





20/09/2011	1	Addition of mounting possibilities	SW	MB	MB
21/03/2011	0	Issued for use	SW	MB	MB
Date	Revision	Description of Revision	Prepared	Checked	Approved

	Forum Subsea Tooling Unit 5 Inch Business Park, Inch, Aberdeenshire AB52 6TA  Tel: +44 (0) 1464 821595	<b>10" Rotary Cutter  User Manual</b>	
		Doc: SRTS_PRMA_038	
		Rev: 1	Page: 2 of 11

## 1 Cautionary Notes




- Familiarise yourself with the manual prior to operation, if in doubt ask supplier for assistance
- Ensure correct PPE is worn at all times (baggy or loose items can catch blade teeth)
- Always wear protective gloves when handling saw blades
- Only remove blade safety covers prior to use
- Visually examine all hoses prior to connecting hydraulic power source
- If the tool is to be run on deck, section off a surrounding area and ensure personnel are clear from blade edge
- Whilst making adjustments to the tool ensure there is no hydraulic power source attached
- Never reuse damaged blades
- Always carry out Risk Assessments before using this equipment in a new location

	Forum Subsea Tooling Unit 5 Inch Business Park, Inch, Aberdeenshire AB52 6TA  Tel: +44 (0) 1464 821595	<b>10" Rotary Cutter User Manual</b>	
		Doc: SRTS_PRMA_038	
		Rev: 1	Page: 3 of 11

## 2 Contents

1	Cautionary Notes .....	2
2	Contents .....	3
3	Introduction.....	4
3.1	Scope .....	4
4	Safety Recommendations .....	4
4.1	General – Operations.....	4
4.2	General – Hydraulic.....	4
4.3	General – Mechanical .....	5
5	Quality, Health, Safety and Environment (QHSE) .....	5
5.1	Quality .....	5
5.2	Health and Safety.....	6
5.3	Environmental.....	6
6	Persons to Contact .....	6
7	Description .....	7
8	Specifications .....	7
9	Connection to ROV .....	8
10	Operation.....	8
11	Adjusting the Cutter .....	10
11.1	Adjusting Extend Speed .....	10
11.2	Adjusting Counterbalance Valve .....	10
12	Changing the Blade .....	11

 <b>Forum Subsea Tooling</b>	Forum Subsea Tooling Unit 5 Insch Business Park, Insch, Aberdeenshire AB52 6TA  Tel: +44 (0) 1464 821595	<b>10" Rotary Cutter User Manual</b>	
		Doc: SRTS_PRMA_038	
		Rev: 1	Page: 4 of 11

### 3 Introduction

#### 3.1 Scope

The scope of this manual is to provide information regarding assembly and set up/operating instructions for the 10" Rotary Cutter.

### 4 Safety Recommendations

#### 4.1 General – Operations

Only authorised people and qualified personnel should work on the system, and take suitable precautions to prevent injury.

Always adhere to authorised working practices, and use the correct tools for the job. To facilitate this, make sure that these are available before commencing.

Ensure that overalls and other garments are kept clean and free of oil or chemicals. Ensure that any cuts or skin abrasions are protected before handling oil or chemicals to prevent ingress into the body. Protect the hands and arms with a suitable barrier cream and gloves and ensure that all system fluids or chemicals are removed from the skin as soon as possible.

Ensure that the working area is kept clear and uncluttered.

#### 4.2 General – Hydraulic

Do not work on pressurised systems. Hydraulic systems contain a large amount of stored energy when pressurised, therefore the system (including any accumulators) should be de-pressurised, and the power pack switched off, prior to working on the system. Exceptions to this would be system adjustments to components requiring the presence of pressure and/or flow.


Any personnel authorised to work on the system must have a complete understanding of the operation of the hydraulic system, so that they will be aware of any system liable to remain pressurised or hazardous in any other way.

Ensure that all personnel are clear of any mechanical/hydraulic system likely to move if pressure to system actuators is released or applied.

Do not attempt to tighten any leaking fittings whilst under pressure. A rupture could result, leading to injury from flying components and/or oil jets.

Regularly inspect fittings and pipe-work for mechanical damage. If any such damage is found, the item must be repaired or replaced as necessary before pressure is applied to the system. Do not allow damaged fittings to remain in service.

Take care when inspecting, commissioning, repairing or maintaining the system to avoid jets of oil issuing from open orifices; pipe ends etc. if pressure is applied. Particular care should be taken to protect the eyes.

