

Gillard Advanced Cutting Systems

Operating Instructions

Servo-Torq Rotary Cutting System

Issue 01/97/ST
Servo-Torq Cutting System

August 1997

English

Operating Instructions

S e r v o - T o r q M o d e l L T 5 0 B

Construction date

Serial No

Warning!

Ensure that all personnel involved in the installation, operation and maintenance of this machine, as well as those persons who will act as supervisory personnel for this listed above, have read and understood fully these instructions and those contained in the accompanying supplier's instruction manuals and instruction sheets, before attempting to install, operate or perform maintenance on this machine.

Should any questions arise regarding the safe and proper installation, operation or maintenance of this machine, contact the manufacturer at the address listed below before proceeding. No modifications or alterations are to be made to this product without the prior express written consent of Peter Gillard & Co Ltd.

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Warning!

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A GENERAL INFORMATION

1 Introduction

Your machine was carefully inspected, both mechanically and electrically, prior to shipment.

It should be free from scratches and in perfect mechanical and electrical order upon receipt. Check the machine for any physical damage that may have occurred in transit.

If there is any indication of damage, inform us, so that we can take prompt action to remedy the problem.

If the machine appears to be in good condition proceed with the following instructions. Make sure to familiarise yourself with the power, safety and control requirements of the Servo-Torq before starting the machine.

IMPORTANT NOTICE

THE CALIBRATION SCREEN REQUIRES A PASSWORD FOR USE – CODE = 2706

In normal day to day use, this password will not be required.

2 General purpose and use of the machine

The Servo-Torq is an extrusion cutting system. It utilises a 'flying knife' action for cutting. By rotating an ultra-thin knife blade in an arc at high speed, the Servo-Torq can slice through extrudate with minimal product interruption.

An AC BRUSHLESS SERVO MOTOR is used to power the flying knife. The servo motor is powered via a DIGITAL SERVO AMPLIFIER. The combination of amplifier & motor has been carefully selected, and is capable of position holding to within 0.01%.

The machine is capable of a number of cutting modes. A SINGLE AXIS POSITION CONTROLLER calculates the optimum cutting mode from the data entered into the OPERATOR INTERFACE.

The type of accuracy achieved by your machine will depend upon a number of factors:

- Linespeed
- Material type
- Feeding method
- Length measuring system
- Blade/guide bush configuration

Your particular application will have been discussed prior to placing an order. If you feel that your machine is not achieving the performance specified please contact us.

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When cut accuracy problems do occur, they are rarely due to the Servo-Torq itself. We have paid particular attention in these operating instructions to explaining the Influence of non-cutter factors on cut length accuracy.

If you have any problems please telephone us or fax us. We can usually solve a problem quickly, avoiding hours of frustration.

3 Products to be cut or handled

The Servo-Torq is designed to be used in an extrusion line, cutting flexible and rigid plastic and rubber extrusions. The maximum capacity of the machine is either 50 or 100mm depending on machine type. However, actual cutting capacity will depend upon product type and wall thickness.

4 Local service and after-sales support

The following companies in the countries listed support this machine. For all other countries, please contact the manufacturer directly at the address shown on page 2 of this manual.

Standards to which this machine complies

The machine is supplied in accordance with the Supply of Machinery (Safety) Regulations 1992 (EU Machinery Directive 89/392).

A CE mark will have been affixed to the machine to signify compliance with the above mentioned Directive. Either a Declaration of Conformity or a Declaration of Incorporation will have been completed and filed after this page.

The following European Standards have been applied to the machine design.

EN 292-1:1991	Safety of Machinery, - Basic Concepts - General Principles for Design, Part 1 Basic Terminology, Methodology.
EN 292-2:1991	Safety of Machinery - Basic Concepts - General Principles for Design, Part 2 Technical Principles and Specifications.
EN 294:1992	Safety of Machinery - Safety Distances to prevent danger zones being reached by the upper limbs.
EN 418:1992	Safety of Machinery - Emergency Stop equipment functional aspects, Principles for design.
EN 60 204-1: 1992	Electrical Equipment of Machines Part 1 - Specification for General Requirements.

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Introduction

Declaration of conformity

93/44/EU

Manufacturer's name: Peter Gillard & Co Ltd

Product description: Servo-Torq rotary cutter and infeed

Declaration: I declare, as the authorised representative, the above machinery is in conformity with the provisions of 93/44/EU Directives.

