PECULIARITIES OF COMPUTER PROGRAMS CNC MULTI SPINDLE MACHINING

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Abstract

Using a multiple number of coordinate systems for multi spindle machining centres significantly increase productivity of timber.

***Key words**: CNC, multi spindle, routins*

INTRODUCTION

Using a multiple number of coordinate systems for multi spindle machining centres significantly increase productivity of timber.

Through the processes to obtain a multi spindle efficiency wood processing centers through:

-processing with the same grip of a greater number of identical pieces;

-processing of parts on different rotating with several clamping points on several sides;

-processing in large series of pieces fixed clamps on the dedicated machine tools..

MATERIAL AND METHOD

Introduction in machine memory tools to position these devices increase productivity.

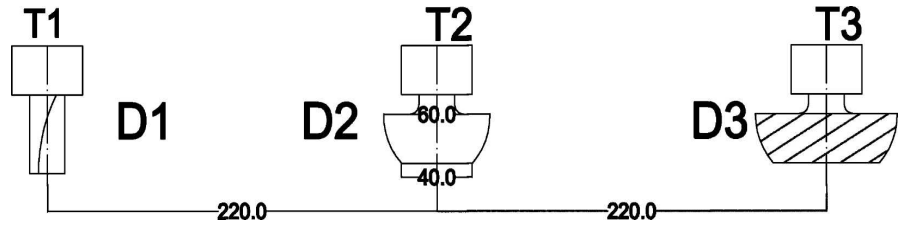
The main objective of the program is to optimize the programs depending on facilities equipments: two machining centres with numerical control with different technical characteristics and determination of labour productivity for each benchmark.

Fig. 1. Machining center RANK 216

Fig. 2. Machining center RANK 230

Development routine with three tools

Tool 2 profiling **Tool 3grinding**



Ranc 216
%2MPF
(70*876*20)
N1 G40 G64 G54 M51
G54 M51 M52
N2 G0 G90 D0 Z170
/M91
/S180
N3 G59 X0
R993=3
N10 X70 Y976 (PCT.DE START)
N15 T1
N20 G91 D1 Z0
N25 G91 G64 G1 G41 Y-50 Z-30 F6000
N30 G1 Y-50
Y-50 Z-30 F6000
N35 G1 Y-78

Ranc230
%2MPF
(70*876*20)
N1 H29 S0 T0 G40 G64
N2 G0 G90 D0 Z230 M15
@714
H21
N5R998=7 R996=180
N10 L899 P1
M21
N15 X70 Y976 (
PCT.DE START.)
N20 G91 D1 Z0
N25 G91 G64 G1 G41
N30 G1 Y-50

```
N40 G2 X-16 Y-48 U80 F4000
N45 G3 X-8 Y-24 U40 F4000
N50 G3 X8 Y-24 U40 F4000
N55 G2 X16 Y-48 U80
N60 G2 X-16 Y-48 U80 F4000
N65 G3 X-8 Y-24 U40 F4000
N70 G3 X8 Y-24 U40
N75 G2 X16 Y-48 U80 F4000
N80 G2 X-16 Y-48 U80 F4000
N85 G3 X-8 Y-24 U40
N90 G3 X8 Y-24 U40 F4000
N95 G2 X16 Y-48 U80
N100 G2 X-16 Y-48 U80
N105 G3 X-8 Y-24 U40
N110 G3 X8 Y-24 U40
N115 G2 X16 Y-48 U80
N120 G2 X-16 Y-48 U80
N125 G3 X-8 Y-24 U40
N130 G3 X8 Y-24 U40
N135 G2 X16 Y-48 U80
N140 G1 Y-78
N145 G1 G62 Y-30 Z30
N150 G40 G1 Y-10
N155 G90 G0 D0 Z170
/M82
/S180
N160 G59 X-220
R996=130 R993=3
N165 X70 Y976 (PCT.DE START)
```

```
N35 G1 Y-78
N40 G2 X-16 Y-48 U80
F4000
N45 G3 X-8 Y-24 U40
F4000
N50 G3 X8 Y-24 U40
F4000
N55 G2 X16 Y-48 U80
N60 G2 X-16 Y-48 U80
F4000
N65 G3 X-8 Y-24 U40
F4000
N70 G3 X8 Y-24 U40
N75 G2 X16 Y-48 U80
F4000
N80 G2 X-16 Y-48 U80
F4000
N85 G3 X-8 Y-24 U40
N90 G3 X8 Y-24 U40
F4000
N95 G2 X16 Y-48 U80
N100 G2 X-16 Y-48
U80
N105 G3 X-8 Y-24 U40
N110 G3 X8 Y-24 U40
N115 G2 X16 Y-48 U80
N120 G2 X-16 Y-48
U80
N125 G3 X-8 Y-24 U40
N130 G3 X8 Y-24 U40
N135 G2 X16 Y-48 U80
N140 G1 Y-78
N145 G1 G62 Y-30 Z30
N150 G40 G1 Y-10
N155 G90 G0 D0 Z230
N160 G54 G90 G0 D0
Z230 S0 T0
N165 R998=8
N166 L899 P1
```

