



বাংলাদেশ শিল্প কারিগরি সহায়তা কেন্দ্র(বিটাক)

শিল্প মন্ত্রণালয়

১১৬(খ), তেজগাঁও শিল্প এলাকা, ঢাকা ১২০৮।



Research Report on:

Design & Development of Bar Puller for CNC Lathe Machine.

Team Members:

Rahamat Ullah

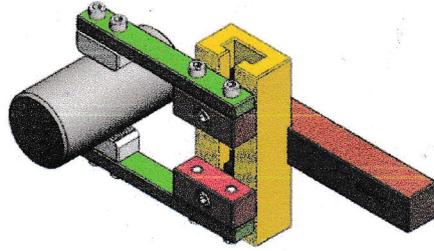
Assistant Engineer, BITAC Dhaka

Mahmudul Hasan

Assistant Engineer, BITAC Dhaka

Faysal Khan

Junior Technician, BITAC Dhaka



Supervisor:

Md. Fazlul Karim

Additional Director, BITAC Dhaka

Summary:

This report discuss the process of making a bar puller for CNC lathe machine. It also discuss the benefits of this bar puller in actual production. Main objective of this study is to minimize machine idle time, increase production and minimize manual labor. At the end of the study we tested the Bar puller Attachment on our CNC lathe (Haas st-30y). Outcome of the study is positive. The Bar puller was able to function during job production. Though more study is needed to improve its design.

Introduction:

We do multiple type of job production in CNC Lathe Machine and most of them are repetitive job. For multiple production we have to open door, change stock of the material, take measurements, open and close jaw by foot paddle. All those steps take some time. Sometime as much as the time of doing a complete job. The wastage of time can be saved by automatic Bar Puller. Customized bar Puller can be bought but those kind of bar Puller can't hold all size of bar and have limitations. As we did different kind of job daily we need a bar Puller or sets of them for overcome this limitations.

Review of Literature:

CNC Turn Mill is one of the finest machine in production line. To ensure this finest machines full capacity necessary jigs, fixtures, tools & accessories are compulsory. Bar Puller is one of the most useful and necessary accessories of them. Customized bar feeder are available in market for single type or fixed type job production but for workshop who have variety types and size of job, doesn't have much help. By this research we would try to make a simple solution for bar pulling technology. Main objective is to design a simple bar Pulling device depending on our research data which can solve the problem.

Methodology:

To conduct this research we studied several bar puller operation and design from various manufacturer. We designed the Bar puller attachment using SolidWorks 2016. The Main component of our design include:

- A) Base Plate
- B) Main body
- C) Plunger
- D) Pin & Bush
- E) Arm
- F) Gripper

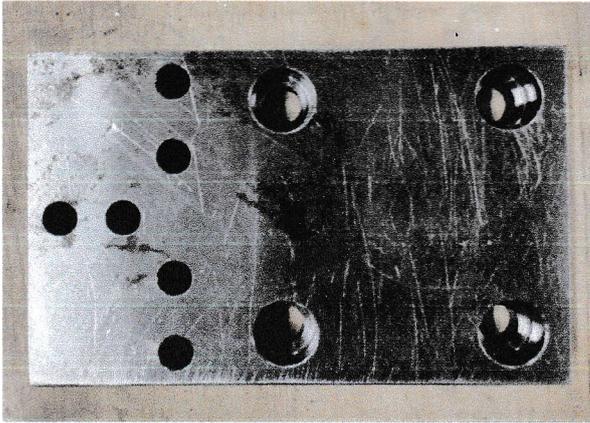
All these parts are manufactured in our CNC workshop.

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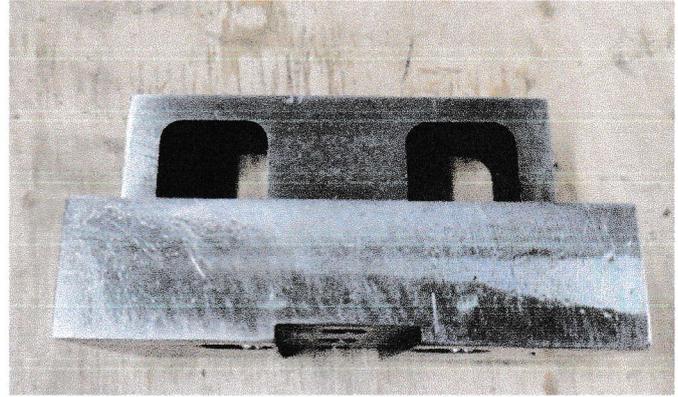
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A) Base Plate:



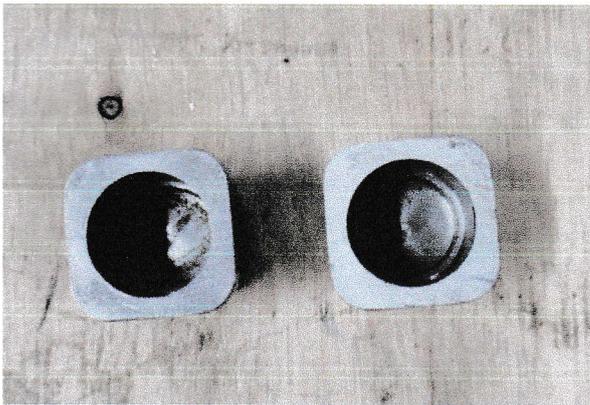
The bar Puller assembly is attached to the CNC lathe with this part. This part is a Mild steel part and manufactured in our Haas VF1 CNC Milling Machine.