Name of authorised representative: Mr C.N. Gillard

Position of authorised representative: Director

Signature of authorised representative:

Place: Tewkesbury, England

Date:

B SAFETY CONSIDERATIONS

Please refer to drawing No. M-ST-001 page 14. This shows the location of danger areas, guarding and emergency stop push button.

1. Hazards in case of non-compliance with safety guarding

UNDER NO CIRCUMSTANCES SHOULD GUARDING BE MODIFIED OR REMOVED. MODIFICATION OR REMOVAL OF GUARDING CAN RESULT IN THE FOLLOWING HAZARDS:

- 1.1 Loss of fingers, thumbs and severe cuts to hands, caused by rotation of knife blade.
- 1.2 Fatal electrical shock - Contact with 380/415 Volts **MAY KILL OR INJURE**

2 Safety conscious work practices

Cutting machines are potentially extremely dangerous. The knives used in the Servo-Torq are of the highest sharpness. They can easily cut through fingers, thumbs and cause severe cuts.

Although the Servo-Torq is fully safety protected, it is strongly recommended that the following additional safety guidelines be followed:

- 2.1 **Never** attempt to change cutter blades when the electrical supply is connected to the machine.

Always turn the isolator switch **off** before changing blades.

- 2.2 **Never** open the clamshell safety guard or remove cutter bushes without first stopping the cutting cycle and caterpillar.

For absolute safety it is recommended that the isolator switch be turned **off** to disconnect electrical supply.

- 2.3 **Never** use cutter bushes whose inner bore is considerably larger than the extrudate size being cut. **Always** match extrudate size to cutter bush bore.

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Safety Considerations

POSITION GUIDE ONLY!

DIAGRAM OF SERVO-TORQ DANGER AREAS

DRAWING NUMBER M-ST-001

2.4 **Never** attempt to use fingers to remove cut pieces from the cutter bush bore.

The cutting action of the Servo-Torq could be engaged, causing the blade to rotate, slicing through whatever was in the bush bore.

Always isolate the machine before clearing the bore.

- 2.5 **Never** leave knife blades lying around where they could be used for purposes for which they were not intended.

Always keep your spare blades in a safe place and allow only trained personnel to change blades.

- 2.6 **Never** allow unskilled personnel to change blades, bushes or generally handle the Servo-Torq.

Always brief your staff, including part-timers, of the potential danger of the equipment.

Be Careful - Keep Your Fingers!

3 Safety protection

The Servo-Torq is fitted with a number of features designed to minimise the possibility of damage to either operators or the machine. Please refer to drawing number M-ST-001 to illustrate the danger areas of the Servo-Torq. Please ensure that all staff have seen this and are aware of potential danger points.

3.1 Cutter Clam-shell guard (1)

The machine will not operate unless the clamshell guard covering the knife blade is in its down position.

3.2 Inlet and Outlet Guide Bushes (2 & 3)

Under no circumstances attempt to operate the machine without the inlet and outlet guide bushes in place.

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Safety Considerations

4. Noise emissions

This machine conforms to the following regulations:

The Supply of Machinery (Safety) Regulations 1992 (SI 1992/3073).

Equivalent continuous A weighted sound pressure level at workstations	70dB
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Peak C weighted instantaneous sound pressure level at workstations	94dB
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Sound power level emissions	less than 85dB
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5. Prohibition of non-authorized modifications.

No modification or alterations are to be made to this product without the prior express written consent of Peter Gillard & Co. Limited. Failure to do this will void all legal obligations from Peter Gillard & Co. Limited regarding this product.

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Safety Considerations

POSITION GUIDE ONLY!

DIAGRAM OF SERVO-TORQ INSTALLATION

DRAWING NUMBER M-ST-002

INSTALLATION

1. Weight and dimensions of machine

Weight	-	400Kgs unpacked (approximate depending on spec).
Dimensions	-	1180mm Long 820mm wide 1340mm high

2. Lifting and handling instructions

It is strongly recommended that a suitable carriage or forklift truck is used to move the Servo-Torq more than a few metres.

3 Unpacking instructions

- 3.1 Carefully check that all crating, packing and transportation strapping has been removed from the machine.
- 3.2 Check that all loose items have been removed from within the top cabinet and electrical cabinet of the Servo-Torq.
- 3.3 Unpack these items - what is supplied is dependent upon individual customer's requirements. As a minimum, a knife blade, Manual, Blank cutter bushes will have been supplied.

4 Electrical supply

A standard 400-Volt, three phase, 50Hz supply plus, fused at 20A per phase. A neutral and earth connection is required.

