

# Diamond Life Monitoring Through CNC Programming by Generating Alarming System

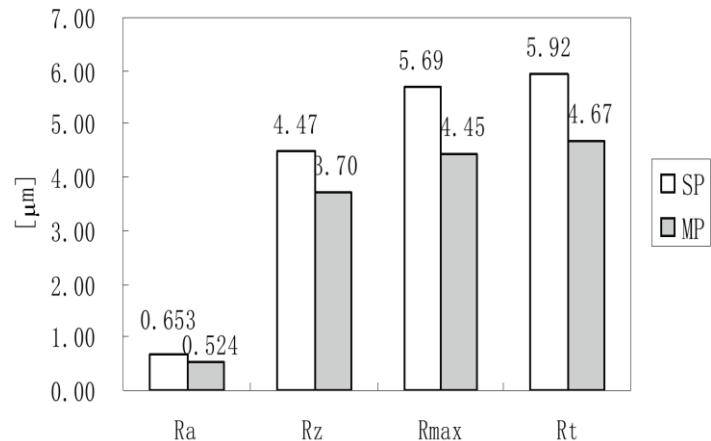
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**Abstract:**-This paper focuses on monitoring the life of diamond of a multipoint Diamond dresser which is placed behind the grinding wheel to ensure that the wheel is concentric with its axis and prevents Glazing of wheel. This can be done by creating an alarming system by feeding an appropriate NC program in the CNC and a message will be displayed on the screen through which the worker will come to know that the diamond needs to be changed and hence job rejection rate can be decreased, and machine downtime can be reduced, thus improving quality of the job.

**Keywords:** CNC, Diamond dresser, Alarming system, NC programming.

## I. INTRODUCTION

Dressing is the process of leveling the grinding wheel. diamond cutter(dresser) is present at the other end of the wheel. Dressing is mainly done to avoid ovality in the circular job like crankshaft, to avoid runout of the crankshaft and to improve cutting tendency of the wheel. In grinding, the grinding wheel has to be dressed periodically to restore wheel form and cutting efficiency [1]. In diamond dressing, a number of parameters govern the process, including dressing depth, dressing lead/traverse rate, the type of dresser used and number of dressing passes [1]. Diamond dressers are made with natural diamond and synthetic material. They are mainly used for truing and dressing of conventional abrasive grinding wheel. Dressers can be single point or multipoint depending on the type of application. As the dresser is on the other side of the wheel, it cannot be seen by the operator, and thus unless the grinding wheel is opened up and checked, the operator cannot know the condition of the diamond whether it has worn out or not which is a time consuming process and in order to avoid that, a program is created which can be interlocked with the main program of the CNC which will display a message "change diamond" hence alerting the worker that the diamond needs to be changed. This program was made specifically for the CNC machine by Siemens (SINUMERIK 840D) and thus this system will be applicable for any Siemens CNC machine since the commands used are specific to these machines. However, it can be implemented for any CNC machine by making certain changes in the commands using the company's program catalogue.



Comparison of effect of single point dressing on roughness with multi-point dressing.[1]

Referring to the four measured surface parameters, it can be seen that the multi-point diamond dressing decreased its values by approximately 20% respectively, with those obtained in single point diamond dressing as a baseline. It can thus be inferred that multi-point diamond dressing can result in a smoother surface than single point diamond dressing.

## II. PREVIOUS PROBLEM

The previous problem experienced was deterioration of job quality due to wearing out of diamond dresser and uneven dressing of grinding wheel.

## III. PREVENTIVE ACTION

We monitor dresser life and interlock part program with the main program i.e. the main program will not execute if the set dresser life is over. So, basically number of revolutions of the wheel are decided by trial and error and the set count is entered in the program.

Following procedure is followed in order to set dress count and interlock the alarm with the main program.

### A. Nomenclature

1. GUD- Global User Data
2. GOTOB- Conditional program jump (backward)
3. M – Miscellaneous function
4. ; - Comment start
5. GOTOF- Conditional program jump (forward)
6. eof – end of file
7. STOPRE- Stop Read [3]

**B. Procedure**

- Note down the following GUD (Global User Data) parameter.

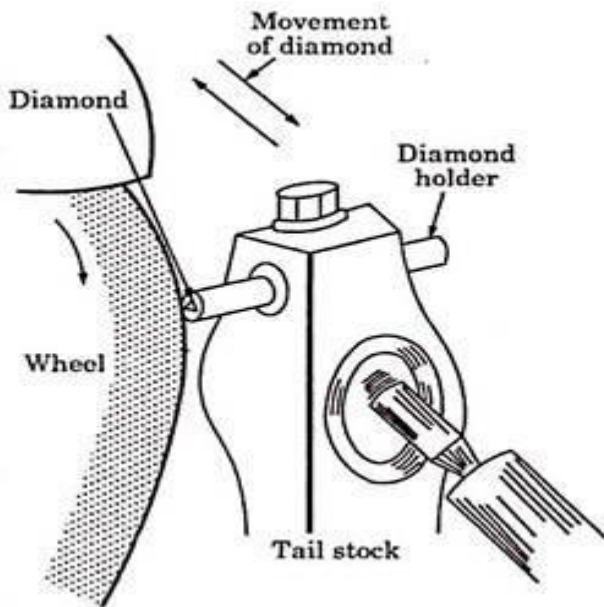
WH\_CURR\_DIA  
 X\_OFFSET

- Go to GUD5 definition file
- Change name of following GUD5  
 DIAMOND\_ROT1CUT =DRESS\_COUNT  
 DIAMOND\_ROT2CUT =DRESSER\_LIFE
- Create program L235- To update dress count L235 should be called at the end of dressing program.
- Create program L236- To compare actual dresser life with set dresser life. L236 should be called in the beginning of MAIN.mpf

L236

```

; Dresser Life monitoring
; only Channel 1
R225 = Dresser _ Life
STOPRE
R226 = Dress _ count
STOPRE
IF (R226 >R225) GOTOF AY
STOPRE
M17 ; end of subprogram
STOPRE
AY:
MSG ("Change Diamond ") ; message to be displayed
M00
GOTOB AY
=eof=
    
```



Diamond dressing [2]



Multipoint Diamond Dresse

**C. Programs**

Channel 1 – Grind  
 Channel 2 – Dress

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L235
; Dresser Life monitoring
; only Channel 2
R103 = Dress _count
STOPRE
R103 = R103+1
STOPRE
Dress _count = R103
STOPRE
M17 ; end of subprogram
=eof=
    
```

**IV. EFFECTS OF IMPLEMENTING THE ALARM**

- Decreased rejection rate of workpieces.
- Reduced machine down-time.
- Improved quality.
- Loss due to scraping of jobs will be reduced.

**V. SCOPE**

Currently this system is applied to grinding wheel of specific width and dresser life is calculated for that specific wheel only. The set life of diamond dresser for one wheel is not the same for any other wheel. To overcome this drawback, we can consider the diamond life based on the distance travelled by the diamond tool before failure.

## VI. CONCLUSION

In this paper, the procedure to implement an alarming system in the Siemens SINUMERIK 840D has been explained. A corresponding NC program has also been provided which needs to be interlocked with the main program in order to get the alarm working efficiently. This program can be implemented in any CNC with minor changes in commands according to the manufacturer of the CNC. As a result of this system, except for maintenance purposes, the worker does not need to waste time in checking the sharpness of the diamond dresser and will be informed as soon the cutting point of the tool loses contact with the grinding wheel. This will prevent jobs from getting damaged and hence will save their reworking cost, reduce machine down time and improve efficiency of the superfinishing processes like grinding.

## REFERENCES

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