Arundle Optical Instruments
MICROSEAM VISUAL SEAM GAUGE

OPERATING & MAINTENANCE MANUAL

Customer:
Visual Seam Gauge Serial No :

ARUNDLE OPTICAL INSTRUMENTS
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Introduction.

Arundle Optical Instruments have almost a quarter of a century of experience manufacturing visual seam gauges.

During that time we have had consultation with can manufacturers, large end user companies, small end user companies and industry advisory bodies endeavouring to provide reliable, accurate easy to use equipment.

From our communications we were amazed to learn that most end users work to their own standards from can manufacturers specifications, advisory bodies only suggested measuring procedures to try to achieve best industry standards, but their suggestions are not mandatory for their members.

We believe to achieve a high standard of quality assurance, that frequent inspection using all types of measuring techniques will ensure that your packaging is known for the reliability of it's internal integrity.

Measuring procedure page is only a suggestion, but we recommend that it is adhered to as close as possible, remember the more parameters inspected the higher the standard of product you achieve and the greater the confidence of your customers.

From installations carried out in the UK, we recommend that once a measuring procedure has been compiled that all personnel involved in quality assurance are given a short training period, to ensure that every one carries out inspection in the same order, prepares the specimen correctly and measures from the same points. (see measuring points page).

As with all inspection consistency is paramount and it is good practice that from time to time that the quality assurance administrator carries out operator spot checks to ensure that procedures are carried out as prescribed.

Please take the time to read all pages of this manual to achieve the best results with this instrument.

If you experience any problems or have any suggestions for improvements to our products we are always pleased to hear from you.

To contact us use any of the methods on the cover of this manual.

Installation

Check plate on bottom of machine to see if machine is correct voltage.

Having established voltage, check dual voltage selector (item 0/83) is correctly set.

Fix suitable plug to cable. Ensure that correct colour wire is fixed to appropriate connector on plug e.g. brown to live, blue to neutral and green and yellow to earth.
The plug should be fitted with a 3 (three) amp fuse and connected to the mains electricity supply.

Important

It is essential that equipment is properly earthed.

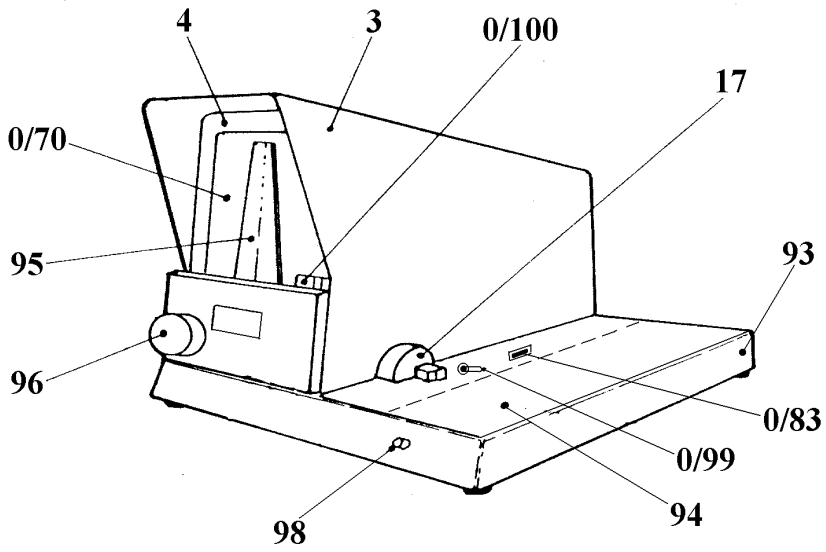

Figure 1 -Visual Seam Gauge General Arrangement

Item No	Description	Item No	Description
3	Cover	94	Specimen Plate
4	Front Panel	95	Cursor
17	Objective Mount	96	Cursor Hand Wheel
0/70	Screen	0/100	L.E.D Display
93	Base		

Table 1 -Reference Numbers For x 30 Metric Micro Seam Visual Seam Gauge

Switching On Seam Gauge

The visual seam gauge is switched 'ON' and 'OFF' using the switch (item 0/73) located at the left hand side of instrument base.

The indicator light in the switch (item 0/73) shows when the machine is switched “ON”.

1. CONSTRUCTION Steel base, aluminium alloy cover, painted with electro-statically applied magnolia powder paint.	
2. WEIGHT 12 Kilograms (27 lbs)	3. SCREEN SIZE 260mm X 180mm (10” X 7”)
4. MAGNIFICATION X30	5. OVERALL DIMENIONS 540mm x 505mm x 400mm
6. MEASURING ACCURCY 0.001mm (0.0005”)	7. VOLTAGE see manufacturers label
8. LAMP 12v 100 Watt	9 CURSOR metric / imperial

Table 4 - Technical Specification

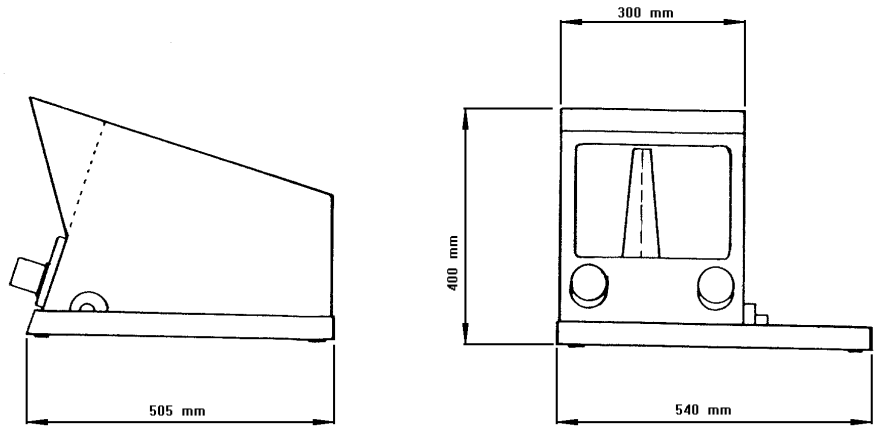

Figure 6 - Visual seam gauge dimensions

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Obtaining & Measuring An Image

To obtain an image of the can on screen (see Figure 2) :

Place a prepared section of the can against the objective mounting (item 17) on the right hand side of the visual seam gauge screen.
A prepared can is one which has been cut and prepared on an *Arundle Optical Instruments* Can Saw (CS1 or CS2) according to instructions.
The two cuts **MUST NOT** be central about the centreline of the can. One cut however, **MUST** be on the centreline in order to produce an accurate image of the can seam.