If requested, your machine will have been supplied with a different electrical specification.

The electrical specification for your machine will be noted on the serial number plate. Please check this before connecting an electrical supply.

WE CANNOT BE HELD RESPONSIBLE FOR ANY DAMAGE CAUSED TO THE MACHINE BY BEING CONNECTED TO AN INCORRECT ELECTRICAL SUPPLY.

CHECK THE SUPPLY REQUIRED BEFORE MAKING A CONNECTION.

A suitably qualified electrician should undertake all electrical installations. See drawing M-ST-002 for location of electrical cabinet (6)

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Installation

D MACHINE CONTROL AND THEIR FUNCTIONS

IMPORTANT NOTICE

THE CALIBRATION SCREEN REQUIRES A PASSWORD FOR USE – 2706

This password is required for setting only not for day to day operation.

1 Control panel details

See control panel drawing M-ST-003 on page 23.

- 1.1 **Power on lamp (1).** (White) This illuminates when the electrical isolation switch located on the side of the machine has been turned on.
- 1.2 **Guard lamp (2).** (Blue) To enable the machine to run, this lamp must be illuminated. If it is not, check that the emergency stop button has been reset and that all guards are closed.
- 1.3 **Safety circuit reset button (3).** Once the guard lamp is illuminated this button will flash, pressing this button will reset the safety circuit. The lamp will remain illuminated in a steady state to confirm circuit reset. If the lamp does not illuminate when pressed, re-check from section 1.2.
- 1.4 **Datum axis button (4).** (in ACTIVE screen)
Once the safety circuit has been reset this button will flash, pressing this button causes the cutter axis to move to its 'HOME' position. The machine will not begin cutting until it has performed this function. This lamp will also remain in a steady illuminated state to confirm the operation. It will flash at a slower rate whilst the cutter performing the home function.
- 1.5 **Emergency stop button (5).** When pressed the whole machine will stop immediately. The switch must be reset before operations can recommence.
This switch is only to be used in emergencies.
- 1.5A **Caterpillar start/stop buttons.** (only in active screen)
Pressing the start button enables the caterpillar to run at the speed pre-set in the DT40 operator station (combined machine only)
- 1.6 **Cutter start/stop buttons.** (only in ACTIVE screen only)
Pressing the start button begins the cutting cycle. NOTE, The product must be moving through the machine, and the encoder must be sending a pulse train, before the machine will begin cutting. If the machine has a built in caterpillar this must be running before the cutter will start.
- 1.7 **Manual cut button.** (Only in ACTIVE screen)
This button causes the machine to perform a single cut. This function will not operate until the datum axis function has completed.

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Control Panel

- 1.8 Operator interface. DT40

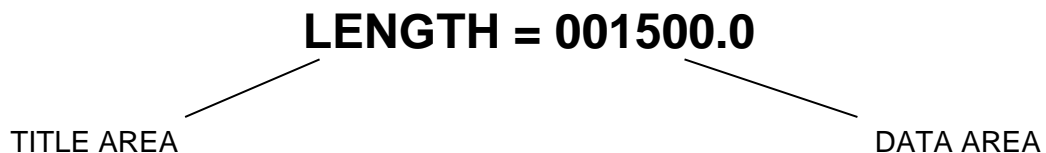
This panel allows the user to enter information concerning the cut product into the machine.

2 Operator Control Panel

- 2.1 When power is first applied to the machine, the control system performs a series of self-tests. On completion of these tests the control panel displays the word GILLARD, and a title screen. **(It is important that during the first 10-15 seconds from power being applied that start buttons are not pressed, as this will cause the self-test procedure to fail)** Having self tested the machine, press the button marked 'F1' to go to the 'ACTIVE SCREEN'.

The 'ACTIVE SCREEN' always displays information concerning the machines current settings. The machine will cut according to what is displayed on this screen when it is put into cutting cycle.

The screen is comprised of a number of 'FIELDS'. To modify any of the settings, move the cursor onto the required field by pressing the relevant number key. The cursor will appear in the field, over-write the information displayed. The fields have a TITLE and a DATA area. The cursor appears on the DATA area.



Always press 'ENTER' to confirm your entry.

- 2.1 The 'ACTIVE SCREEN'

The 'ACTIVE' screen is in two sections, the left section is for operator input, the right section is information display.