B) Main Body



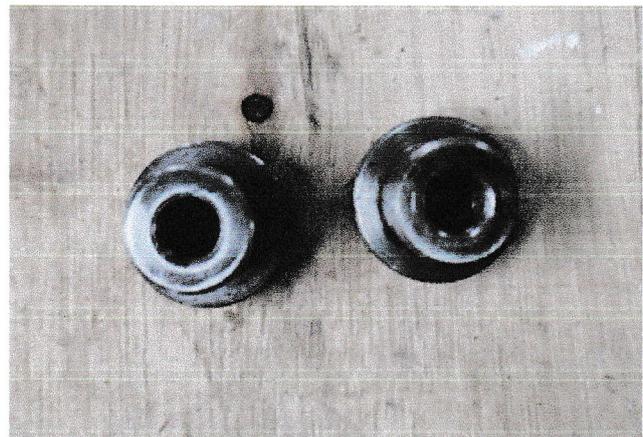
All parts of Bar puller is assembled to this body. This part is a Mild steel part and manufactured in our Haas VF1 CNC Milling Machine.

C) Plunger & Spring



These parts are alloy steel parts and manufactured in our Haas VF1 CNC Milling Machine. These two parts provide spring mechanism to the arms to hold various diameter bars.

D) Pin & Bush



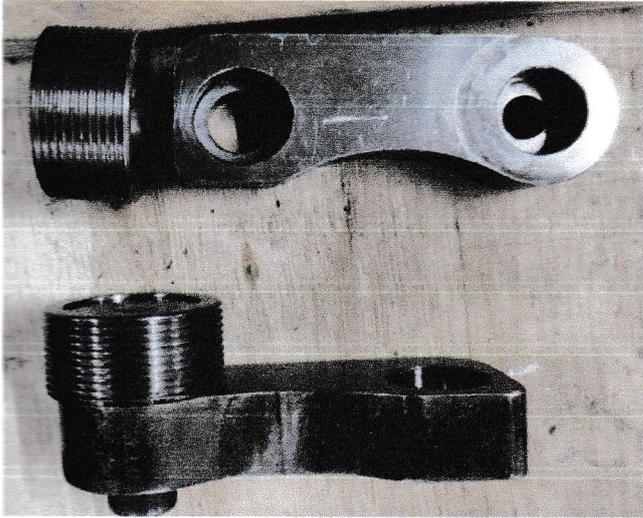
These parts are alloy steel parts and manufactured in our Haas ST30Y CNC Lathe Machine.

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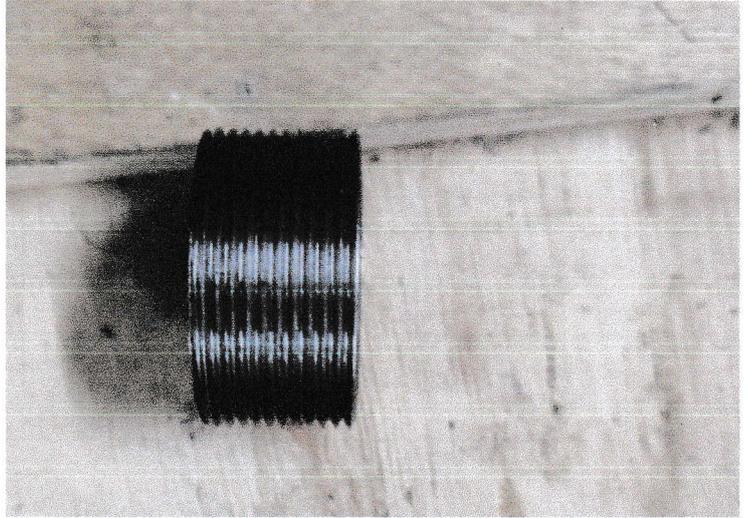
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E) Arms



These parts are alloy steel parts and manufactured in our Haas VF1 CNC Milling Machine. These two parts work as jaw for holding various diameter stock/Round bar

F) Gripper



These parts are alloy steel parts and manufactured in our Haas ST30Y CNC Lathe Machine. The function of this part is to grip