 <b>Forum Subsea Tooling</b>	Forum Subsea Tooling Unit 5 Insch Business Park, Insch, Aberdeenshire AB52 6TA  Tel: +44 (0) 1464 821595	<b>10" Rotary Cutter User Manual</b>	
		Doc: SRTS_PRMA_038	
		Rev: 1	Page: 5 of 11

Hydraulic components may be heavy and slippery when covered in oil. Ensure that adequate protective clothing and footwear is used.

Any moving component should be treated with caution when the system is pressurised during operation, and especially during on-deck testing and repair. Keep clear of all moving components, and take all necessary precautions to avoid injury when working on these systems by preventing movement of any components likely to cause injury.

### 4.3 General – Mechanical

Ensure that all the guards are in place before applying power to the system. The power must be turned off and any potential movement prevented before removal of any guard.

Beware of and keep clear of all moving components. Do not work on the system whilst power is applied, or if there is any potential for components to move.

Ensure that all load bearing components are adequately and regularly inspected. If damage is found the component must be repaired/replaced as necessary. Do not allow damaged components to remain in service.

Some mechanical components/assemblies are heavy and, if covered in oil/water, also slippery. Always ensure that items are correctly and adequately supported before removal, and that authorised lifting equipment and procedures are used.



**Note:** trying to lift heavy components in an awkward position by hand without the assistance of correct lifting equipment, or lifting any component without adopting the correct stance, can lead to serious injury.

Ensure that when working within or underneath the machine that your presence is known to your supervisor. If working underneath the machine, always ensure that there are no loose or unsupported assemblies, components or tools above.


## 5 Quality, Health, Safety and Environment (QHSE)

### 5.1 Quality

It is the prime objective of Forum Subsea Tooling to perform all work safely and efficiently in accordance with our Quality Procedure, Legislative and Client specifications and requirements. In performing this work, the quality system of Forum Subsea Tooling shall be adhered to, so as to ensure that Client requirements are met.



Certification No. 187786

 <p><b>FORUM</b> ENERGY TECHNOLOGIES Forum Subsea Tooling</p>	<p>Forum Subsea Tooling Unit 5 Inch Business Park, Inch, Aberdeenshire AB52 6TA</p> <p>Tel: +44 (0) 1464 821595</p>	<p><b>10" Rotary Cutter User Manual</b></p>	
		<p>Doc: SRTS_PRMA_038</p>	
		<p>Rev: 1</p>	<p>Page: 6 of 11</p>

## 5.2 Health and Safety

The company considers that prevention of accidents incidents and hazardous occurrences resulting in injury to personnel, damage to equipment and the environment is essential to ensure employees safety. Reducing injuries and ill health, protecting the environment and reducing unnecessary losses and liability contributes to a good safety record which, goes hand in hand with safe operating practices and high quality standards.

The Company is committed to continuous improvement involving the constant development of procedures, approaches to implementation and techniques of risk assessment and control.

To meet these criteria all personnel will be trained to identify, eliminate or control the effects of hazards in their area of work.

It is expected that all employees will exercise a personal responsibility in preventing injury to themselves, their fellow workers, the general public and the environment.

Only through close communication and co-operation by all personnel can safety performance be established and maintained.

It is the duty of all employees to confirm to the Company Safety Policies, codes, plans, procedures and manuals and to accept and undertake their responsibilities.

All employees and those of our sub-contractors have a legal duty to take reasonable care of themselves and any other person who may be affected by their acts and omissions whilst at work and to co-operate with the Company and any persons directly or indirectly involved in the Company's activities.

## 5.3 Environmental

Forum Subsea Tooling pledges to comply with current environment legislation and best environmental practices, and achieve a balance between economic, social and environmental responsibilities. We are committed to avoiding damage to the environment by any of our actions and operations.


Forum Subsea Tooling is committed to continual improvement, and efficient use of resources, which will be achieved by setting and ensuring successful implementation of environmental objectives.

## 6 Persons to Contact

All technical enquiries relating to the tooling should be addressed to:

Forum Subsea Tooling Unit 5 Inch Business Park, Inch, Aberdeenshire AB52 6TA

Telephone: +44 (0) 1464 821595  
Web: [www.f-e-t.com](http://www.f-e-t.com)

	Forum Subsea Tooling Unit 5 Insch Business Park, Insch, Aberdeenshire AB52 6TA  Tel: +44 (0) 1464 821595	<b>10" Rotary Cutter User Manual</b>	
		Doc: SRTS_PRMA_038	
		Rev: 1	Page: 7 of 11

## 7 Description

Forum Subsea Tooling 10" Rotary Cutter has been designed to clamp on to structures of up to 15" and cut up to 10" diameter material in one cut or up to 15" in 2 cuts.

