Trade of Sheet Metalwork	
Module 4:	**General Sheet Metalwork**
Unit 2:	**135° Elbow**
	Phase 2

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Document Release History

Date	Version	Comments
10/11/06	First draft	
08/04/14	2.0	SOLAS transfer

Module 4 – General Sheet Metalwork

Unit 2 – 135° Elbow

Duration – 7 Hours

Learning Outcome:

By the end of this unit each apprentice will be able to:

- Read and interpret drawing for 135° elbow
- Produce elevation, half plan and development
- Calculate circumference, material required and production sequence
- Cut, deburr, roll, groove, swage, crimp, spot weld and assemble elbow by feather-edge welding
- Produce true shape of elliptical joint and use as template
- Complete job card

Key Learning Points:

D	Drawing and development of truncated right cylinders.
Rk	Correct sequence of operations and material requirements.
Rk	Correct procedure for laying out circumference on metal.
Rk	Types and positions of joints (cross and longitudinal).
Sk	Crimping of cylinder.

Training Resources:

- Tool kit
- Welding equipment
- Safety equipment and protective clothing
- Tools and machinery/equipment
- Job card
- 0.6mm galvanised mild steel
- Work sample
- Book – The Geometry of Sheet Metal Work

Key Learning Points Code:

M = Maths D= Drawing RK = Related Knowledge Sc = Science

P = Personal Skills Sk = Skill H = Hazards

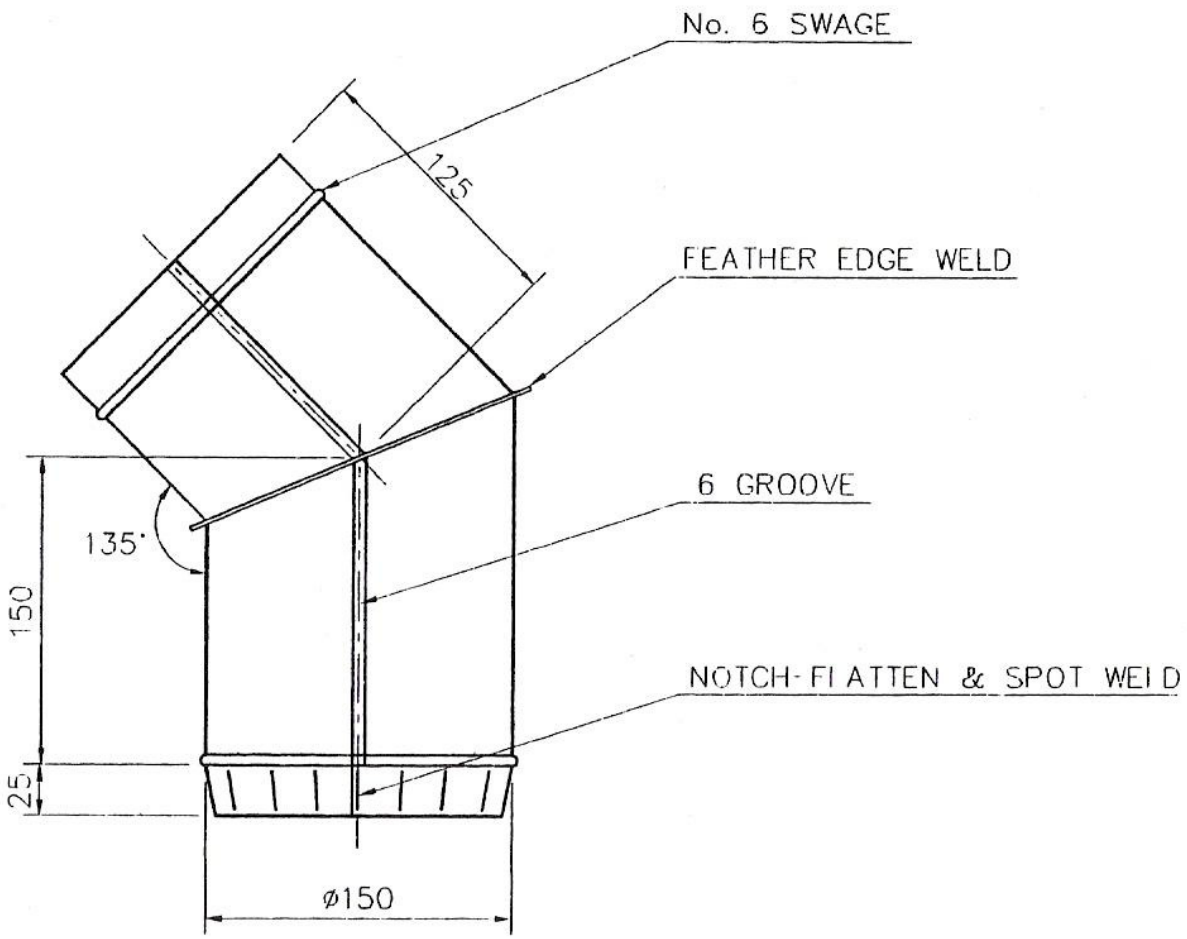

Figure 1 - 135° Elbow

Pattern & Elevation

The pattern for 'A' is developed by parallel line.

Note: Joint is on the short side. If we put the joint on 3 we get the so-called 'fish pattern'.

The fish pattern is more economical with metal and time.

