

## DEPARTMENT OF MECHANICAL ENGINEERING

<b>Name of SOP</b>	P1-metal cutting process laboratory equipment
Effective Date	
Author	Jim McLaren
Reason for SOP	Potential for injury due to rotating machinery Injury from metal cuttings or objects/workpiece ejected from machine.
Approved by (supervisor)	Dave Schick
Date reviewed by (JHSC)	June 13 <sup>th</sup> 2007

### Definitions

Terms	<b>None</b>
acronyms	RMM – Risk Management Manual JHSC - Joint Health and Safety Committee EOHSS - Environmental Occupational Health & Safety Service

### Requirements

<b>Applicable OSHA regulations and / or codes of practice.</b> <ol style="list-style-type: none"> <li>1. OSHA code.</li> <li>2. McMaster University Risk Management Policies</li> </ol>
<b>Training and competency.</b> <ol style="list-style-type: none"> <li>1. Training provided by Mechanical Engineering technicians .</li> <li>2. Lab supervised by trained Graduate student/teaching assistant</li> <li>3. Competency is shown by the individual after training</li> </ol>

### Description of the Task

<b>Location and time of work</b>	JHE-106 during normal working hours
<b>Individuals and skills required</b>	Graduate students/teaching assistants with proper training
<b>Equipment and supplies required</b>	Colchester Lathe ,dynamometer cutting tool, cutting inserts. Stopwatch , toolmaker's microscope
<b>Personal protective equipment required</b>	Safety glasses
<b>Sequential steps to complete the work safely.</b> <ol style="list-style-type: none"> <li>1) Safety glasses must be worn.</li> <li>2) Make sure work piece is tightened in chuck before turning on power.</li> <li>3) Ensure chuck key is removed from chuck</li> <li>4) Make sure tailstock is in position and locked ( Fig 1)</li> <li>5) Set up Dynamometer and tool in tool post. ( Fig 2 )</li> <li>6) Select proper feeds and speeds (Figs.3 and 4 )</li> </ol>	
<b>General safety instructions</b> <ol style="list-style-type: none"> <li>1) <b>Develop and use common sense</b> when using the equipment (think before you act).</li> <li>2) Be sure to discuss the operation of the lathe in detail with the TA before conducting the tests.</li> <li>3) Do not operate the machine until you have had detailed instruction from the TA.</li> <li>4) Make sure the work piece is adequately clamped in the spindle for the job being performed. The clamping force must be high enough to resist movement under these conditions. Make sure the TA checks the part clamping before starting the machine. <b>(Never leave the chuck key in the spindle.)</b></li> </ol>	

- 5) Make sure the tool holder and cutting insert are adequately clamped for the job being performed.
- 6) **Always wear safety glasses** when around the machine.
- 7) Long hair should be tied back to avoid being caught in the revolving parts of the machine (**Keep loose items away from rotating objects**).
- 8) Loose clothing, rings or watches must not be worn when operating machine tools to avoid being getting caught in the rotating part of the machine.
- 9) Wear long pants (preferably cotton) as metal cuttings removed from the work piece during the machining process can reach temperatures in excess of 300°C and will burn.
- 10) **No sandals or open toed shoes are permitted in the lab.**
- 11) Watch out for sharp edges on the part, tool and on the chips.
- 12) Do not use rags near the rotating machines when the spindle is running. Rags can be caught in the rotating spindle and the result can be serious injury. Rags may be used for material handling and for cleaning purposes provided there are no rotating hazards nearby.
- 13) Use extreme caution with the chips produced during machining. Chips are sharp and some chips are long stringers which can easily be caught up in the spindle and thrown with great force. Do not clear chips away from the work area when the machine is in operation. If it is necessary ask the TA how this can be best done. (If necessary there is a long handled tool available for pushing the chips out of the way.)
- 14) It is mandatory to report all cases of injury to the lab TA.
- 15) Anyone using the lab equipment is expected to work safely at all times. If you do not work safely you will be asked to leave.. Re-admittance to complete the lab requires the approval of the department chair. You are responsible for your safety and the safety of others working around you. If you do not know how to safely operate the equipment it is your responsibility to obtain the proper instruction from the lab TA.