The Operators input fields are:

- i) 'PART NUMBER ='

This field is used for recalling product information which has been previously stored. It is not essential to enter any information in this field. If you wish to cut a previously stored part, entering the part number in this field will automatically recall the relevant information and enter it in the LENGTH & BATCH QUANTITY fields. You can modify any of the settings displayed, doing so will not affect the stored information. Valid part numbers are 1 to 100.

If you wish to save information as a part reference for future use, press the 'RIGHT ARROW' key, the machine will prompt you if the part number has already been used.

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Control Panel

- ii) 'BATCH QTY ='

This field is for the required number of cut parts to each batch. The field will accept values from 10 to 99999.

iii) 'LINE SPEED ='

This field sets the speed of the caterpillar belts. The maximum value will vary from one machine to another. The machine will accept values from 0 to maximum in increments of 0.01m/min. The UP & DOWN arrow keys increment or decrement the displayed value in 0.01m/min increments. If no caterpillar is fitted to the machine, this field sets the cutter blade RPM in continuous mode.

iv) 'CUT LENGTH ='

Enter the length you wish the product to be cut into in this field. Accepted values are from 1.0mm to 900000.0mm (1mm to 900m).

v) 'BLADE SPEED ='

This field sets the speed of the blade during a cut when the machine is in 'ON DEMAND' mode. This speed is also effective during a Manual cut or Sensor cut, if this option is fitted. The maximum blade speed is 99% @ 2000 RPM. All speeds are relative to this i.e. 25% = 500 RPM

The display fields are:

i) 'TOTAL CUTS ='

This field is a dynamic count of the total number of parts cut.

ii) 'BATCH QTY ='

This is the number of parts cut in the current batch so far.

iii) 'BATCHES CUT ='

The total number of batches cut so far.

One or all of the above counters will always be highlighted. Pressing the 'LEFT' arrow key will scroll through which counter is highlighted. Pressing the (-) 'Minus' key will reset to zero all highlighted counters.

iv) 'CPM ='

This gives a display of the current cut rate of the machine.

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Control Panel

v) 'CUT MODE ='

This field only appears on 'Free Standing' machines with no built in caterpillar.

It displays the currently selected cutting mode.

ON DEMAND
SPEED CUT
SENSOR (If option fitted)

Pressing the 'CLEAR' key will toggle the selected mode. The sensor is selected by operating the 2-position selector switch mounted on the front panel.

ERROR ROUTINES DESCRIPTIONS

ERROR	"OUT OF RANGE"	AXIS 0 OR 1
Invalid number entered		
ERROR	"INVALID AXIS"	AXIS 0 OR 1
Smartmove software issued a command to an axis that does not exist.		
ERROR	"MOTION IN PROGRESS"	AXIS 0 OR 1
A movement command has been issued to an axis that is already moving.		
ERROR	"SERVO OFF"	AXIS 0 OR 1
A Movement command has been issued to an axis that has been turned off by the software.		
ERROR	"KEY WORD NOT DEFINED"	AXIS 0 OR 1
An invalid command word exists within the software.		
ERROR	"FOLLOWING ERROR"	AXIS 0 OR 1
Either axis 0 or 1 has exceeded the following error limit		
ERROR	"HIT LIMIT OR GUARD OPEN"	AXIS 0 OR 1
Input is in the incorrect state. To clear hit emergency stop or switch selector into encoder mode.		
ERROR	"SOFTWARE ABORTED"	AXIS 0 OR 1
Smartmove software corrupted.		
ERROR	"EXTERNAL ERROR"	AXIS 0 OR 1
Smartmove fault.		
ERROR	"OUTPUT OVER CURRENT"	AXIS 0 OR 1
A Smartmove output has exceeded the current limit maximum.		

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Control Panel

POSITION GUIDE ONLY!

SERVO-TORQ CONTROL PANEL

DRAWING NUMBER M-ST-003

POSITION GUIDE ONLY!

SERVO-TORQ OPERATOR PANEL DETAILS

DRAWING NUMBER M-ST-003A

POSITION GUIDE ONLY!

SERVO-TORQ STRAIGHT BLADE MOUNTING

DRAWING NUMBER M-ST-004

POSITION GUIDE ONLY!

**DIAGRAM OF SERVO-TORQ CURVED BLADE
MOUNTING**

DIAGRAM NUMBER M-ST-004A

E SETTING UP PROCEDURE

1. Check that the machine is switched off at the mains isolator.
2. Fit a knife blade. Refer to diagrams M-ST-003A AND M-ST-003B attached. These diagrams, show the 2 main types of blades that will have been supplied with your machine (please note: the razor and chip blade holders are options). Follow the instructions below for information on fitting the blades and holders.