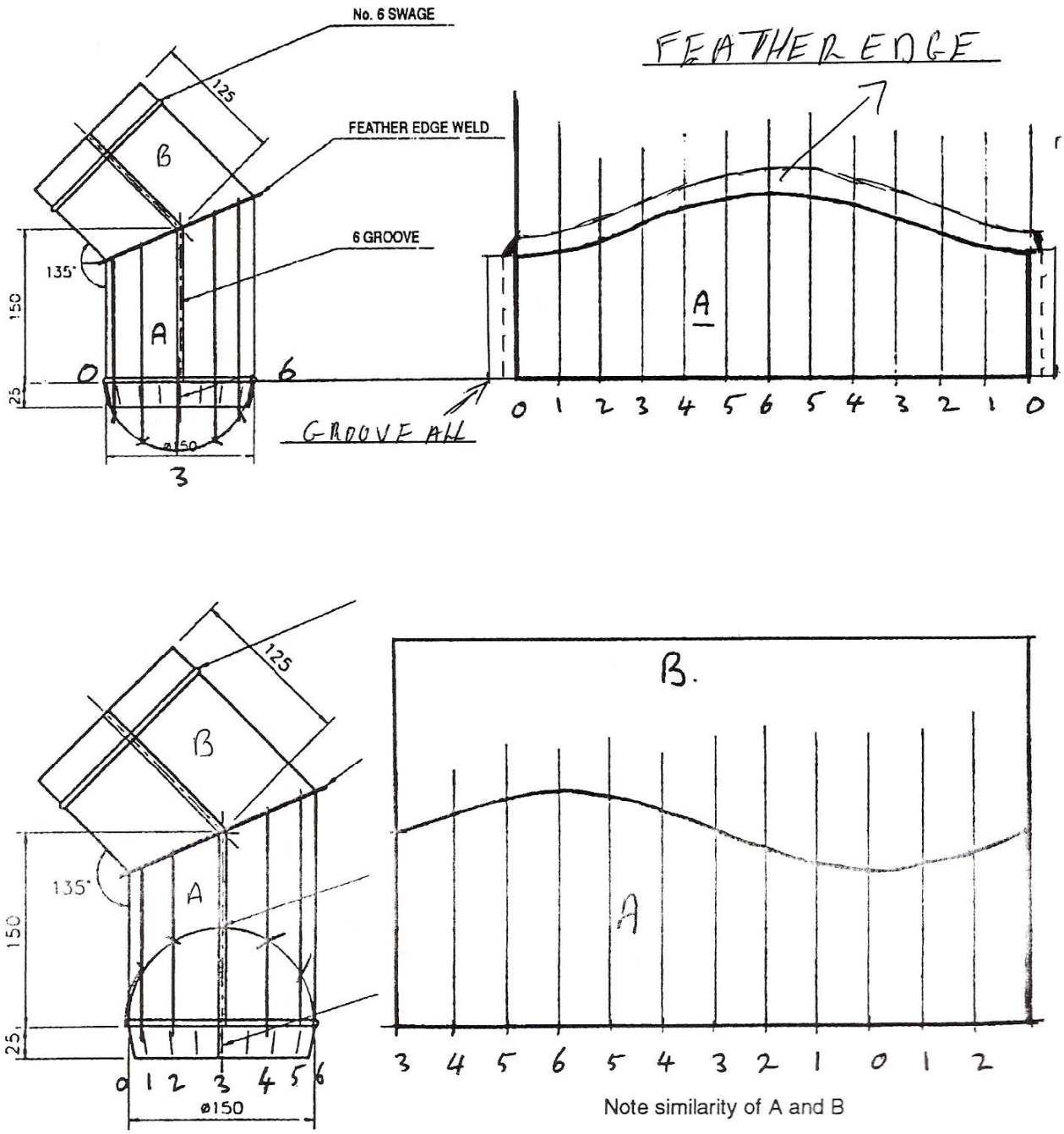

Figure 2 - Pattern and Elevation

We may use two pieces of metal for the two pipes being careful that their circumferences are correct. The height of the metal required is got by measuring the tallest part of the elevation and adding on approximately 10mm. This provides for the 5mm feather edge and a little extra metal to facilitate cutting away of the scrap.

Circumference example	$= 2\pi R$	or πD
	$= 2 \times 3.14 \times 75$	or 3.14×150
	$= 471$ mm	

An accurate way of laying out the 12 divisions is to divide 471 mm in 2 and we have the 6 line or middle point. $471 \div 2 = 235.5$.

Divide the 235.5 by 2 again and we have the position of both 3's; $235.5 \div 2 = 117.75$.

This guarantees us accuracy with points 3, 6 and 3. We get the other points by dividing the circumference into 12 equal parts as explained earlier. We only subdivide the spaces between 0 and 3; 6 and 3. This practice will prevent accumulative error in the spacing out of the 12 distances.

Take care to allow for the particular joint you may use, e.g. grooving; add on groove allowance on both sides.

On this job we are using a groove joint for the longitudinal seam. The cross joint is a paned joint or feather edge depending on the type of material used.

Self Assessment

Questions on Background Notes – Module 4.Unit 2

1. Name two longitudinal seams and give their allowances.

2. What is the formula for the circumference of a circle?

3. Why would you use a feather edge in preference to paned joint?

4. Why would you use a paned joint in preference to a feather edge?

Answers to Questions 1-4. Module 4.Unit 2

1.

a. Groove Joint = 1½ width of groove minus 2 x metal thicknesses on both ends of the item being made.

b. Lock form joint = 35mm on the large part and 8mm on the smallest.

2.

$2\pi R$ or πD π = PYE

3.

If thickness of metal is over 1mm thick, and it may simplify notching.

4.

When using light gauge metal its easier not to weld and also if using coated steel it prevents the coating being damaged during welding.

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