N170 T2
N175 G91 D2 Z0
N180 G91 G64 G1 G41 Y-50 Z-30 F6000
N185 G1 Y-50
N190 G1 Y-78
N195 G2 X-16 Y-48 U80 F4000
N200 G3 X-8 Y-24 U40 F4000
N205 G3 X8 Y-24 U40 F4000
N210 G2 X16 Y-48 U80
N215 G2 X-16 Y-48 U80 F4000
N220 G3 X-8 Y-24 U40 F4000
N225 G3 X8 Y-24 U40
N230 G2 X16 Y-48 U80 F4000
N240 G2 X-16 Y-48 U80 F4000
N245 G3 X-8 Y-24 U40
N250 G3 X8 Y-24 U40 F4000
N255 G2 X16 Y-48 U80
N260 G2 X-16 Y-48 U80
N265 G3 X-8 Y-24 U40
N270 G3 X8 Y-24 U40
N275 G2 X16 Y-48 U80
N280 G2 X-16 Y-48 U80
N285 G3 X-8 Y-24 U40
N290 G3 X8 Y-24 U40
N295 G2 X16 Y-48 U80
N300 G1 Y-78
N305 G1 G62 Y-30 Z30
N310 G40 G1 Y-10

M21
N170 X70 Y976 (PCT.DE START)
N175 G91 D2 Z0
N180 G91 G64 G1 G41 Y-50 Z-30 F6000
N185 G1 Y-50
N190 G1 Y-78
N195 G2 X-16 Y-48 U80 F4000
N200 G3 X-8 Y-24 U40 F4000
N205 G3 X8 Y-24 U40 F4000
N210 G2 X16 Y-48 U80
N215 G2 X-16 Y-48 U80 F4000
N220 G3 X-8 Y-24 U40 F4000
N225 G3 X8 Y-24 U40
N230 G2 X16 Y-48 U80 F4000
N240 G2 X-16 Y-48 U80 F4000
N245 G3 X-8 Y-24 U40
N250 G3 X8 Y-24 U40 F4000
N255 G2 X16 Y-48 U80
N260 G2 X-16 Y-48 U80
N265 G3 X-8 Y-24 U40
N270 G3 X8 Y-24 U40
N275 G2 X16 Y-48 U80
N280 G2 X-16 Y-48 U80
N285 G3 X-8 Y-24 U40
N290 G3 X8 Y-24 U40
N295 G2 X16 Y-48 U80
N300 G1 Y-78
N305 G1 G62 Y-30 Z30

N315 G90 G0 D0 Z170
N320 G59 X0
N999 M30

N310 G40 G1 Y-10
N315 G90 G0 D0 Z170
N999 M30

As seen in the program, the basic scheme is repeated, the difference being the calculation of engines, and if you enter contour sanding operation and loading N25până from the string, you must enclose the N155 six times, leading to repeated errors. That's why we use a subroutine, which sums up the repeated operations and is called whenever needed.