TAKE CARE! BEFORE CONTINUING MAKE SURE YOU HAVE READ SECTION B - SAFETY CONSIDERATIONS, IN THIS MANUAL.

BLADES ARE DANGEROUS - KEEP YOUR FINGERS!

- 2.1 Remove the blade cap clamp bolt. To assist in releasing the bolt there is a Tommy bar hole in the hub.
- 2.2 Remove the blade cap. Rotate the knife shaft until the score line on the edge of the blade head is visible. This score line should be uppermost when you attach the blade.
- 2.3 For standard blades (not razor or chip blades) fit the clamp bolt through the cap and then through the hole in the knife blade. Then attach both blade and cap to the blade head.
- 2.4 For the razor and the chip blades, the blades must be fitted to the holder provided before the holder itself is attached to the blade head.

With the blade in the holder, fit the clamp bolt through the hole in the holder and attach to the blade head. The blade cap is not required for these types of blades.

It is essential that the blade is correctly located as shown in the diagrams

3. Select the correct cutter bushes to suit section or tube to be cut.
4. Insert the cutter bushes into the cutter bush holder.
5. Rotate the blade by hand (take care) until it lies across the centre line of the bushes.
6. Slide the bushes into the block up to the stops.

It is recommended that the blade is allowed to just 'brush' the faces of the bushes.

It is vital that the clearance between the blade and the bushes is kept to an absolute minimum to prevent the extrudate - particularly flexibles - from being pushed down between the bushes by the blade. In addition, the bushes act as guides for the blade during the cutting sequence.

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Setting Up

POSITION GUIDE ONLY!

**DIAGRAM OF SERVO-TORQ GUIDE BUSHES
DIAGRAM NUMBER 005**

POSITION GUIDE ONLY!

DIAGRAM OF SERVO-TORQ GUIDE BUSHES

DIAGRAM NUMBER 005a

7. Tighten bush clamping bolts and check that the bushes have not moved.
8. Rotate blade by hand two or three times to ensure that it moves freely.
9. Close all guards. Switch on mains isolator. The machine will not operate until all guards are closed. Guard light will illuminate
- . Press the safety circuit reset button (4). Until this button is pressed and illuminated, the machine will not function.
10. Pass the extrudate through the caterpillar infeeders and the cutter bushes.
11. Pull the extrudate so that it is straight as it passes through the caterpillar belts and guide bushes. Rotate the caterpillar boom adjustment handle to clamp the caterpillar belts on to the extrudate.

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Setting Up

F OBTAINING THE BEST RESULTS FROM YOUR SERVO-TORQ

1 Introduction

- 1.0 This section is intended to help you to get the optimum performance from your Servo-Torq rotary cutter. It runs through the main causes of poor cut quality and accuracy and suggest correct procedures to overcome these problems. A checklist is provided at the end of this section to help you quickly pinpoint possible causes of poor performance.
- 1.1 Advice is always readily available from experienced personnel at GILLARD should you require it.
- 1.2 Cut quality and accuracy are principally affected by the following:
- a. Cutter positioning
 - b. Infeeder control
 - c. Cutter bushes
 - d. Knife blades
 - e. Type of cutting action

2 Cutter positioning

The material to be cut should be fed into the cutter from a similar operating height. It is not recommended that the material be pulled off the floor.

For very flexible extrudates, which are easily stretched, it is strongly recommended that a relaxing loop of material be allowed to form before the infeeder. This will ensure that the extrudate is not stretched as it enters the infeeder.

It is also important to ensure that any pre-coiled material is allowed to un-twist before it goes into the cutter. A un-wind table or stand should be used to remove any twist.

3. Infeeder Control

3.1 Speed stability

Infeeder speed variation should be avoided as far as possible. Do not adjust the speed unnecessarily during a production run. Allow time for the caterpillar to accelerate from rest to production speed before checking cut length accuracy.

The more stable the infeeder speed the better the accuracy on cut length.

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Optimum Results

3.2 Caterpillar belts

Check that your caterpillar belts are in good condition. Very worn belts, or belts where the surface joint has come apart, should not be used.

Even dirty belts can effect cut length accuracy. Ensure that the belt is clean and free from grease or any other matter.

Keep your caterpillar belts in good condition.

3.3 Nip Pressure

Check that the nip pressure used with the infeed/take-off is adequate to avoid extrudate slippage and snaking within the belts. This is especially important if the infeed is pulling material from a drum or coil, particularly if the extrudate has a curved 'memory' which encourages it to attempt to turn within the belts.