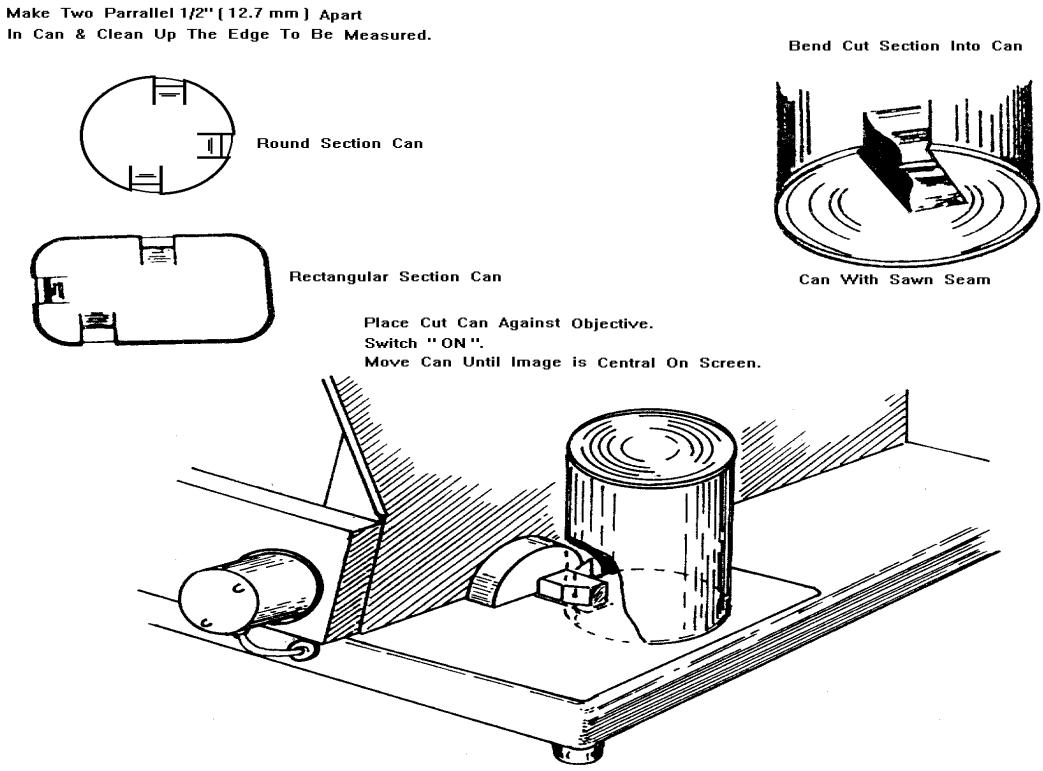


Figure 2 - Preparing The Can & Positioning Of Can To Gain Image

Adjust position of can until the image on the screen is in sharp focus.

Once a good image has been obtained, the various horizontal features of the section of the can be measured on the screen (item 0/70).

Move the cursor (item 95) to the left hand side of the seam to be measured. Align the centre line on the cursor (item 95) with the edge, press the red zero button (item 98) to zero the L.E.D display.

Turn hand wheel clockwise (item 96) to move the cursor (item 95) to the right hand side of the part being measured and read the measurement from the L.E.D display.

Note the parameter in the appropriate position on inspection sheet and repeat the operation for subsequent parameters until all parameters have been measured.

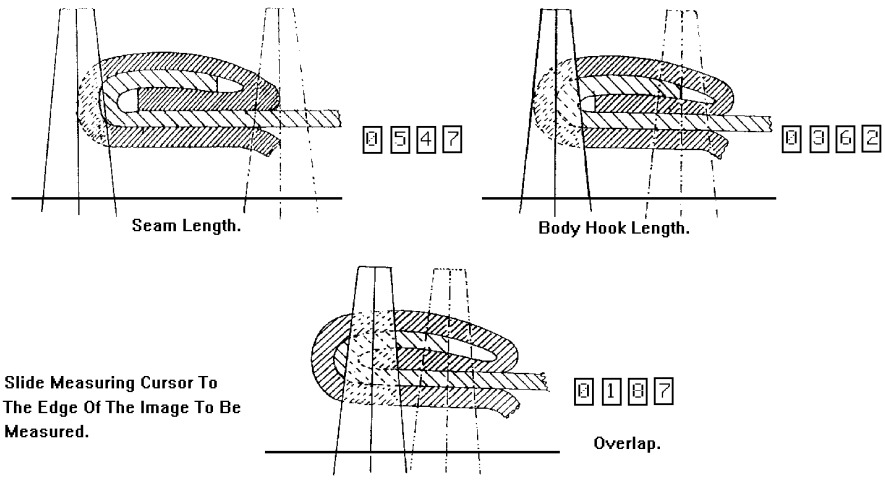


Figure 3. Some of the various measuring positions

Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments Measuring using software

Measuring with software. Turn on visual seam gauge and computer.
Access MIS software on computer via screen icon.
Log on from “file” on left-hand side of tool bar, select user name and insert password.
Dialogue box confirms identification, click on.
Click onto “measure” from tool bar and measuring screen will appear, select measuring file to be used from measuring screen buttons.
From measuring screen buttons select “Take measurement” and a Bitmap seam representation with pre programmed measuring points will appear (see Figure 7), red line indicates the point to be measured.

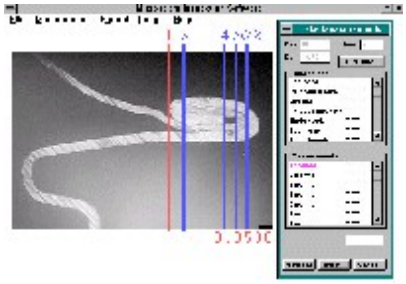


Figure 7

Obtain an image of the can on the seam gauge screen (see Figure 2) :
Place a prepared section of the can against the objective mounting (item 17) on the right hand side of the visual seam gauge screen.
A prepared can is one which has been cut and prepared on an *Arundle Optical Instruments* Can Saw (CS1 or CS2) according to instructions.

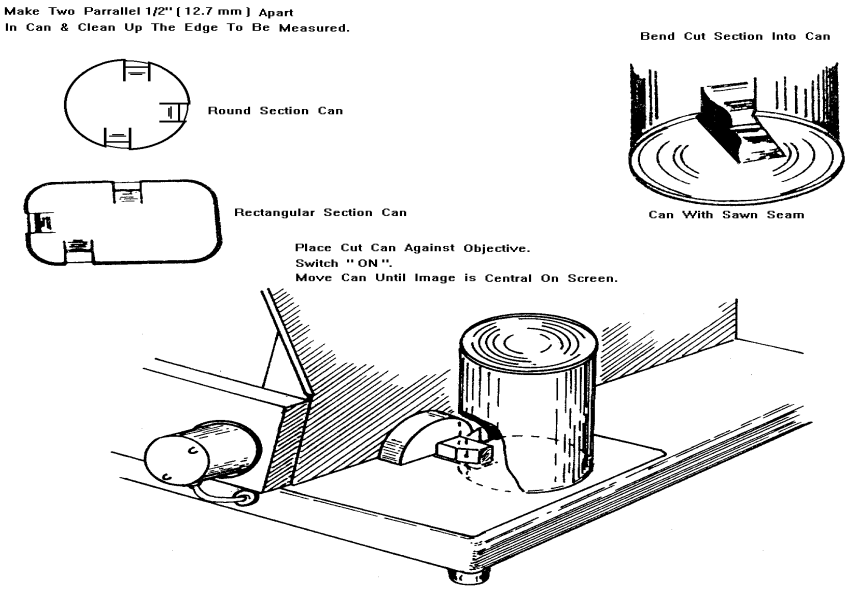


Figure 2 -Preparing the can & positioning of the can to gain image.

The two cuts MUST NOT be central about the centreline of the can. One cut however, MUST be on the centreline in order to produce an accurate image of the can seam (see specimen preparation).

Adjust position of can until the image on the screen is in sharp focus.

Once a good image has been obtained, the various horizontal features of the section of the can be measured on the screen (item 0/70).

Move the cursor (item 95) to the far left hand side of the seam to be measured.

Align the centre line on the cursor (item 95) with the edge, press the red zero button (item 98) to zero the L.E.D display.

Turn hand wheel clockwise (item 96) to move the cursor (item 95) to the next measuring position as indicated by red line on the computer screen (see Figure 10).

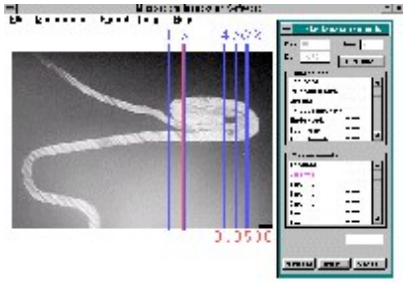


Figure 8

When position achieved click on to next on computer screen, red line moves to next measuring point, move cursor to that point, click on next on the computer screen and click on next when that point is achieved.

Repeat procedure until all parameters have been measured.