#### **Power-Up sequence**

- 1) Switch machine power on ( power switch is located on back of headstock( Fig.5)
- 2) Make sure emergency stop button is released Pull stop toward you . (Fig. 6).
- 3) Press White start button (Fig.6 )

#### **Machine operation**

- 1)Start spindle rotation. Pull spindle on/off handle to right and then downward .( Fig7 )
- 2) Carefully touch tool to rotating work piece and set ZERO on cross feed graduated dial.
- 3) Move cutting tool clear of work piece ( by turning cross feed handle counter clockwise)
- 4) Relocate cutting tool to right hand side of workpiece . Set depth of cut
- 5) Start feed by pulling feed on/off lever up. ( Fig.8 )
- 6) Stop feed by pushing feed on/off lever downward.
- 7) Stop spindle .Pull spindle on/off handle up

#### **Power down sequence**

1. Press emergency stop button.
2. Switch off breaker at back of headstock (Fig. 3.)
3. Clean and remove all cuttings from machine
4. Use gloves if necessary
5. Clean floor area around machine

### **Contingency Plan and Reporting**

#### **Accident / injury response**

1. Notify Mechanical Engineering technical staff Apply first aid as required immediately
2. For all injuries complete a "Injury/Incident Report" and provide a copy to the Chair and EOHSS
3. In case of critical injury call security (DIAL 88).
4. In case of critical injury notify EOHSS immediately, ext 24352

#### **Spill response**

#### **Equipment shutdowns.**

### **Environmental Responsibility**

#### **Waste disposal procedures**

#### **Building air quality**

**References** (OHSA/ regulations, EPA and Municipal environmental regulations, McMaster University Program/ Policy, Material Data Sheets (MSDS).

1. RMM Policy #300 Safety Orientation and Training Program
2. RMM Policy #301 Standard Operating Procedure
3. RMM Policy #309 Laboratory Safety Manual
4. RMM Policy #310 Eye Protection.
5. RMM Policy #403 Noise Control and Hearing Preservation
6. RMM Policy #1000 Reporting and Investigating Injury, Incidents and Occupational Disease