The blades are Tungsten Carbide tipped and will cut ferrous and non-ferrous metals easily including high tensile steel.

The cutter consists of an aluminium assembly, a clamp arrangement which is actuated by two rams to enable opening and clamping on to structures which are more than 3" diameter and up to 15" diameter.


The main motor is mounted on a vertical slide actuated by a 300mm stroke extend and retract cylinder to position the blade.

There is a flow control valve on the input of the Extend side of the cylinder and a counterbalance valve on the retract side. The counterbalance valve is set to stop the weight of the saw motor and blade from dropping when hydraulic pressure is removed.

Blades are mounted on a hub and bolted on to front shaft of motor. When the motor is spinning the blade is then brought down slowly onto the structure to be cut and cutting will commence. Once cut has concluded the blade can then be retracted back in to the saw for ease of recovery back to surface.

## 8 Specifications

Specification	Measure
Main Motor	
Pressure	140–180Bar
Flow	40–60Lmin
Clamp	
Pressure	50–100 Bar
Flow	1-5Lmin
Motor Extend Cylinder	
Pressure	20–100Bar
Flow	0.1Lmin

	Forum Subsea Tooling Unit 5 Insch Business Park, Insch, Aberdeenshire AB52 6TA  Tel: +44 (0) 1464 821595	<b>10" Rotary Cutter          User Manual</b>	
		Doc: SRTS_PRMA_038	
		Rev: 1	Page: 8 of 11

## 9 Connection to ROV

The 10" Rotary Cutter can be connected directly to an ROV or via the Forum Subsea Tooling Manifold which makes connections and disconnections very quick and easy.

Hose connections supplied are JIC although these can be easily converted to Swagelok or another connector as necessary.

The hose connections are as follows:

- Motor
  - 8 JIC Pressure
  - 8 JIC Return
- Clamp
  - 4 JIC x2
- Cylinder Extend & Retract
  - 4 JIC x2

## 10 Operation

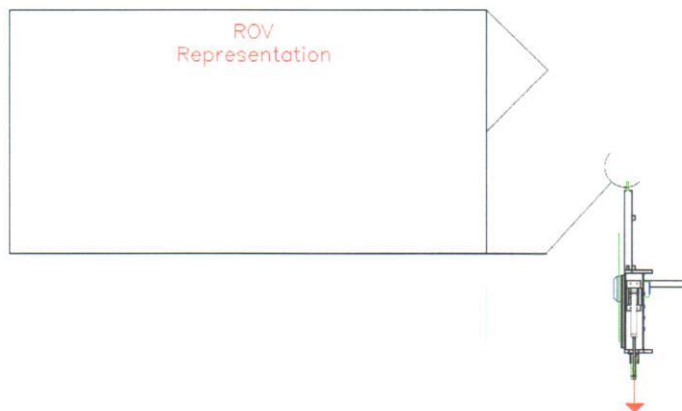
The cutter is designed to be deployed by the Manipulator or Grabber on ROV.

The lifting eye located on the top of cutter should have a suitable lifting sling attached and be firmly secured to manipulator or grabber.


### \*NOTES\*

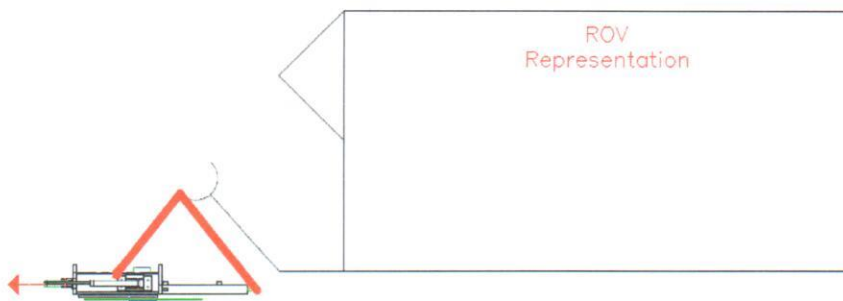
For illustration purposes only.

Sketch showing that the cutter can be mounted both horizontally and vertically.