Image measuring points

Seam length = 1 to 8

Body hook length = 3 to 6

Countersink depth = 1 to 9

Seam gap = 2 to 3

Actual overlap = 5 to 6

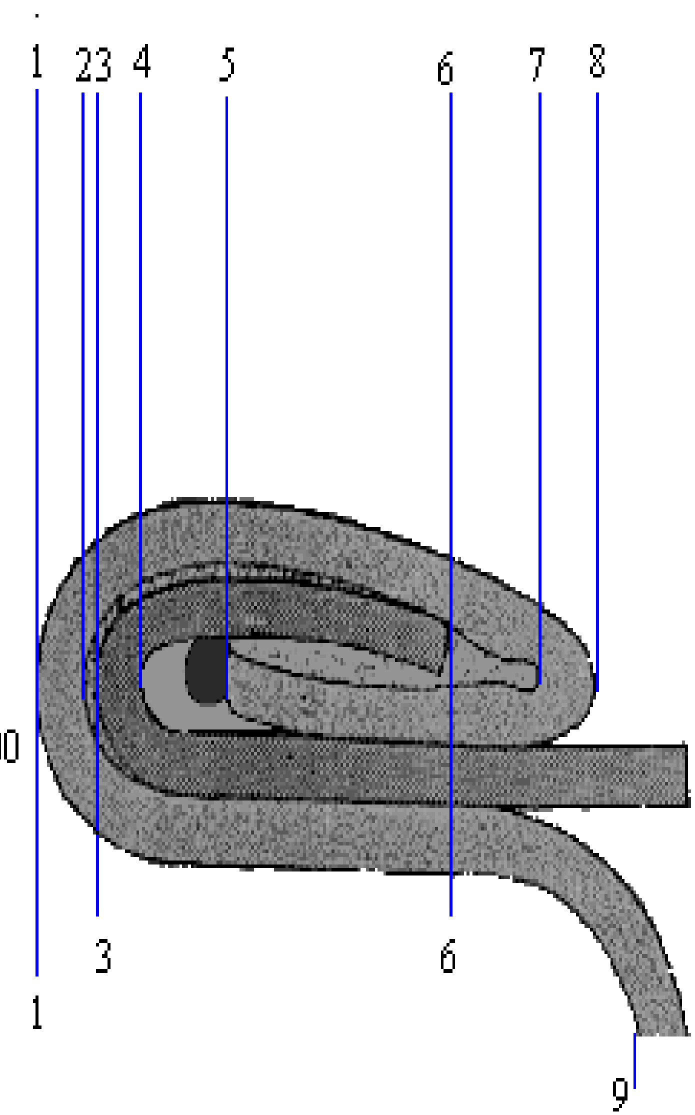
End hook = 5 to 8

Internal seam length = 4 to 7

Internal body hook = 4 to 6

% Body hook butting is calculated as follows.

$$\% \text{ Body hook butting} = \frac{\text{Internal body hook length}}{\text{Internal seam length}} \times 100$$



Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments MIS software

Microseam visual seam gauges have an LED display with on board processor, this emits an RS232 signal every half a second to give real time input to our MIS software package.

Our windows based MIS software is designed to work in conjunction with microseam visual seam gauges and independent stand alone gauges with RS232 output (see gauges section page).

Data is transmitted from a 9 way D-plug from the rear of the instrument via a mouse extension lead to the computers COM port.

The simple Bitmap set-up screen prompts administrator to construct the measuring file in the order that the individual customer requires.

Once initial measuring file has been constructed then any subsequent files are simply copied over and modified.

Software has the following features:

3 levels of password security.

Day / date data retrieval.

Batch coding.

Auto-sequencing of cuts.

Standard deviation on screen at the end of each measuring cycle.

Data export to word processing software.

Note facility.

Graph's for statistical process control.

Computer on screen graphic display with defined measuring points when taking measurements with visual seam gauge or optional independent gauges.

Note: for fully automatic inputs of all seam parameters, visual seam gauge must be used in conjunction with the appropriate optional independent gauges.
It is recommended that end component and body wall thickness are measured using a plate thickness gauge and seam thickness is measured using a double seam measuring gauge to achieve constant measurements. *(see procedure page step 4 for details).*

Measuring points page is for reference only, when setting up data files measuring point numbers must be adjusted i.e. seam length is not necessarily 2 to 9 but may be 1 to 7, depending on how many parameters are required to be measured.

With a small amount of training less skilled personnel can operate MIS software to an acceptable standard, freeing senior staff to concentrate on other aspects of product quality control.

For a demonstration version for evaluation contact.

Arundle Optical Instruments, 20EvansRoad,Willesborough,Ashford,Kent,TN24 0UA England.
Telephone / Fax +44 (0)1233 633766 or email stevegoble@arundle-optical-instruments.com

Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments MIS Software (continued)

Setting up a 1st operations file.

Microseam software was primarily designed for use with microseam visual seam gauges and modified to accept direct inputs from independent digital gauges with RS232 output.

It is possible to construct data files that have **NO** direct inputs to data file, however when prompted for measuring points insert the minimum quantity **two (2)** and as 1st operation checks are performed without sectioning but software requires cuts on prompt insert **one (1).**

View image 000000022.bmp in MIS software image file, this image is a 594 x 382 x 256 colours screen which has operator instructions.

Once initial data files are set up use copy facility to construct future data files and modify as required.

Separate visual defects file.

As with 1st operations file, to set up use visual defects screen with operating instructions Image file 000000023.bmp and set up as previously described, with minimum measuring points **two (2)** and cuts **one (1)** again no sectioning is required but the program requires these parameters.

With type of file as with all MIS software files input has to be numeric, set **lower limit** tolerance to **0** and **upper limit** tolerance to **0.00001**.
It is then just a case of inserting **0** in the appropriate place when **NO defect** is found and inserting **1** for a **defect** when observed.

Adding images.

If there is no image in the library that is compatible to represent the seam to be measured, section the appropriate can, place on visual seam gauge and photograph directly from frosted measuring screen with a digital camera or a 35mm single lens reflex camera on a tripod, adjusting f- stop and exposure time to achieve a reasonable image.

If using film, image will require scanning and resizing to 594 x 382 .

Digital camera image will be required to be rescaled to 594 x 382.

Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments Optional gauges

Gauges.

All gauges shown on these pages are available in analogue or digital versions, metric or imperial.
Digital versions have an RS232 output for interface with our MIS software package and provide automatic data transfer.

Countersink depth gauge.

For the measurement of the countersink depth of food and beverage cans.

Plate thickness gauge.

For measurement of body and end plate thickness.

Double seam measuring instrument.

For the measurement of double seam thickness prior to sectioning.

Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments Optional gauges

Overall can height comparator.

For the precise measurement of height of flanged cylinders and cans with one end or both ends fitted.

This instrument can also be used to measure trimmed can height and necked can height of two piece cans and necked / flanged cylinder height.

Also open can height and height over cone on aerosols.

Flange width gauge.

For measurement of flange width on cylinders of open cans.

Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments Suggested procedure

Procedure for visual seam gauge inspection

Step 1.
Collect cans from production area, removing one can from each closing head numbering them to correspond to the appropriate head and indicating the user end.

Step 2.
Remove to Quality Assurance laboratory.

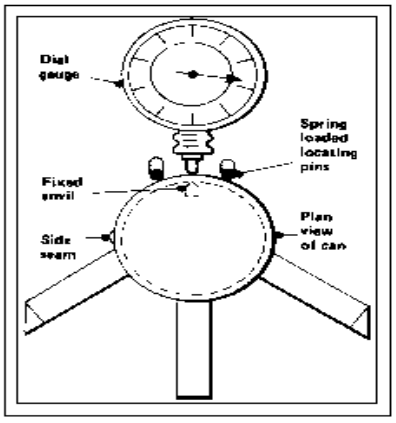
Step 3.
Carry out visual inspection for defects. (see visual inspection defects pages)

Step 4.
Measure seam thickness of the user end using a seam thickness gauge or seam micrometer and note measurement on the inspection sheet in the appropriate position.
(This is carried out prior to sectioning as spring back of material may occur once sectioning has been performed, giving a larger measurement).