#### **Distribution**

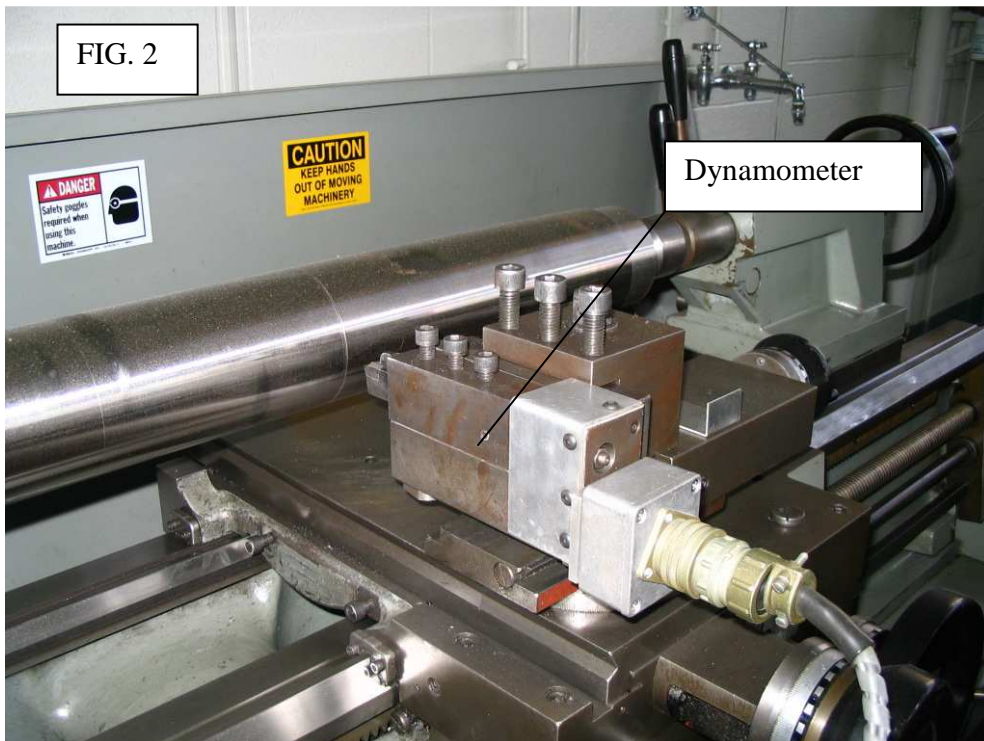
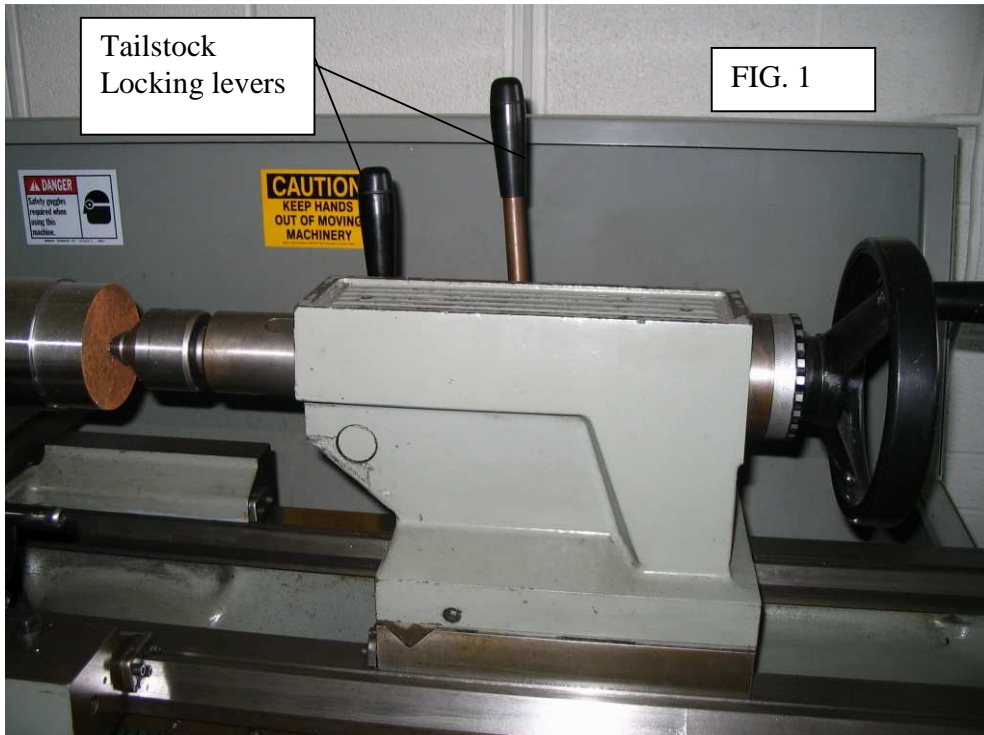
1. Supervisor
2. Trained graduate student/ teaching assistant who is the laboratory operator
3. Technical Staff of Mechanical Engineering
4. Faculty of Engineering JHSC