However, do not use excessive nip pressure as this may damage the extrudate and place the caterpillar infeed under unnecessary load.

Avoid changing the nip pressure during a production run. This may effect the cut length being produced, causing apparent cut length inaccuracy. If possible, set the nip-pressure to the same setting for each product size from run-to-run.

Set nip pressure sufficiently to avoid extrudate slippage or snaking.

4. Cutter bushes

4.1 Product support

Cutting plastic, rubber or other material with a flying knife type cutter, such as the Servo-Torq, requires a device to support the material while the cut is in progress.

The cutter dies or bushes are cylindrical metal devices, which have been bored or otherwise machined to match the cross-sections profile of the material to be cut.

They serve the following functions:

- a. Guide the product to the cut point.
- b. Provide support for the material as it is cut.
- c. Guide and support the knife.

Although frequently overlooked, cutter bushes are extremely important in obtaining a clean cut on extruded tubes, pipes and profile.

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Optimum Results

4.2 Boring the bushes

Have the cutter bushes machined or bored to suit the product cross-sectional profile. Clearance must be provided to permit the material to freely slide through the opening. However, the clearance must not be great enough to permit excessive movement of the product material. This may cause irregular or angular cuts.

Excessive clearance will allow the material to move laterally and may cause irregular or angular cuts.

The opening in the pair of bushes should be continuous. Any misalignment will cause feeding problems.

Do not enlarge the entrance of the down-stream bush unless the product is being held-up on the edge at each cut. The more square the entrance, the better the cut quality.

4.3 Positioning the bushes

The upstream (inlet) side of the cutter guide bush should be as close as practicable to the discharge point of the caterpillar infeed, which precedes cutter.

This reduces the tendency for flexible extrudates to snag or droop as they leave the infeed and enter the cutter bush.

For the optimum results the inlet end of the inlet cutter bush should be coned so that it can fit in between the upper and lower belts of the infeed. This ensures that it reaches right into the exit of the caterpillar nip giving the product no opportunity to snag or jam.

Generally, the more flexible the extrudate the nearer the cutter guide bush has to be to the caterpillar belt.

5. Knife Blades

The most significant factor to successful cuts is a sharp knife.

Different products will require different knife blade thickness.

As a general rule -

The thinnest knife blade possible should be selected when cutting flexible extrudates.

The more rigid the product, the greater the thickness of Blade required.

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Optimum Results

Despite the first statement in this section, it is sometimes found that when cutting rigid materials a better cut quality is achieved with a blade which has had its edge taken off.

The following thickness blades are available from the Factory -

0.25 mm	(0.010")
0.38 mm	(0.015")
0.46 mm	(0.018")
0.60 mm	(0.024")
0.80 mm	(0.031")

Please see the parts list section J.4 for details on ordering blades.

6. Type of cutting action

Possibly the most difficult selection concerning knife blades is whether the cutting action should be chopping or slicing.

Chopping directly through a product with a straight edged blade causes the least amount of engagement time and, therefore, the least interruption to the extrudate as it is continuously pushed forward by the caterpillar infeeders.

Slicing through the product with a curved blade tends to give a better cut quality, but can considerably increase extrudate interruption time.

Using a static cutter, such as the Servo-Torq, with a continuously moving product demands a compromise between slicing angle and engagement time.

The type of blade you should use will obviously depend upon your application. However, in our experience, approximately 90% of products can be cut adequately with a straight edged 'chopping' blade.

The remaining 10% are best served with a curved 'slicing' blade. Typical products would be thin-wall tubes or profiles, or profiles with an intricate shape where a chopping action might cause material distortion or collapse.

We can offer you a selection of straight or curved blades, or produce a custom blade design especially for your product

Additional advice is always available from the factory. Experienced staff would be pleased to share their knowledge to help you achieve the best possible results from your Servo-Torq.

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Optimum Results

POSITION GUIDE ONLY!

DIAGRAM OF SERVO-TORQ BLADE CLEARANCE DIAGRAM NUMBER 006

PROBLEM

a Poor length accuracy

POSSIBLE CAUSE

1.Extrudate slippage in belts.

2. Extrudate tension varying.

3.Cutter bush set-up incorrect.