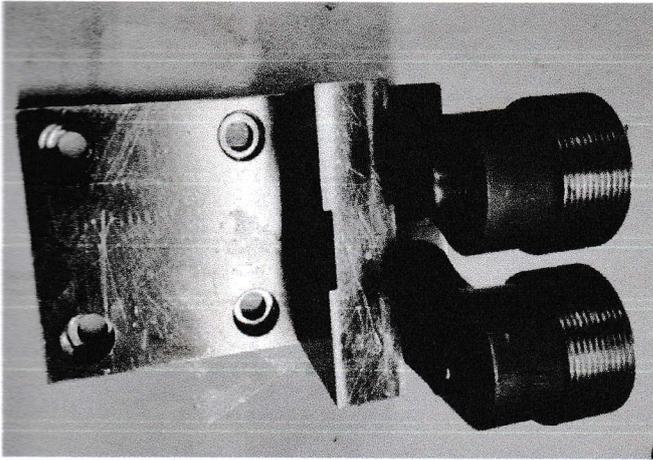


Fig: Bar Puller Assembly

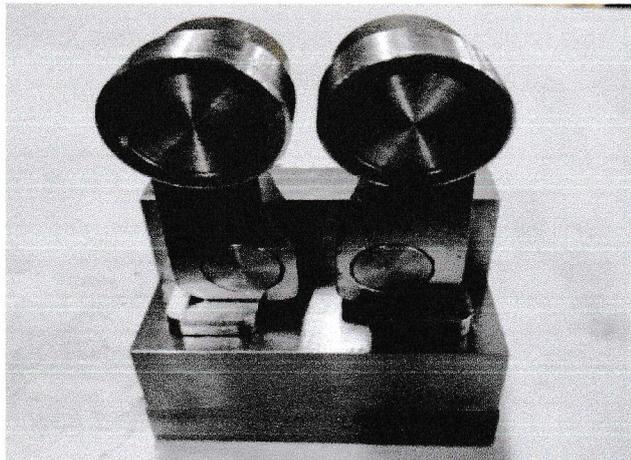


Fig: Bar Puller Assembly

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After assembling all the parts we attached the Bar puller on our Haas st30y CNC lathe machine. We tested the gripping and pulling capabilities of the Bar puller Attachment on various diameter Bars. It was able to hold and pull shafts/bars of various diameter.

To check the performance of the Bar puller we implemented it to manufacture one of high production parts in our CNC lathe machine. Selected test conditions:

Name of the selected parts	Post Office Seal Blank
Material of Bar/shaft	Mild Steel
Diameter of Bar/shaft	2 inch
Length of Bar/shaft	3 feet approx.
Name of the selected machine for bar puller implementation.	Haas ST30Y CNC lathe Machine
Spindle Revolution	1000 rpm
Turning Feed Rate	.25mm/rev
Bar Puller Feed Rate	Rapid

By implementing the Bar puller with the above mentioned conditions we were able to compare the benefits of Automatic Method with Manual Method.

Automatic Method (with Bar Puller): In this mode at the end of the program cycle the bar/shaft is pulled automatically by our bar puller automatically without using any hand.

Manual Method (without Bar Puller): In this mode at the end of the program cycle the bar/shaft is pulled manually by an operator's hand.

Summary of time comparison between automatic and manual method:

Parameters	Automatic Method(with Bar Puller)	Manual Method(without Bar Puller)
Turning, Facing and Parting time	5min	5min
Door opening time	Not necessary	30sec
Chuck unclamp time	Not necessary	20sec
Bar Pulling/advance time	20sec	20sec
Bar measurement time	Not necessary	30sec
Chuck unclamp time	Not necessary	20sec
Door closing time	Not necessary	20sec
Production Cycle time	5min 20sec	7min 20sec

By using the Bar puller reduction in cycle time was 2 minutes.

Test Result:

From the test we can easily deduce that implementing the Bar Puller saves minimum 2 minutes of cycle time for the selected production line. At the end of each cycle no manual labor is not needed if we use the Bar Puller. Thereby we can implement our skilled operators on other machines. This will ensure higher production in our work shop.

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Conclusion:

Outcome of the study is positive. The Bar puller was able to function during job production. It was able to grip and pull round bars of various diameter automatically during production. It was able to save precious time and labor during production. Though more study is needed to improve its design. Successful implementation of this Bar Puller can increase productivity and minimize manual labor.

Reference:

1. <https://www.roviproducts.com/bar-pullers/bar-pullers-universal/compact-cnc-bar-pullers/>
2. <https://tormach.com/ez-puller-38789.html>
3. <https://www.travers.com/product/royal-43372-bar-puller-69-000-215>
4. <https://thameworkholding.com/products/tec-accessories/powerpull-bar-puller/>



Fig: Reference Pictures of various Bar Puller Attachments

Mulim
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মাহমুদুল হাসান
সহকারী প্রকৌশলী
বাকসেম শিখা জরীপারি সবারজ কেরা (বিজিও)
১১৬/খ, ডেজনার্ড বি/এ, ঢাকা-১২০৮

Fajew
20-06-22

Karim
20/06/2022

Engr. Md. Fazlul Karim
Additional Director
Bangladesh Industrial Technical
Assistance Center (BITAC)
Dhaka-1208