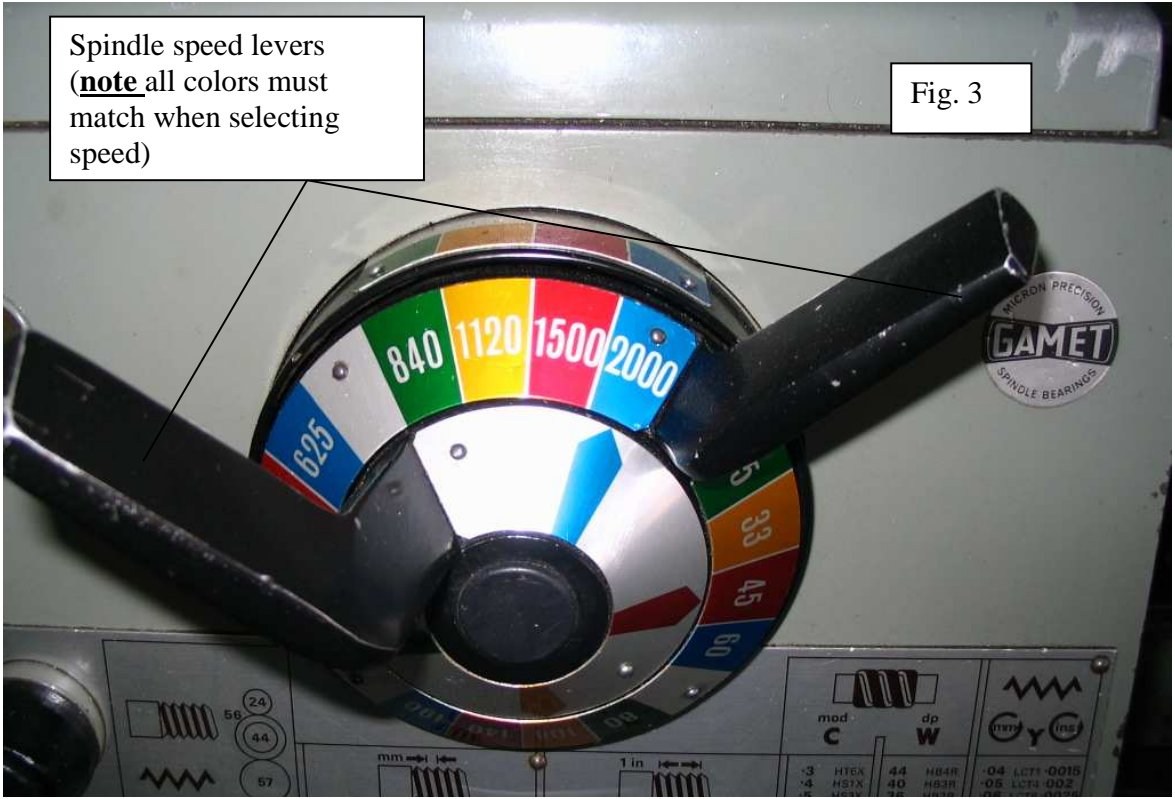
Risk Management Manual (RMM)