4. Cutter bush set-up incorrect

5. Material not exiting bush.

RECOMMENDED ACTION

The extrudate must be firmly clamped between the upper and lower caterpillar belts. When setting up the machine, check that it is not possible to pull the extrudate out from between the belts. If it is, increase the nip pressure. In addition, check that the extrudate is not wet or slippery. Finally, make sure that the caterpillar belts are in good condition. Worn belts should be replaced. See the spares parts list within this manual for the appropriate part number.

The extrudate must be under constant tension as it enters the caterpillar belts. This is particularly critical for materials, which easily stretch, e.g. foam rubber, silicone and very small diameter flexible plastics. Ideally, the tension on the material should be as low as possible.

The machine must be operated at a constant linespeed to achieve best results. Do not adjust the caterpillar speed unnecessarily. Leave it set onto a constant speed. Similarly, do not adjust the nip pressure during a run. Any changes in infeed speed or nip pressure will immediately influence cut length accuracy.

The guide bush bore should be a reasonable tight fit to the product diameter. If too tight, it may cause a product hold-up as the extrudate is pushed through by the infeed. If too loose, it may allow the product to move from side-to-side. For very flexible extrudates, the distance between the end of the caterpillar belt lead-in is kept to a minimum. It is also important that the knife blade brushes the bush faces during cutting.

Any material hold-up in the exit bush may cause compression of the on-coming extrudate end. This will effect the accuracy of the oncoming length. Making sure cut lengths are free to exit the bush. Do this by, either reducing the length of the exit bush, putting an internal cone into the bush or using air to blow the cut pieces out of the bush.

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Optimum Results

a. Poor cut quality

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| 1. Blade gap too large. | It is critical that the knife blade actually brushes each cutter guide bush face during the cut. The bushes should be as tight as possible to the blade, whilst still to pass through the gap when the blade head is turned by hand. |
| 2. Bush edge, not sharp. | The bush faces, which are in contact with the blade, should be straight and clean. The 90° angle between the bush face and the product bore should be as sharp no circumstances should there be a bevel or radius on this edge. Check for wear on this edge from time-to-time. |
| 3. Blade, not sharp | Check the cutting edge. Check the double bevel is even. Replace the blade if appropriate. |
| 4. Blade gap too large. | Check that the blade is touching both bush faces as it passes through the gap between them. Reset the bushes if necessary. If the gap is too wide, the material can be pushed down into the gap by the blade, causing a jam. |
| 5. Blade sticking. | For many products, particularly rubbers and flexible PVC, lubricating the blade greatly assists the cutting action and eases the passage of the blade though the material. Fill the integral blade lubrication system with a lubricant e.g. water with a dash of dish washing liquid. |

b. Feed difficulties

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| 1. Inlet bush too short. | For very flexible extrudates, make sure that the distance between the end of the caterpillar belt nip & the bush lead-in is kept to a minimum. It may be necessary to turn the end of the inlet bush into a cone, so that it can fit in between the caterpillar rollers. In extreme cases, use a small tube to fit right into the nip point & guide the material into the inlet bush. |
| 2. Exit bush too long. | When cut short lengths or very flexible materials, make sure that the exit bush is not over long. If too long, material will have to be pushed an excessive distance through the bush, causing drag and product hold-up. |
| 3. Bush bore, not smooth. | Make sure that the internal bush bore is smooth and free from machining rings and other potential drag points. If possible, polish the bore or use a very low friction material (e.g. Teflon) as an insert in the bush. Alternatively, use low pressure, air blown down the bush, to create an air cushion around the extrudate to minimised drag. |

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| 4. Infeed guide in, not straight. | Check that the extrudate is straight as it enters the caterpillar. If the material has been coiled before it is cut, it may have a |
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Optimum Results

tendency to try to twist as it passes through the inlet guide rollers. If this is a problem, add additional guide in rollers to hold the infeed. In very bad cases, use a tube guide to direct the extrudate right to the caterpillar inlet belt nip.

5. Incorrect blade shape.

Because the material is trying to move forward continuously during the cutting action, a wide blade may cause excessive product hold-up, resulting in a jam. Check that you are using the narrowest blade possible. If necessary, grind away the back of the blade to reduce hold-up.

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G MAINTENANCE AND INSPECTION

1. Monitoring during operation - Consumables

Consumable items such as knife blades and caterpillar infeeders should be visually checked on a regular basis for wear. If these items are not kept in a reasonably condition, the machine performance will almost certainly deteriorate over time.