Seam micrometer

Double seam measuring instrument

Double seam measuring instrument.
This instrument is less susceptible to operator error and may be used by less experienced personnel to achieve accurate measurement.



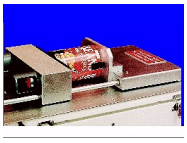
Seam thickness gauge

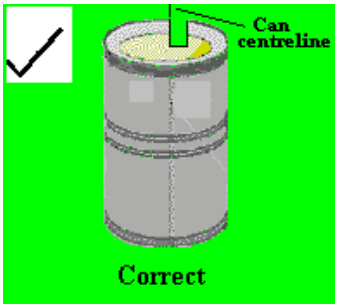
Double seam measuring instrument line drawing

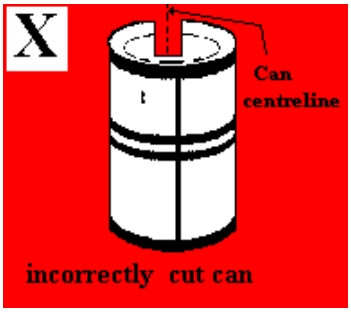
Step 5.
Measure countersink depth using optional countersink depth gauge as a measuring point is not guaranteed using standard field of view visual seam gauges.

Step 6.
Evacuate contents of the can (Remove manufacturers end if required)

Step 7.
Section user end, with a *Arundle Seam Sectioning Saw* and the correct Seam Fixture fitted.
(If saw does not have seam fixture then ensure that cut is as green can picture)

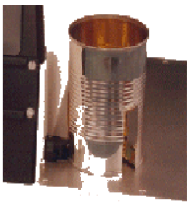


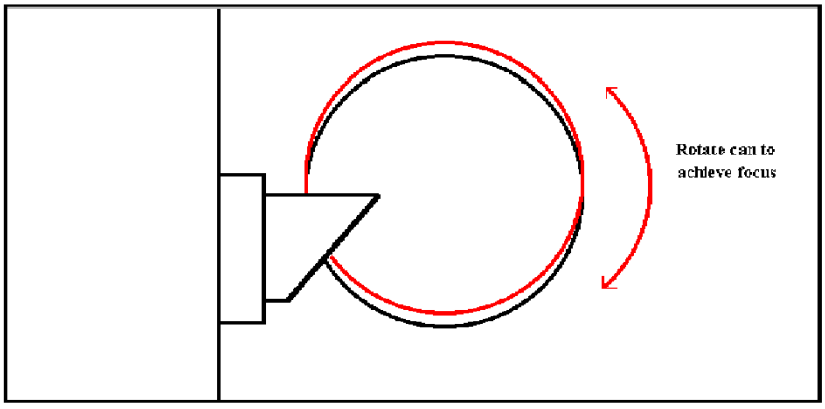




Step 8.
Use rubber provided to enhance cut, gently rub edge to be viewed.

Step 9.
Place sectioned can onto Visual Seam Gauge specimen table (as shown)





Step 10.
Rotate can as shown by red section in line drawing to achieve bright sharp image, keeping prepared edge to objective mirror mounting..

Step 11.
Measure parameters required, automatically input data to software package or manually note reading in the appropriate position on the inspection sheet. (See seam image measuring points page)

Note.
If cans supplied are not Guaranteed for closure of manufacturers end, then a quantity must be inspected on that end to satisfy the quality of the total package.

Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments Specimen preparation

Sectioning cans.

Collect cans from the production area, remove one can from each closing head numbering them to correspond to that head and indicate the user end.

After checking for visual defects, measure seam thickness, insert data into *Arundle MIS software package via keyboard* or write onto inspection sheet in the appropriate position.

Using an *Arundle seam sectioning saw* with correct *seam fixture* (see Figure 9) place can into seam fixture as close to measured seam thickness position (so cut comes where measured), move switch bar to clamp can.

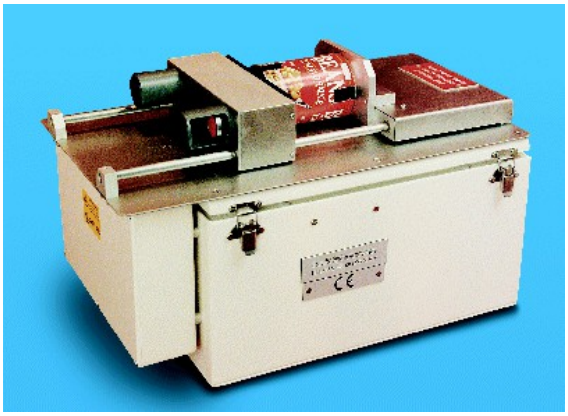


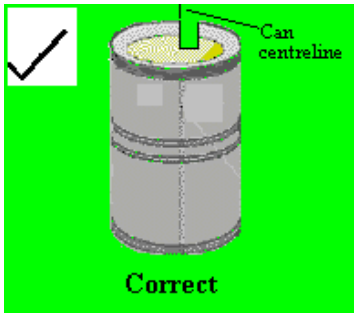
Figure 10 - Seam sectioning saw with seam fixture attached.

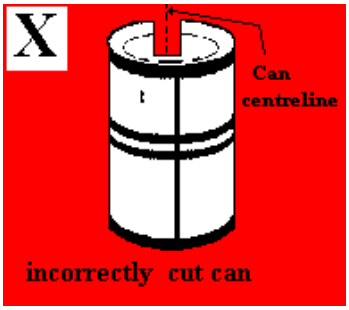
Note: Operator should **always** wear ear defenders and safety goggles supplied with *Arundle seam sectioning saw.*.

Press both buttons to start saw, gently move switch bar and can backwards towards blades, maintain a constant pressure and speed until can is cut, switch off saw ,allow blades to stop, allow can and switch bar to come forward to clear blades.
Rotate can to next sectioning position and repeat cutting procedure. Repeat procedure until as many cuts as desired has been achieved.
Once all cans have been sectioned take pliers which have been supplied with *Arundle seam sectioning saw* and depress the sectioned segments back into the body of the can.
Finally take rubber that has been supplied with *Arundle seam sectioning saw* and gently rub the edge to be viewed.
Sectioned cans are now ready for visual seam gauge inspection (see measuring using software or basic measuring for appropriate measuring technique).

Notes.

Sectioning CAN NOT be performed manually as specimen can not be cut accurately or consistently enough to produce an image of sufficient quality to inspect, a mechanical saw is required.
If using another manufactures saw, ensure can is cut as prescribed by *Arundle* as instrument has been set to this standard.





MAINTENANCE INFORMATION

PAGES 16 to 24

Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments Cleaning

Paint work:

To clean paint work use warm water a minute amount of detergent and a soft cloth.

Simply moisten cloth with water detergent mixture and clean.

Screen:

To clean screen use methylated spirits and a soft cloth.

Optical cleaning.

Arundle visual seam gauges are designed for minimal maintenance, however from time to time due to the fact that the instruments are not fully sealed cleaning of optical elements may be required.

For this purpose the following items are required a commercially available optical cleaning fluid, a soft cloth purchased specifically for cleaning optical components and a clean air source (puffer type).

As lens systems are sealed in cells, generally all that is required is a to remove dust from external faces using a clean air source.

For reflective surfaces (mirrors) use clean air source to blow any dust from the components surface.

If foreign mater is on reflective surface, moisten a small area of the cloth with optical cleaning fluid and gently apply to component in a straight lines, never in a circular motion.

With a dry part of the cloth gently remove liquid residue again removing in straight lines in the same plane as applied and finally use clean air source to blow away any dust.

It is extremely important that the objective mirror (closest to can specimen) is clean, from experience image quality can be greatly improved just by cleaning this mirror.

It is recommended that a spare objective assembly or a spare mirror is kept in stock.

Replacing the Lamp.

To replace the lamp :

Remove plug from mains electrical supply.

Tilt instrument backwards on to a soft cloth as not to damage the paint work.

Remove the large under tray from the rear side of the instrument (4 x M4 screws).

