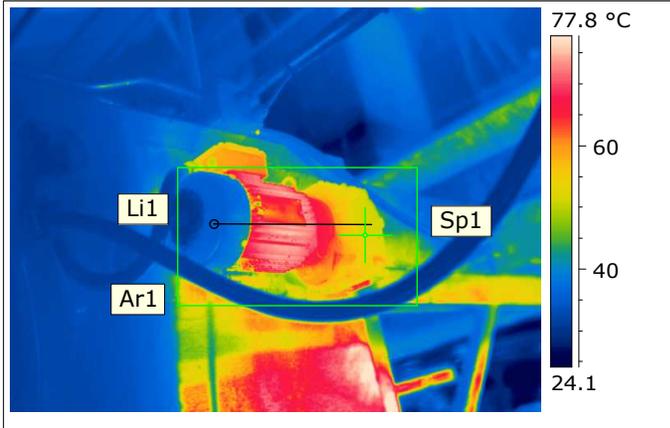


EQUIPMENT INFORMATION

Location	A Plant Lid Return System
Equipment	Lid Take Off Drive
Type	SEW Motor Gearbox



THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	21.0 °C
Sp1 Temperature	52.2 °C
Ar1 Max. Temperature	75.3 °C
Emissivity	0.95
Object Distance	1.2 m
Reflected Apparent Temperature	21.0 °C
Image File name	IR_14704.jpg
Difference Ar1 - Sp1	23.1 °C
Fault Rating	Priority 2

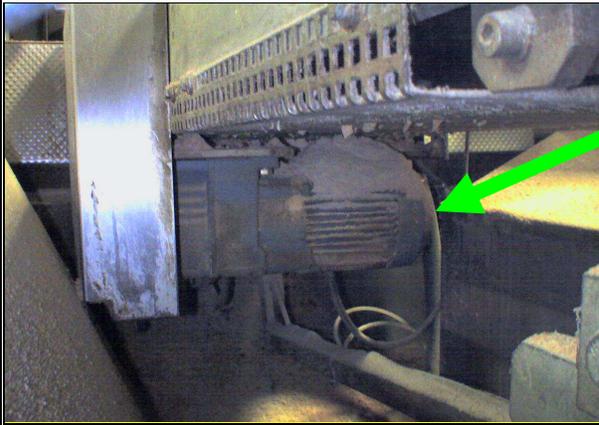
ANALYSIS & OBSERVATIONS

Elevated temperatures noted on motor gearbox surfaces.

Likely cause of heat rise is poor air movement / cooling across the unit.

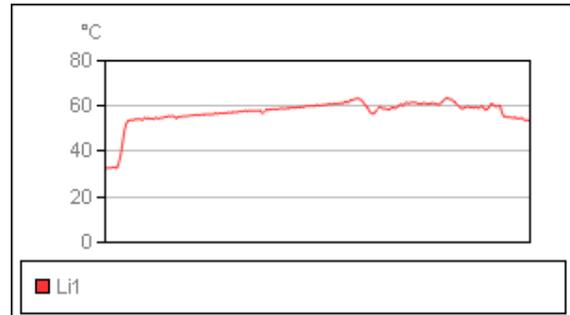
Check / clean the fan cowling to ensure maximum air movement & cooling.

VISUAL IMAGE

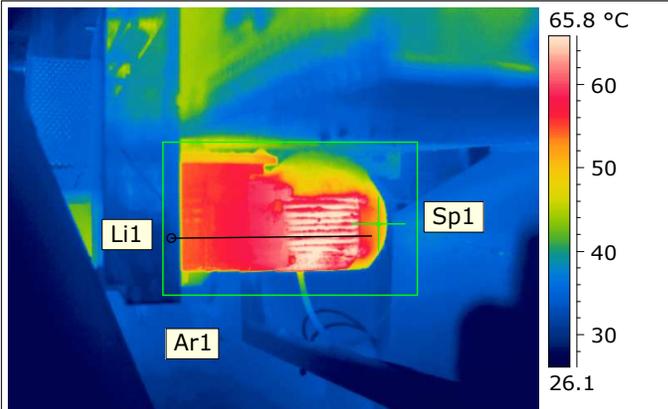


EQUIPMENT INFORMATION

Location	A Plant Crustless Slicer
Equipment	Infeed Conveyor
Type	SEW Motor Gearbox



THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	21.0 °C
Sp1 Temperature	52.0 °C
Ar1 Max. Temperature	67.8 °C
Emissivity	0.95
Object Distance	1.2 m
Reflected Apparent Temperature	21.0 °C
Image File name	IR_14706.jpg
Difference Ar1 - Sp1	15.8 °C
Fault Rating	Priority 2

ANALYSIS & OBSERVATIONS

Elevated temperatures noted on motor gearbox surfaces.

Likely cause of heat rise is poor air movement / cooling across the unit.

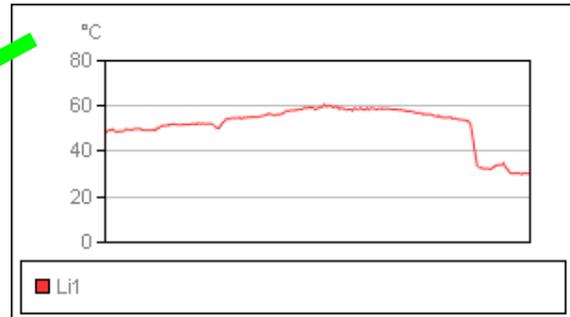
Check / clean the fan cowling to ensure maximum air movement & cooling.