	Forum Subsea Tooling Unit 5 Inch Business Park, Inch, Aberdeenshire AB52 6TA  Tel: +44 (0) 1464 821595	<b>10" Rotary Cutter User Manual</b>	
		Doc: SRTS_PRMA_038	
		Rev: 1	Page: 9 of 11




Ensure there is a gauge teed in to the motor pressure line so the pressure can be monitored during cut (**this is extremely important to ensure blade does not stall**)

N.B. When cutter is about to be attached to the material to be cut the blade should be fully retracted

Sequence of events when cutting:

- Ensure clamp jaws are open
- Before connecting to pipe, stroke cylinder forward and backward for a few seconds when ROV is at the depth cutting will take place (this will equalize pressure in both extend and retract lines)
- Locate cutter in to required position
- Close clamps on a latching switch and keep latched in close position
- Ensuring correct position has been achieved and start the blade turning
- Monitor gauge and record pressure needed to turn blade
- Extend Blade cylinder
- Keep extending until blade just touches pipe to be cut then stop extending
- Continue to move blade forward a little at a time whilst monitoring gauge
- When blade has cut a few millimeters in to pipe continue extending whilst monitoring the gauge all the time
- If the gauge goes up in pressure by 10% stop extending cylinder until gauge pressure drops back to normal then continue to extend
- N.B. If blade stops turning then immediately retract cylinder until blade starts to turn, then continue cut
- When cut is complete retract cylinder
- Open the clamp

 <b>Forum Subsea Tooling</b>	Forum Subsea Tooling Unit 5 Insch Business Park, Insch, Aberdeenshire AB52 6TA Tel: +44 (0) 1464 821595	<b>10" Rotary Cutter          User Manual</b>	
		Doc: SRTS_PRMA_038	
		Rev: 1	Page: 10 of 11

## 11 Adjusting the Cutter

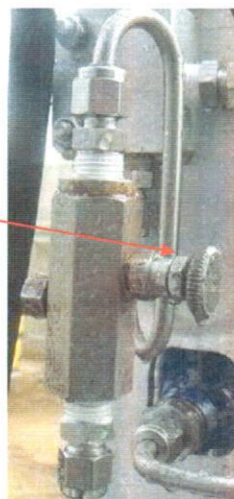
Due to the simplicity of the cutter there are only a couple of adjustments that need to be made. These are for the extend and retract cylinder operation.

The counterbalance valve on the retract side of the cylinder stops the cylinder dropping when no hydraulic supply is present and ensures a positive movement of the cylinder. Additionally there is a flow control adjustment to produce a steady slow speed when advancing the cylinder.

### 11.1 Adjusting Extend Speed

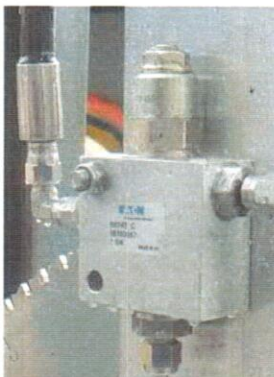
- Stroke extend cylinder fully forward and fully back
- Adjust speed to extend roughly 20 mm per minute (this may differ depending on material to be cut)

Adjusting flow control valve  
 Slacken lock nut and adjust  
 clockwise to decrease speed,  
 counter-clockwise to increase  
 speed



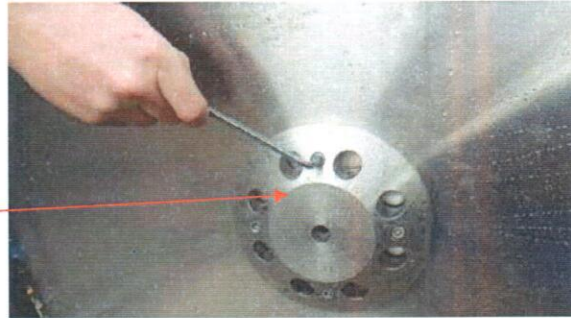
### 11.2 Adjusting Counterbalance Valve

- Adjust Counterbalance valve fully in clockwise until extend does not work
- Adjust out counter-clockwise until extend starts working again then adjust out counter-clockwise a further half turn



## 12 Changing the Blade

1. Slacken and remove the 4 blade Retaining bolts



2. Slacken and remove the centre hub retaining bolt



3. Remove the Centre hub



4. Fit new blade, ensuring the correct number of shims are placed between end of motor shaft and front hub for a gap between rear of hub and ram bolt. Generally this will be 4 shims to create a space of 4-5mm