Remove the faulty lamp, **DO NOT** move any bracket.

Remove lamp from the box, cut the clear plastic protective envelope at the contact end.

Grip the plastic envelope and slide lamp down so that the contacts are exposed.

Insert lamp fully into lamp holder.

Re-assemble in reverse order and stand instrument in normal position.

CAUTION !

DO NOT TOUCH THE GLASS ENVELOPE (OUTSIDE OF LAMP) OR SCREEN WITH BARE FINGERS !

Note.

If lamp is accidentally touched, clean immediately using methylated spurts as acid from the fingers will etch into the glass envelope.

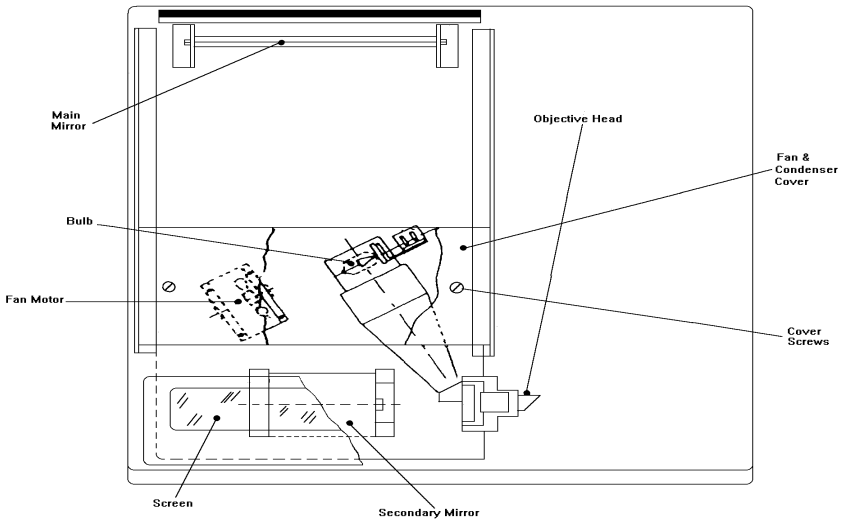


Figure 9 - Optical adjustments

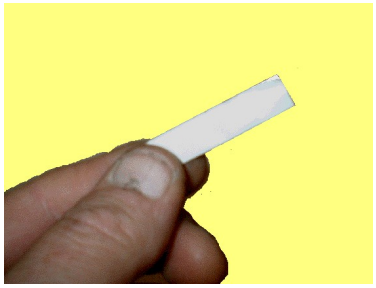
NOTE:

Allays use type 7724 long life 12volt 100Watt gy6.35 projection lamp, with flat transverse element.

Microseam Visual Seam Gauge for 2 - 3 piece cans

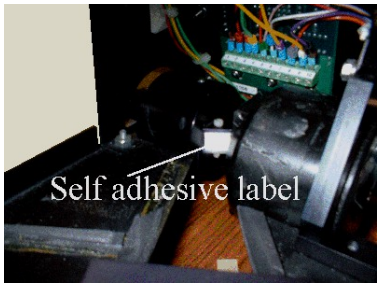
Arundle Optical Instruments Focusing lamp element

Focusing the element.

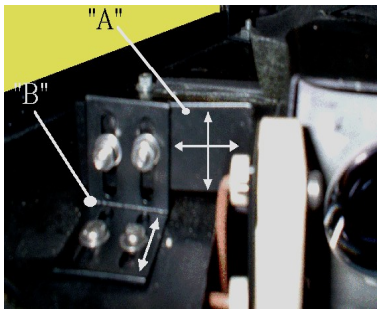


Focusing the lamp element onto the face of the beam splitting prism is extremely important and requires to be as central as possible in both axis to achieve the maximum
light input.

Use a self adhesive label white, cut a strip 10mm x 30, the width is important length is not.



Remove the backing from the label and carefully stick the label on the face indicated.



There are 2 lamp brackets “A” & “B”, they move in the directions indicated.

Both brackets are secured by 2 off M3 screws, M3 washers and nuts, bracket “B” holes in optical mounting plate are also tapped.

Release bracket “A” nuts so that bracket moves, but is firm and can move horizontally and vertically.

Release bracket “B” nuts positioned on the under side of the optical mounting plate, unscrew screws so bracket is firm and can move horizontally.

Using Industrial grade welding goggles only (**NEVER SUN GLASSES**), turn on instrument and adjust bracket ”B” until bulb element appears on the label.

Adjust bracket “A” to centralise element in both axis.

when optimum focus is achieved re-tighten brackets one set at a time observing image to maintain optimum focus.

When happy remove label from prism face, clean the face of prism with methylated spirits and an optical cloth or soft tissue.

NOTE:

See lamp replacement page for lamp details.
Only use specified lamp for best results.

Focusing the Image

If after transporting the visual seam gauge, the image is NOT in focus :

Lift the seam gauge at the front so that the screen is facing skyward.

Remove the 4 (four) screws on the bottom of the unit that retain the under tray.

Remove cover.

Switch 'ON' the visual seam gauge.

Place a sectioned can seam against the objective head and rotate until the brightest possible image is displayed on the screen.

Loosen the M3 socket head cap screw on the objective lens mounting (item 18) and adjust position of the lenses until a focused image is achieved.

Tighten the M3 socket head cap screw.

Replace the under tray.

Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments Instrument Calibration

Calibration

To calibrate :

Use an *Arundle* supplied calibration piece, place onto the visual seam gauge specimen table, focus until image is clear and defined.

Set the cursor on left hand edge of the image and press the 'ZERO' button.

Move cursor to other side of slip to be measured and compare the actual measurement to the value displayed on the L.E.D. display.

To Alter Calibration.

Should the result not be the same, remove the hood by unscrewing the 5 (five) screws from the hood and lifting from the base.

Adjust the rear mirror (item 0/68) so that the value displayed on the L.E.D. equates to the actual dimensions of the test piece.

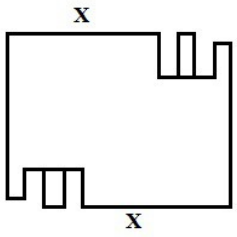
Moving the mirror forwards decreases the size of the image. Moving the mirror backwards increases the size of the image.

When calibrating the instrument it is of paramount importance to place the setting piece flat against the objective head.

Failure to comply with the will render an inaccurate calibration of the instrument.

See below to ensure procedure is carried out correctly.

NOTE: PIN FACE MUST BE IN LINE WITH EDGES MARKED "X".



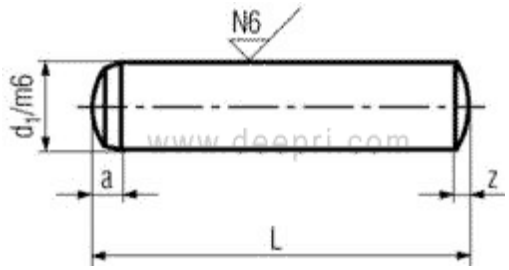
OBJECTIVE MIRROR MOUNT IS STEPPED TO CORESPOND TO SETTING PIECE, POSITION SO CALIBRATION PIN IS IN VIEWING AREA AND ENSURE THAT MOUNTING BLOCK IS FLAT AGAINST THE OBJECTIVE MOUNT.

Calibration Piece Details

Arundle Optical Instruments calibration pieces are manufactured using commercially produced hardened and tempered dowel pins to DIN-6325 standard.

One end of the dowels are ground square to the length to produce a sharp edge, this provides a flat surface of the sectional area of the diameter for viewing.

1 off nominal 2mm and 1 off nominal 2.5mm diameter dowels are mounted into a black anodised retaining block, this enhances the contrast for viewing.