<http://www.workingatmcmaster.ca/link.php?link=Job+Matters%3APolicy-Manual>

Environmental and Occupational Health Support Services

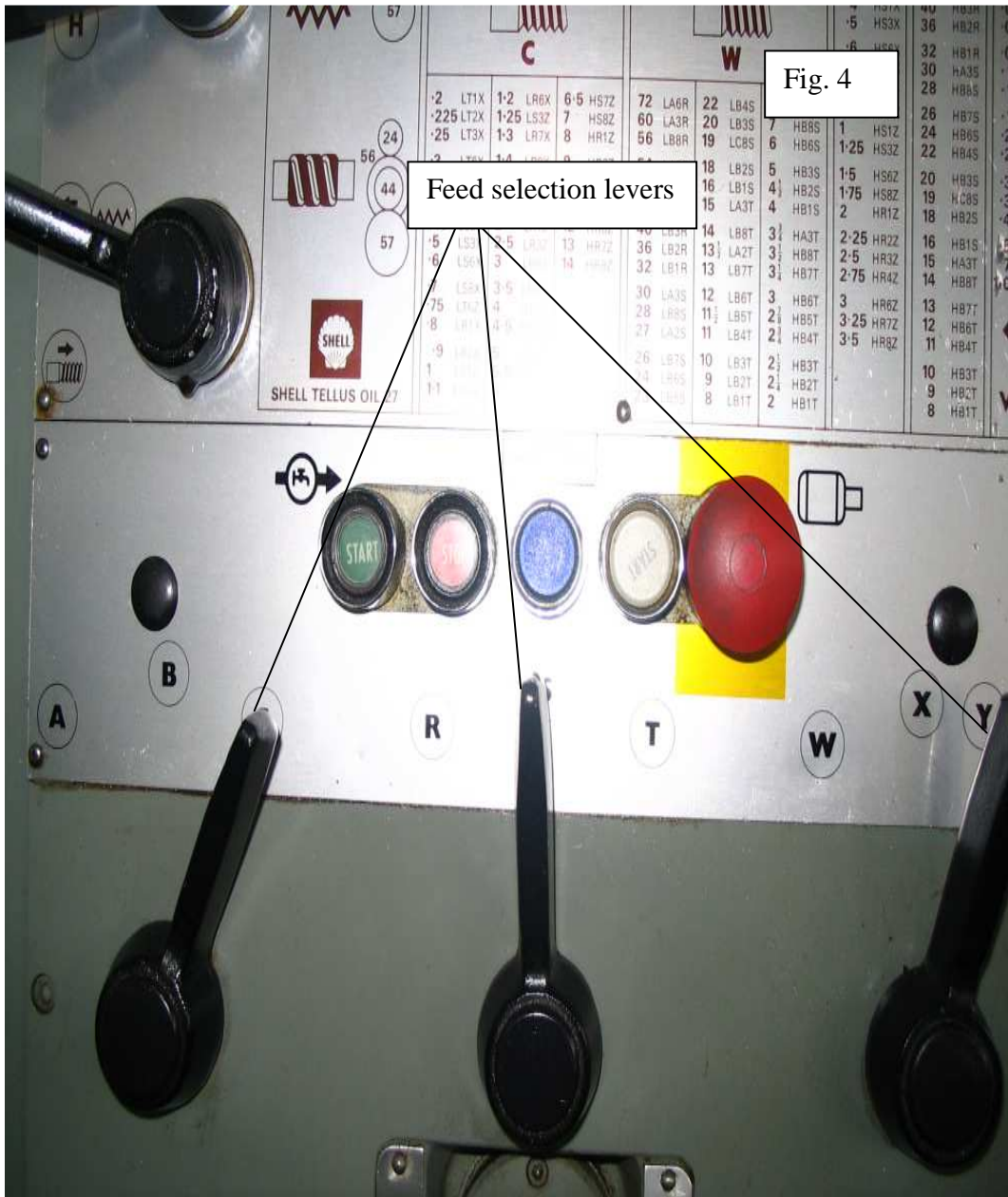
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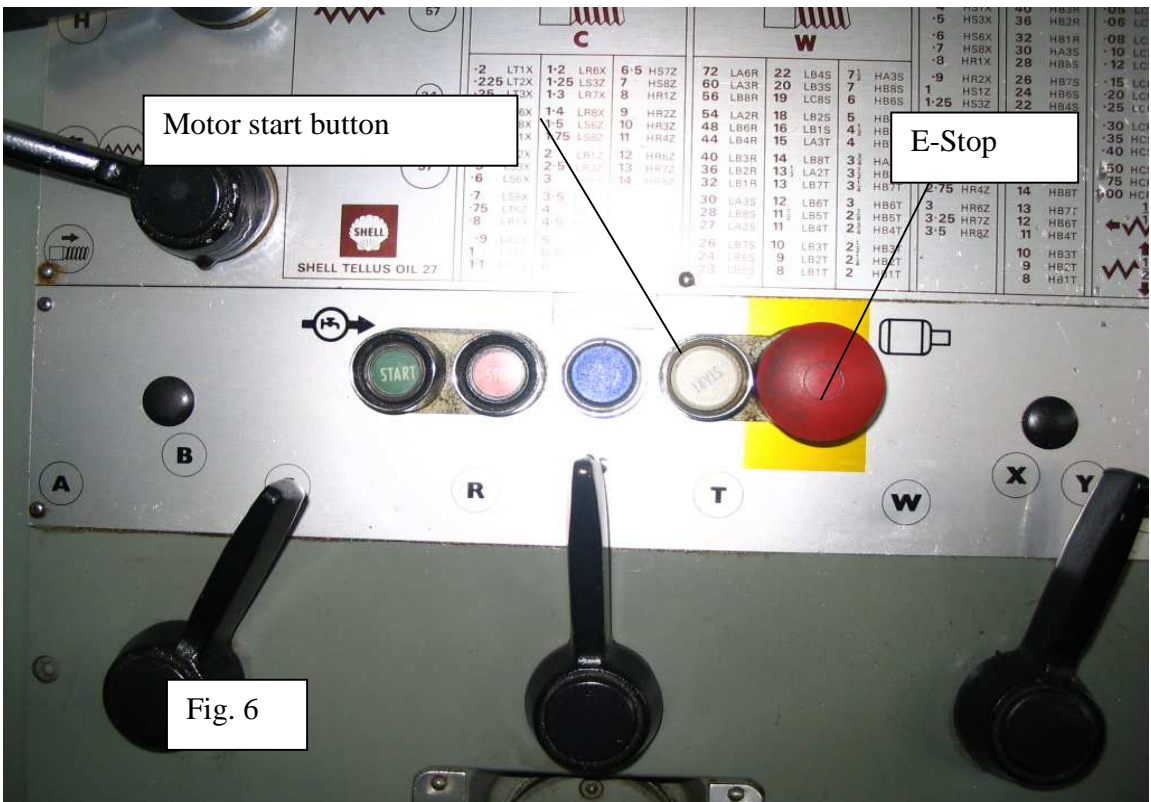