VISUAL IMAGE

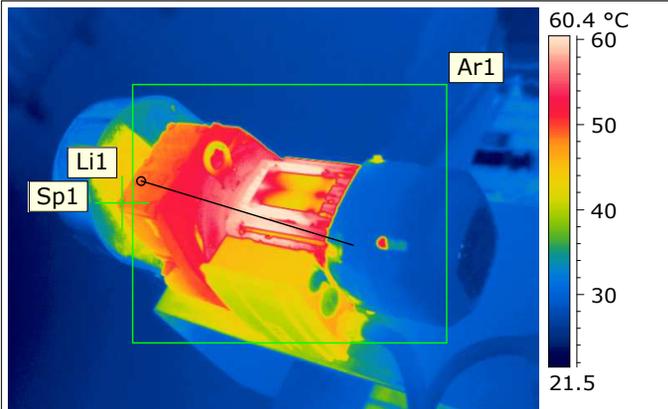


EQUIPMENT INFORMATION

Location	B Plant Tin Return System
Equipment	Diverter Conveyor
Type	SEW Motor Gearbox



THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	21.0 °C
Sp1 Temperature	48.8 °C
Ar1 Max. Temperature	62.0 °C
Emissivity	0.95
Object Distance	1.2 m
Reflected Apparent Temperature	21.0 °C
Image File name	IR_14708.jpg
Difference Ar1 - Sp1	13.3 °C
Fault Rating	Priority 2

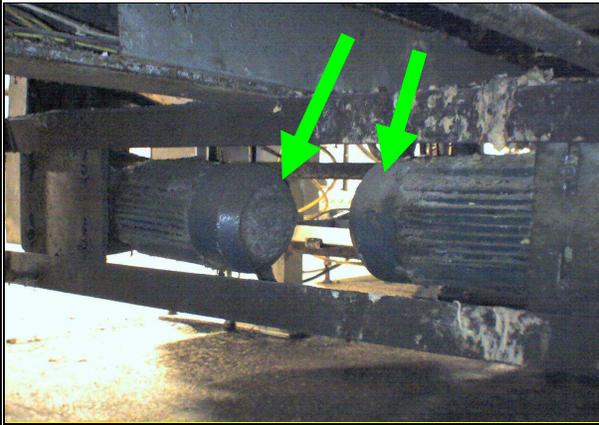
ANALYSIS & OBSERVATIONS

Elevated temperatures noted on motor gearbox surfaces.

Likely cause of heat rise is poor air movement / cooling across the unit.

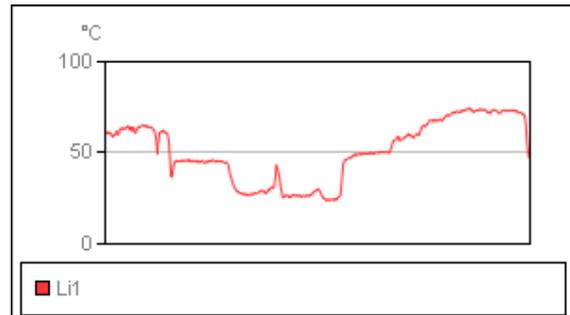
Check / clean the fan cowling to ensure maximum air movement & cooling.

VISUAL IMAGE

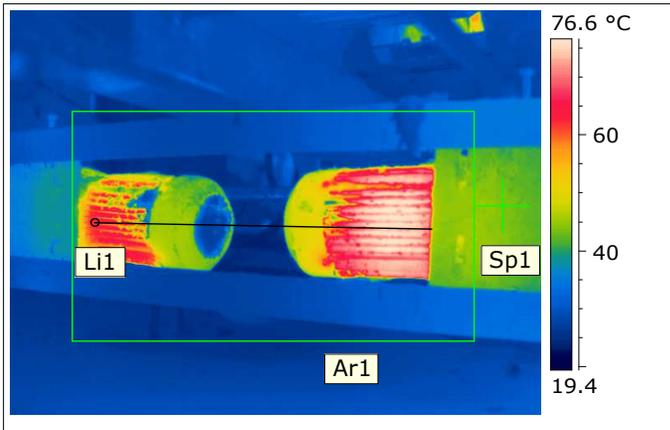


EQUIPMENT INFORMATION

Location	B Plant Tin Return System
Equipment	Conveyor Under Moulder B257
Type	SEW Motor Gearbox



THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	21.0 °C
Sp1 Temperature	43.6 °C
Ar1 Max. Temperature	77.0 °C
Emissivity	0.95
Object Distance	1.2 m
Reflected Apparent Temperature	21.0 °C
Image File name	IR_14710.jpg

Difference Ar1 - Sp1	33.3 °C
Fault Rating	Priority 2

ANALYSIS & OBSERVATIONS

Elevated temperatures noted on both motor gearbox surfaces.

Likely cause of heat rise is poor air movement / cooling across the units.

Check / clean the fan cowlings to ensure maximum air movement & cooling.

The following plant and panels were inspected during the survey:

Bun Plant

Oven Leakage

B Plant

Oven Leakage

Prover Leakage

A Plant

Oven Leakage

Prover Leakage

Drives & Gearboxes

Bun Plant

Bun Plant Conveyors

Tin Return System Conveyors

A Plant

Plant Conveyors

Tin & Lid Return System Conveyors

Hot & Cold Bread Conveyors

B Plant

Plant Conveyors

Tin Return System Conveyors

Hot & Cold Bread Conveyors

Ancillary Plant

Basket Feed System Conveyors

Dispatch Area Conveyors & Stackers

Tray Wash Drives

Yeast System Pumps

Goods In Area Drives