*All measurements in millimetres (mm)

d	a approx.	z approx.
M0.8	0.46	0.12
M1	0.48	0.15
M1.5	0.62	0.23
M2	0.78	0.3
M2.5	0.95	0.4
M3	1.1	0.45
M4	1.4	0.6
M5	1.7	0.75
M6	2.1	0.9
M8	2.6	1.2
M10	3	1.5
M12	3.8	1.8
M14	3.8	2
M16	4.7	2.5
M20	6	3

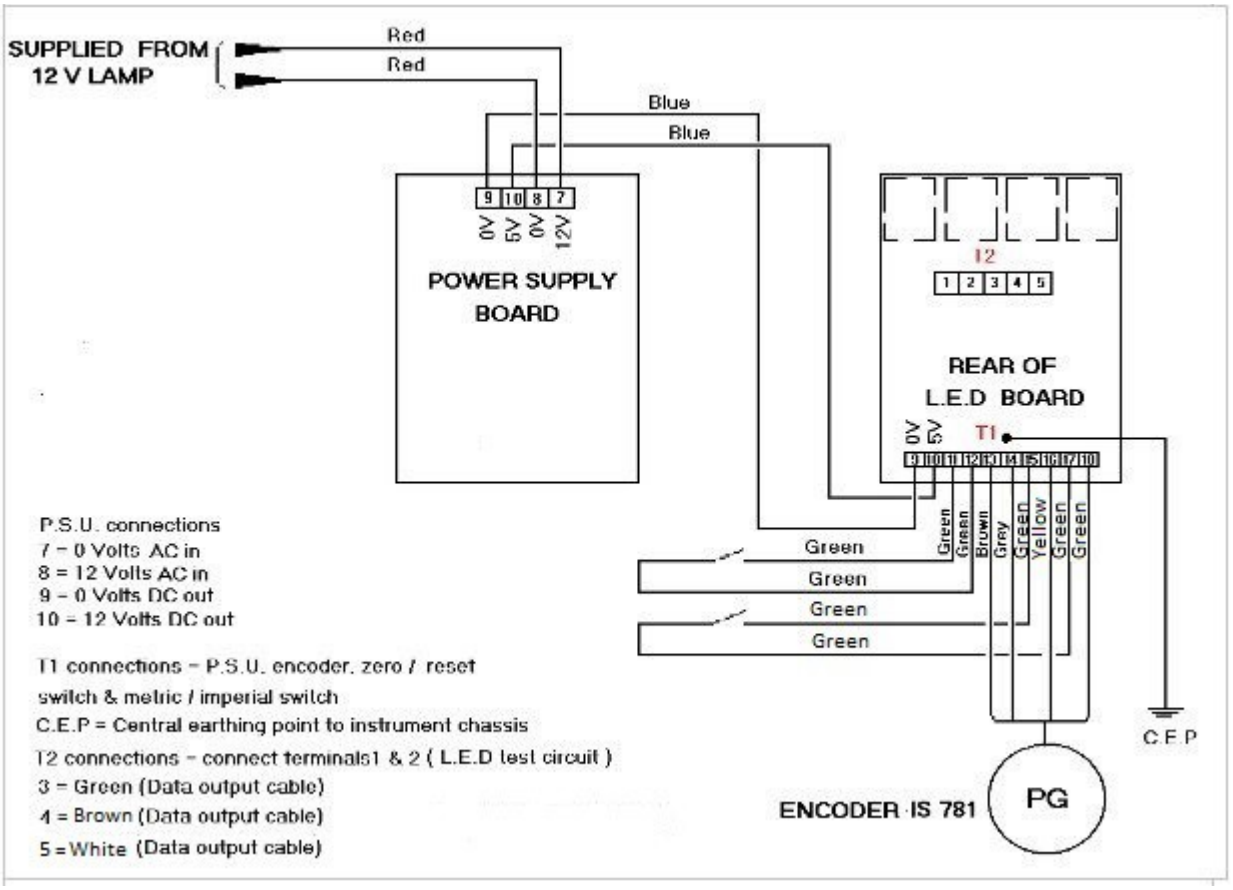
ISO-Tolerances for Metric Fasteners

Nomimal Dimension		Tolerance Zone in mm (external measurements)					
Over	To	h6		h8		m6	
0	1	0	-0.006	0	-0.014	+0.002	+0.008
1	3	0	-0.006	0	-0.014	+0.002	+0.008
3	6	0	-0.008	0	-0.018	+0.004	+0.012
6	10	0	-0.009	0	-0.022	+0.006	+0.015
10	18	0	-0.011	0	-0.027	+0.007	+0.018
18	30	0	-0.030	0	-0.033	+0.008	+0.021

*All information is strictly informative

Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments L.E.D circuit diagram



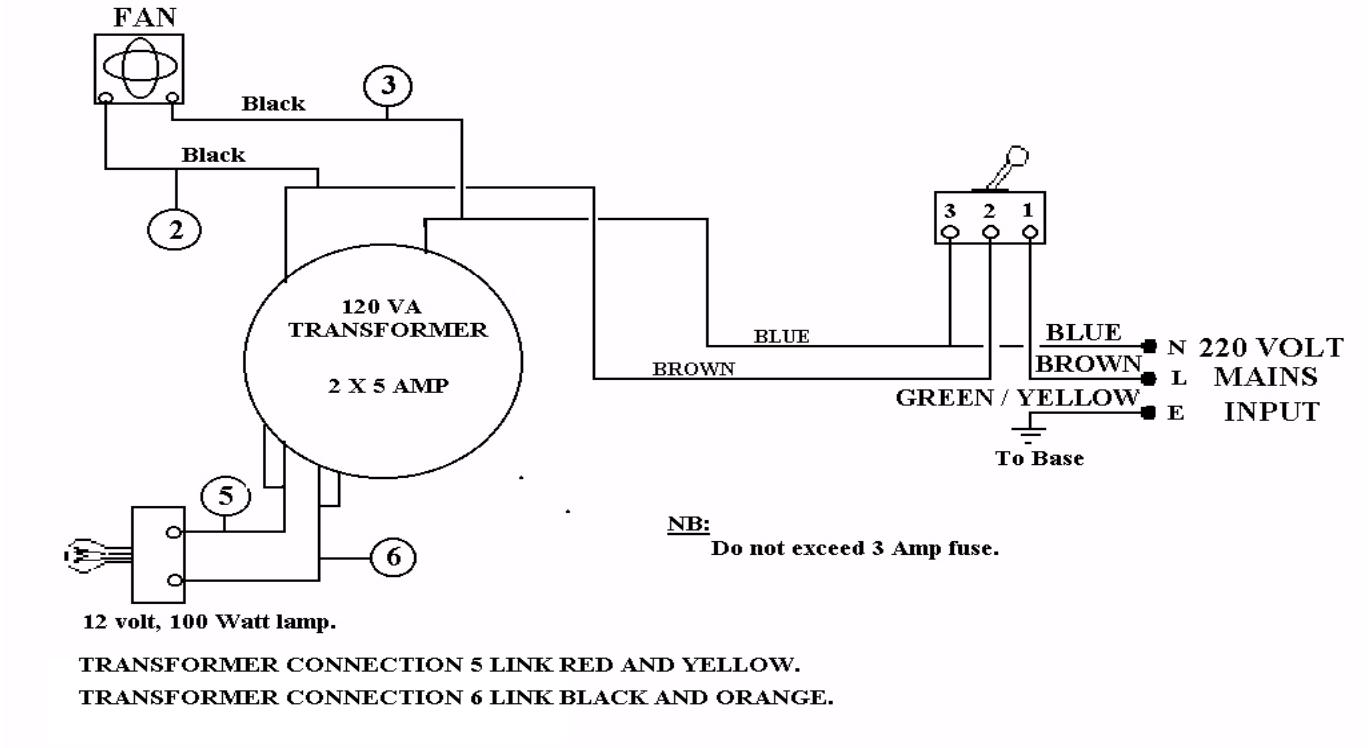
E - SEAM 0001 -01

Any work carried out on this circuit should be done by a qualified electrician.

This circuit must be earthed.

Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments Electrical circuit diagram



E - SEAM 0001 - 02

Any work carried out on this circuit should be carried out by a qualified electrician.

This circuit must be earthed.

Ref No	Part No	Description
3	81/1/3	Cover
4	81/1/4	Front panel
17	81/1/17	Objective mounting
18	81/1/18	Objective lens mounting
55	81/1/55	Bracket, Lamp adjusting
56	81/1/56	Bracket, Lamp holder
115	81/1/115	Specimen plate
118	81/1/118	Base
0/61	OL417/418	Objective lens
0/62	OL419	Lens
0/53	OL420	Lens
0/64	OL421	Lens
0/65	OM91	Objective mirror
0/66	OM92	Mirror, lower
0/67	OM93	Mirror, upper
0/68	OM94	Mirror, rear
0/69	OP35	Prism
0/70	OG24	Screen
0/73	M2002	ON / OFF switch
0/75	M2004	Lamp
0/80	M2005	Compact fan
0/95	M2006	Dual voltage switch

Table 3 -Catalogue Of Parts

GENERAL CAN SEAM INFORMATION

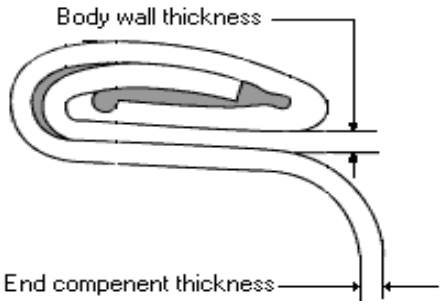
PAGES 25 to 30

Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments Seam thickness & free space

Objective.

To measure the perpendicular layers of metal in the seam and calculate free space.
A double seam comprises of two layers of the body hook and three layers of the end component or cover hook.(This results in five overlapping layers as shown below.)



Seam thickness can be an indication of how tight the seam is, (If seam is loose the thickness will be larger and so will be the free space within the seam formed).

Procedure.

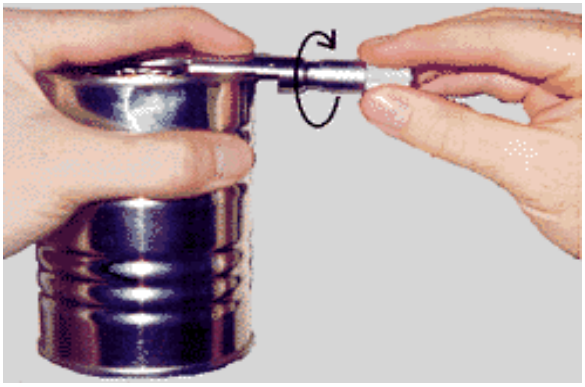
Measure the seam thickness of the can with a seam micrometer or a double seam measuring instrument.

Seam micrometer

Double seam measuring instrument

To measure using a seam micrometer, place the micrometer on the top of the double seam so that the seam lies between the anvil and the spindle screw,

Hold the micrometer level by balancing it with the index finger, do not hold the tip of the micrometer as the anvil will not be able to adjust to the internal seam wall and will cause false readings.

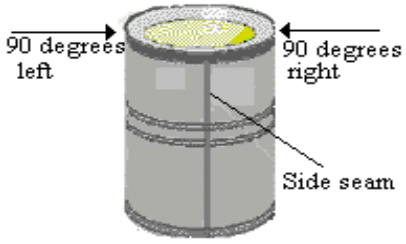


Microseam Visual Seam Gauge for 2 - 3 piece cans

Arundle Optical Instruments Seam thickness & free space

Adjust the micrometer thimble until a snug fit on the seam is achieved, be careful not to over tighten as this will compress the seam giving a smaller reading.

The thickness is usually measured in two positions, 90 degrees left and right of body seam and the average recorded on the inspection sheet.



Notes.

On food cans thickness should never exceed a maximum of 0.053” or 1. mm.

Seam thickness micrometers are available in Imperial and Metric and require a skilled operator to achieve accurate readings.

Free space.

Free space is calculated as follows.
Free space = Seam thickness - (2 x Body wall thickness) - (3 x end component thickness)

Example.
Free space = 0.048” - (2 x 0.008”) - (3 x 0.0085”)
Free space = 0.048” - 0.016” - 0.0255”
Free space = 0.00652”

Recommendation.

Always obtain manufacturers specifications

Individual component thickness. .

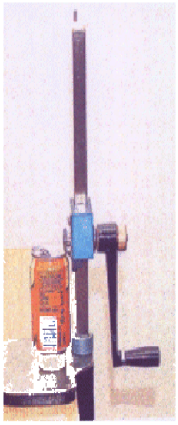
To achieve the most accurate results for free space calculation, body plate and end component thickness should always be measured. (Unless manufacturers absolutely guarantee component size).

Hand held and bench mounted plate gauges

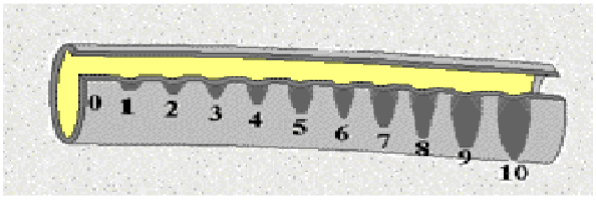
Microseam Visual Seam Gauge for 2 - 3 piece cans

Tightness rating.

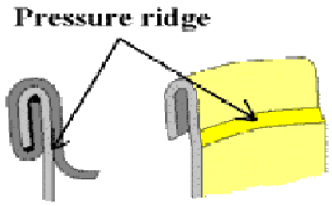
Cans that have been inspected by seam sectioning are not suitable for tightness testing as a section of the circumference has been removed, however on the remaining portion of the circumference visual checks can be carried out for droop's, knock down flanges,ect. (See visual inspection defects pages)
To perform a full tightness check another batch of cans is required, to separate the end component hook from the body hook cleanly an end removal tool is used. (shown below)



Tightness rating is a numerical assignment given for the degree of wrinkling on the inside of the end component hook, a rating of 0 to 10 is used with 0 being the smoothest or most ironed out and 10 being a wrinkle that completely extends down the end component hook as shown.



Tightness rating is a very subjective measurement that requires experience and skill to determine successfully.
As the seam is being formed the end component hook curls under the body hook in the first closing operation roll and is then ironed flat in the second operation roll.
It is this ironing which causes the different degree of tightness or wrinkle.
At the second operation roll a pressure ridge is also formed as seen in the figure below.



This small indentation is formed by the second operation roll pressing the metal against the seaming chuck.

Note.

A pressure ridge is a good indication of a tight seam and is often completely missing in a loose seam.

The danger of excessive wrinkles is that they provide a pathway for the ingress of micro organism's into the can.

Recommendations.

Carry out seam tightness checks with previously applied frequency.

Maintain manufacturers specification and carry out seamer maintenance on a regular basis.

Microseam Visual Seam Gauge for 2 - 3 piece cans

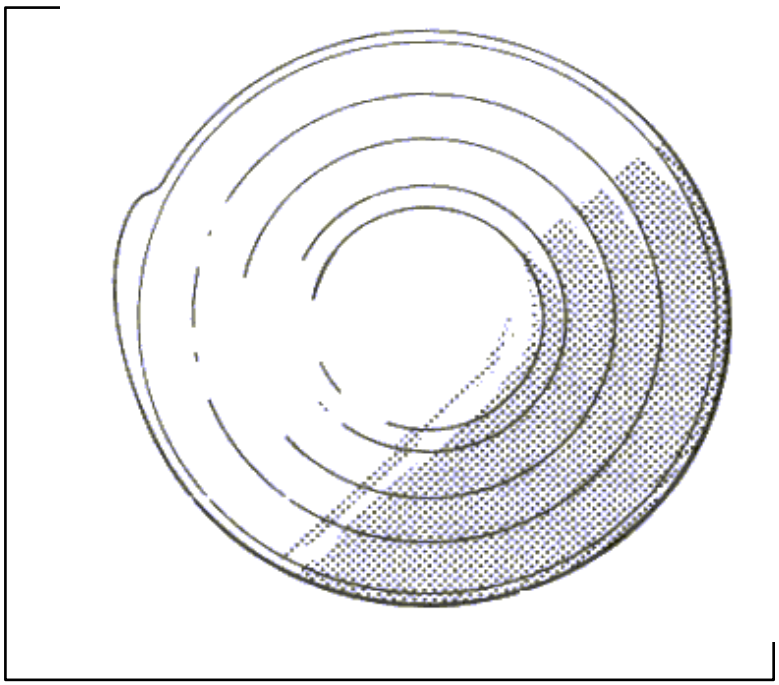
Arundle Optical Instruments Visual inspection defects

Visual inspection for defects

Some defects are more readily detected by touch than by sight, run fingers round the can to check for any roughness or unevenness. Touch will assist in finding some of the following defects.