Spindle speed levers  
(**note** all colors must match when selecting speed)

Fig. 3





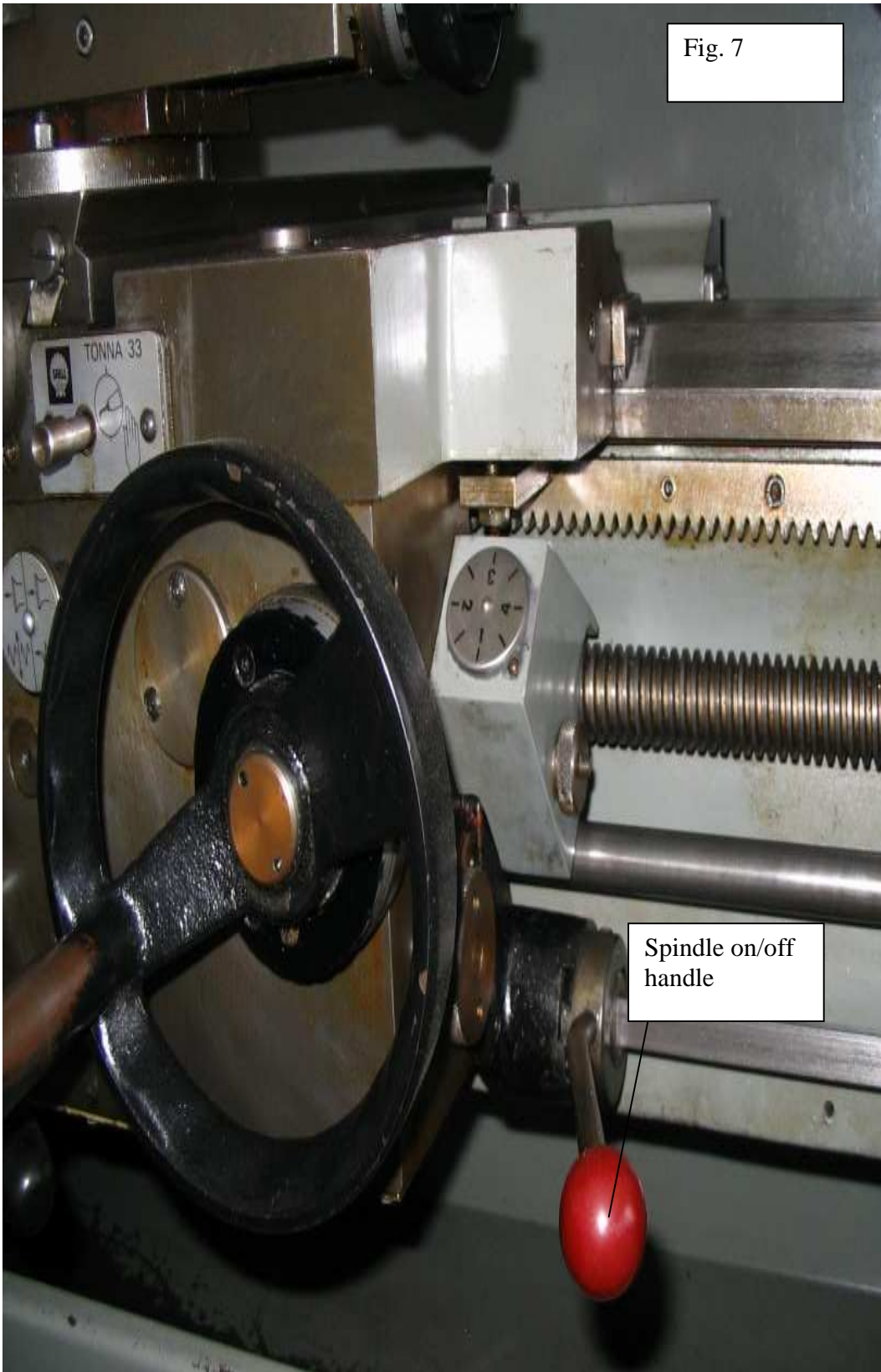


