

বাংলাদেশ শিল্প কারিগরি সহায়তা কেন্দ্র (বিটাক), শিল্প মন্ত্রনালয়  
১১৬(খ), তেজগাঁও শিল্প এলাকা, ঢাকা-১২০৮  
গবেষণা প্রস্তাব

১. গবেষণার শিরোনাম Title of the Research	Local Development of CNC Plasma Router Machine
২. সমস্যার বর্ণনা Statement of the Problem	<p>Metal sheets and plates are currently cut with oxy-acetylene gas torch or Band saw machine and then given to other machines (i.e. milling, shaper, lathe etc.) for final machining.</p> <p>Cutting with oxy-acetylene gas produces very rough edges and requires larger machining allowance resulting much larger machining time. Cutting with Band saw machine produces taper edges resulting in larger machining allowance and consequently higher machining time. Capacity of cutting length is limited to 300-400 mm so that larger plates can't be cut in Band saw machine. Both of these cutting methods can't produce complex shapes</p>
৩. গবেষণার উদ্দেশ্যসমূহ Objectives of the Study	<ol style="list-style-type: none"><li>1. To develop this technology locally</li><li>2. To strengthen the capacity of BITAC</li><li>3. To minimize sheet/plate cutting time</li><li>4. To cut larger size with higher accuracy</li><li>5. To cut complex shapes with higher accuracy</li></ol>
৪. সাহিত্য পর্যালোচনা Literature Review	<p>The basic plasma cutting process involves creating an electrical channel of superheated, electrically ionized gas i.e. plasma from the plasma cutter itself, through the work piece to be cut, thus forming a completed electric circuit back to the plasma cutter through a grounding clamp. This is accomplished by a compressed gas (oxygen, air, inert and others depending on material being cut) which is blown through a focused nozzle at high speed toward the work piece. An electrical arc is then formed within the gas, between an electrode near or integrated into the gas nozzle and the work piece itself. The electrical arc ionizes some of the gas, thereby creating an electrically conductive channel of plasma. As electricity from the cutter torch travels down this plasma it delivers sufficient heat to melt through the work piece. At the same time, much of the high velocity plasma and compressed gas blow the hot molten metal away, thereby separating, i.e. cutting through, the work piece.</p> <p>On the other hand a computer numerical control (CNC) router is a computer-controlled cutting</p>

		<p>machine. By precisely moving the cutter (in our case a Plasma Torch) through the material it can create virtually any complex pattern or shape. The CNC works on the Cartesian coordinate system (X, Y and Z) for 3D motion control. Coordinates are uploaded into the machine controller from a separate program. Parts can be designed in the computer with a CAD/ CAM program, and then cut automatically using a router to produce a finished part. CNC routers can be controlled directly by manual programming, but CAD/CAM allows wider possibilities for contouring, speeding up the programming process and in some cases creating programs whose manual programming would be impractical.</p> <p>The understanding of both plasma cutting and CNC router technology with all detail is needed for the design of precise equipment</p>
৫.	<p>গবেষণার গুরুত্ব Importance of the study</p>	<p>Typical materials cut with a plasma torch include steel, stainless steel, aluminum, brass and copper, although other conductive metals may be cut as well. Plasma cutting is often used in fabrication shops, automotive repair and restoration, industrial construction, and salvage and scrapping operations. Due to the high speed and precision cuts combined with low cost, plasma cutting sees widespread use from large-scale industrial CNC applications down to small hobbyist shops.</p>
৬.	<p>গবেষণার পদ্ধতি Methods of the Study</p>	<ol style="list-style-type: none"> <li>1. Building the cnc work table (size approximately 4'X4')</li> <li>2. Building the table frame with steel channels</li> <li>3. Assembling x, y and z ball screws with the stepper motors and plasma torch to the frame work.</li> <li>4. Installing air plasma generator</li> <li>5. Installing router controller with a computer.</li> <li>6. Setup the machine with the computer</li> </ol>
৭.	<p>প্রত্যাশিত ফলাফল Expected Output</p>	<p>Local development of cnc plasma router machine should-</p> <ol style="list-style-type: none"> <li>1. Faster production rate especially in sheet/plate cutting.</li> <li>2. Minimize material wastage</li> <li>3. Cut complex shapes</li> <li>4. Minimize or exclude other machining operations</li> <li>5. Cut larger dimension with higher accuracy.</li> </ol>

<p>৮.</p>	<p>কর্ম পরিকল্পনা এবং সম্ভাব্য বিবরণী Action Plan &amp; Tentative Budget</p>	<p><u>Time frame:</u>  1.Design- 20 weeks  2.procurement- 16 weeks  3.Manufacture- 20 weeks  4.Redesign- 16 weeks  5.Manufacture- 12 weeks  6.Quality control- 8 weeks  7.Final test- 4 weeks  Total 96 weeks</p> <p><u>Tentative Budget:</u>  Total cost 1.5 lac</p>
<p>৯.</p>	<p>গ্রন্থ পঞ্জী Bibliography Reference</p>	<ol style="list-style-type: none"> <li>1. THE DESIGN OF A CNC MACHINE FOR CUTTING WITH A PLASMA ARC By Lukas Kudrna</li> <li>2. THE TECHNOLOGY OF THE PLASMA CUTTING ON A CNC MACHINE By Lukas Kudrna</li> <li>3. The Latest Technology of Plasma Cutting By Satoshi Hamada</li> <li>4. Influence of plasma torch design on cutting quality during precision air-plasma cutting of metal By Anakhov Sergey</li> </ol>