1.1 Knife blades

It is difficult to define when a blade requires replacing. However for the efficiency of the cutter it is essential that a sharp cutting edge be maintained on the blade. This ensures that:

1.1.1 A clean, swarf-free, cut edge is maintained on the extrudate.

1.1.2 Undue stress is not placed on the Servo motor and belt.

If in doubt as to the sharpness of the blade, fit a new blade by following the instructions in section F.1.

FOR SAFETY, IT IS ESSENTIAL THAT THE MAIN POWER-IN ISOLATOR SHOULD BE TURNED OFF DURING THE BLADE CHANGING OPERATION.

1.2 Caterpillar infeeders

The belts should be replaced if the belt surface is torn, split or otherwise excessively worn. Belt damage may cause variations in length measuring accuracy.

To change the caterpillar belts:

1.2.1 Fully slacken off the two tension screws located at the left-end of each caterpillar boom. By slackening these screws, the tension roller will move into the machine, thus reducing the tension on the caterpillar belt. When loose enough slide the belt off the front of the boom plate.

Note: For the lower caterpillar belt, it may be necessary to remove the guide-in roller bracket (when fitted)

1.2.2 Once the old belt has been removed, fit the new belt by sliding it over the poly-vee rollers. Ensure that the poly-vee ribbing on the back of the belt matches the poly-vee grooves in the rollers.

2. Preventative measures

Regular maintenance inspection is vital if unscheduled breakdowns are to be avoided. Please follow the maintenance schedule listed in section 4 below. It is designed to identify problems before they cause production downtime.

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3. Planned maintenance schedule

Once per day	-	1. Check knife blade condition 2. Check caterpillar belt condition 3. Check safety guard operation 4. Check emergency stop operation
Once per week	-	1. Clean wet block if being used 2. Lubricate infeed vertical drive shaft and adjusting screw
Once per month	-	1. Check drive belt tension 2. Check drive belts wear
Once per six months	-	1. Visually check for loose wires 2. Visually check for loose bolts 3. Check hinges and lids for damage 4. Check that the infeed is stationary when speed control set to zero. 5. Check boom height adjustment screw for ease of movement. Brush with light machine oil or grease if dry. 6. Run infeed at full speed and check for excessive noise. 7. Check that the blade head is square to cutter bush holder block.
Once per year	-	1. Check caterpillar and gearboxes for wear. To do this, rock caterpillar belts back and forth by hand. If excessive movement is possible, it is probable that the gears are worn.
As necessary	-	1. Replace any blown lamp bulbs.

4. Functional checking of safety devices

The functional checking of all safety devices occurs, each time the machine is started. This is done automatically. When all guards are closed and the emergency stop push-button is reset, the guard lamp should illuminate. As all safety switches are 'fail to safe' type switches, the guard lamp will not illuminate until all circuits have been checked as being safe. When the safety circuit reset button is pressed the following actions take place:

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4.1 Safety relay energised. This re-checks that all guards are closed.

- 4.2 The main motor contactor and relays are checked to ensure that they have returned to a De-energised (safe) condition since the machine was last used. As contactors are of a 'positive guided' type, you cannot start a motor if there is a fault in a contactor.

The safety circuit reset button will not illuminate if there is a fault in any motor contactor, guard switch or emergency stop switch.

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WARRANTY

Standard products manufactured by **Peter Gillard & Co. Limited**, hereinafter referred to as the "Company", are warranted to be free from defect in workmanship and material for a period of one year from the date of shipment, and products which are defective in workmanship or material will be repaired or replaced at the option of the Company at no charge to the Buyer. Final determination as to whether a product is actually defective rests with the Company.

The obligation of the Company hereunder shall be limited solely to repair or replacement of products that fall within the foregoing limitations, and shall be conditioned upon receipt by the Company of written notice of any alleged defects or deficiency promptly after discovery within the warranty period and, in the case of components or units purchased by the Company. The obligation of the Company shall not exceed the settlement that the Company is able to obtain from the supplier thereof.

No products shall be returned to the Company without its prior consent. Products which the Company consents to have returned shall be shipped CIF to the Company's factory. The Company cannot assume responsibility or accept invoices for unauthorised repairs to its components, even though defective.

The life of the products of the Company depends, to a large extent, upon type of usage thereof.

The Company makes no warranty as to fitness of its products for specific applications by the buyer nor as to period of service unless the company specifically agrees otherwise in writing after the proposed usage has been made known to it.

The foregoing warranty is exclusive and in lieu of all other warranties expressed or implied, including, but not limited, to any warranty of merchantability or of fitness for a particular purpose.

This Warranty does not apply to experimental or development products.

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