Fig. 7

Spindle on/off handle



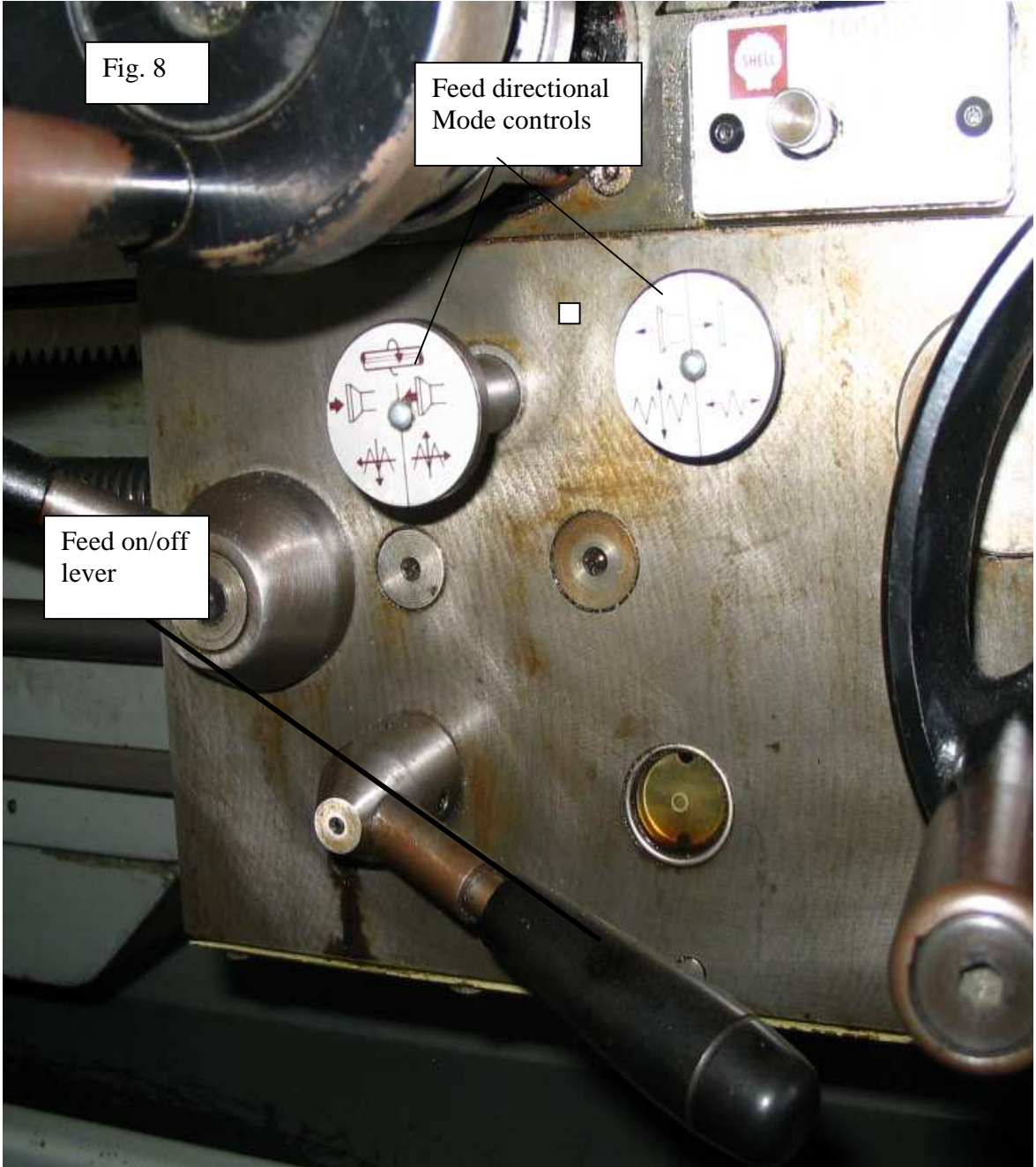


Fig. 8

Feed directional  
Mode controls

Feed on/off  
lever