The subroutine

```
%SPF001
N10 G91 G64 G1 G41 Y-50 Z-30 F6000
N15 G1 Y-50
N20 G1 Y-78
N25 G2 X-16 Y-48 U80 F4000
N30 G3 X-8 Y-24 U40 F4000
N35 G3 X8 Y-24 U40 F4000
N40 G2 X16 Y-48 U80
N45 G2 X-16 Y-48 U80 F4000
N50 G3 X-8 Y-24 U40 F4000
N55 G3 X8 Y-24 U40
N60 G2 X16 Y-48 U80 F4000
N65 G2 X-16 Y-48 U80 F4000
N70 G3 X-8 Y-24 U40
N75 G3 X8 Y-24 U40 F4000
N80 G2 X16 Y-48 U80
N85 G2 X-16 Y-48 U80
N90 G3 X-8 Y-24 U40
N95 G3 X8 Y-24 U40
N100 G2 X16 Y-48 U80
N105 G2 X-16 Y-48 U80
N110 G3 X-8 Y-24 U40
N115 G3 X8 Y-24 U40
N120 G2 X16 Y-48 U80
N125 G1 Y-78
N130 G1 G62 Y-30 Z30
N135 G40 G1 Y-10
N140 M17
%SPF name of subroutine
M17 End Of File.
```

Under program calling for Ranc 216 is performed in the N25, N55 and N85 and Ranc 230 shall be in rows, N40 N70 and N100. What numbers can be allocated subprogramelor: L001 at L079 and L100 at L899 rest being blocked by the manufacturer for internal control cycles.

After established programs yield each NCC after its own characteristics.

Table 1.

Eficiency ofRANK 216 and RANK230

Pieces	Ranc 216		Ranc 230	
	Nr. pieces	Times	Nr.pieces	Times
Front drawer A	8	135	8	126
Slat	8	84.3	8	81
Front drawer B sertar	8	108.1	8	103
Frame door A	4	117	4	84.3
Front A	4	143.8	4	129.1
Frame door B	4	79.7	4	94
Door A	4	513.4	8	311.5
Door B	4	5148	8	5107
Door B	4	5137.5	8	5084
Door tv.	4	5004	4	4970
Door bar	4	4987	4	4986
Front B	4	420	4	379
Total	Total pieces 60	Total times 21877.8	Total pieces 72	Total times 21454.9

Loading in tandem

The program of the previous example can be changed for loading in tandem (Figure 4) namely the two pieces to be fitted to the machine table, so they can be fed and processed separately.

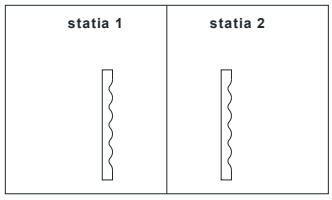


Fig. 3. Loading in tandem.

The first motion of the base will be used (G54) for station 1 and the second movement of the base will be used (G55) for station 2. The main

program of the previous example you rename in subprogramme (SPF002) to the main program 2.

The main program 2 to show you so;

```
For Ranc 216
% 4MPF
(sample 1)
N1 G40 D0 G54 M51
N2 G0 G90 Z170
N10 X70 Y976
N15 T1
N20 L004 P1
R996=160 R993=3
N25 G0 G90 D0 Z170
N30 M28
N35 M0
N40 G55 X70 Y976 M52
N45 T1
N50 L004 P1
N55 G0 G90 D0 Z170
N60 M29
N999 M30
```

```
ForRanc 230
% 4MPF
(sample 2)
N10 H29 S0 T0 G40
N15 G0 G90 D0 Z230
@714
H21
N20 R998=14
N25 L899 P1
M21
N30 X70 Y976
N35 L004 P1
N40 M0
N45 G56 M53 G0 G90
N50 M41 M42
N55 X70 Y976
N60 L004 P1
N65 G56 G90 G0 D0
Z230 S0 T0
N70 M43 M44
N999 M30
```

For Ranc 230 functions M51, M52 for station 1 and M53, M54 for 2 station checks the coupling parts the vaccum. Detach the automatic part is scheduled with M41, M42, M43 mod station 1 and Station 2 M44.

RESULTS AND DISCUSIONS

Of the programs that exposed by the CNC (Computerized Numerical Control) machine tools through a microprocessor controls all operations.

Conexion of machine and order is called the control Adaptive throttling, which consists of an integrated program in order.

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CONCLUSIONS

It was determined the productivity of two cars with different characteristics tool.

So with the help of the table 1(where you can see the run times and number of points performed) were fired the following conclusions:

-parts that require processing more than two tools will run on Ranc 230.

-parts that have a width of more than 420 mm will run on Ranc 230.

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