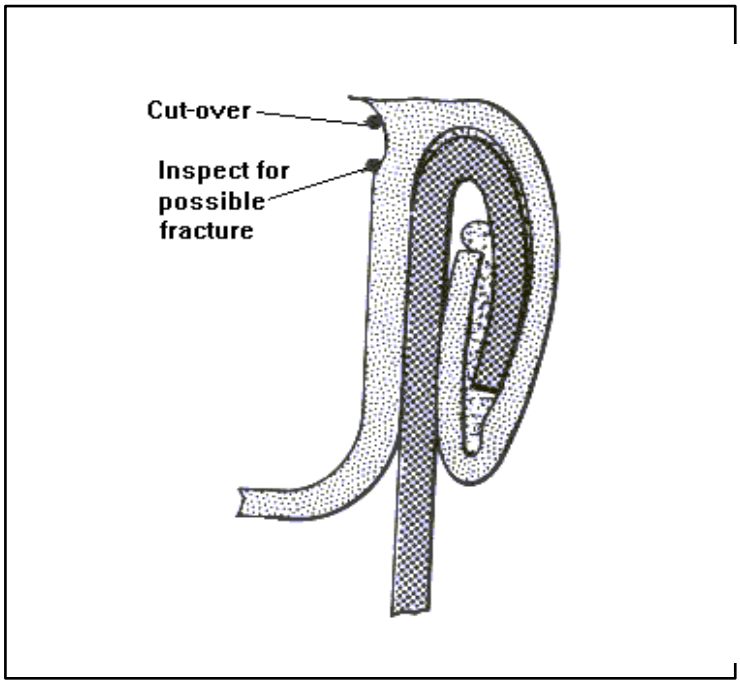
(1) Skidders
(2) Cut overs
(3) Knocked down flanges
(4) False seams
(5) Split droop

Skidders may be caused by
(1) Insufficient base pressure.
(2) Seaming rolls not rotating freely.
(3) Worn seaming chuck.
(4) Oil or grease on chuck.



Skidder

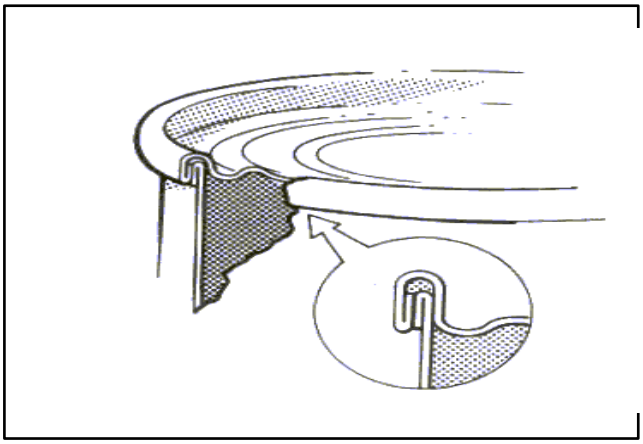
Cut over may be caused by.
(1) Excessive solder in side seam.
(2) Wear on seaming chuck.
(3) Wear on first or second operation seaming rolls and / or bearings.
(4) First or second operation seaming rolls are set too tight.



Cut over

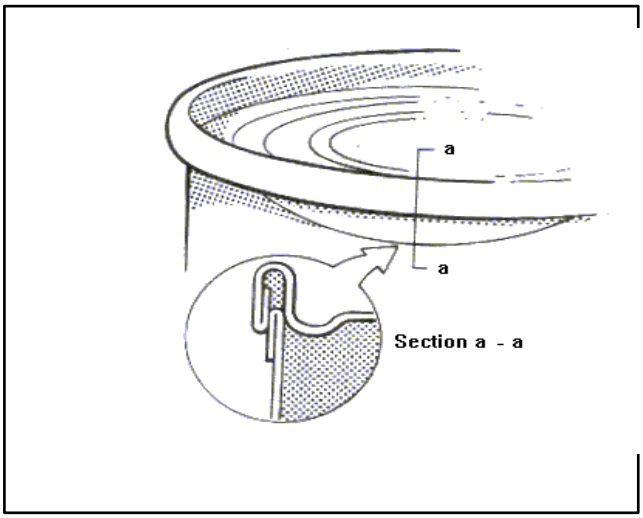
Visual inspection defects (cont)

False seam may be caused by.
(1) Damaged body flange.
(2) Mushroomed body flange.
(3) Damaged end curl.
(4) Ends not seating correctly on seaming chuck.
(5) Incorrect seamer setting.



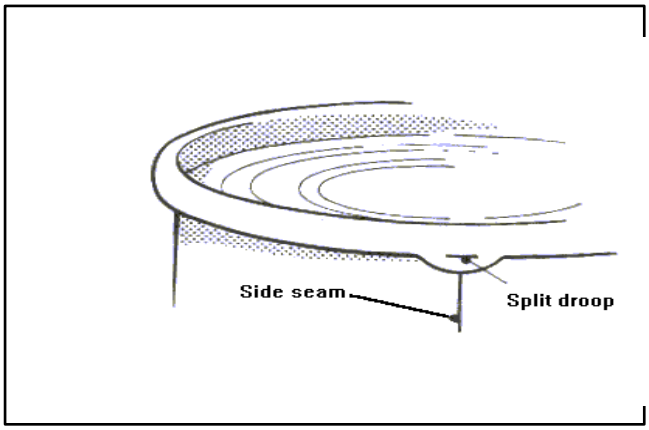
False seam

Knocked down flange may be caused by
(1) Damaged body flange.
(2) Mushroomed body flange.
(3) Incorrect seamer setting.



Knocked down flange

Split droop may be caused by
(1) Excessive solder in side seam.
(2) Excessive body hook.
(3) Excessive lining compound.
(4) Second operation too tight.



Split droop

INSTRUMENT CERTIFICATION

PAGE 31

Microseam Visual Seam Gauge For 2 - 3 Piece Cans

Arundle Optical Instruments Certificate of Calibration

Instrument Certificate of Calibration.

PROCEEDURE.

To verify the accuracy of Mitutoyo digital micrometer frame number 9097924 (manufacturers tolerance plus or minus 0.001mm , 0.00005") readings were compared to reference sizes of certified gauge blocks.

The above mentioned gauge blocks were certified by **K.B. Calibration Service of St Leonards-on-sea** and were measured to a National Standard via Laboratory Standards Set No 9011 (NAMAS certification No 02687) with measured results within specification of BS4311 Pt3:1993.

Hardened and tempered dowel pins manufactured to DIN-6325 with the end ground flat are measured three times to achieve an average size.

Instrument serial No. V.S.G. 000 has been calibrated using the calibration piece below.
.

Calibration Piece Number. 00101, (see separate certificate of calibration supplied with calibration piece.)

Nominal Pin Size	Instrument reading "A"	Instrument reading "B"	Instrument reading "C"	Average Size
2 mm				
2.5 mm				

Inspected.

Verified.

Date Inspected.

ARUNDLE OPTICAL INSTRUMENTS

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