

USING OF THE FIVE AXES MACHINING AT THE MANUFACTURING OF THE SPECIAL GEAR CAMS

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Abstract

Keyword: *Five axes machining.*

The five axes machining is a new technology with large possibilities in the field of the special parts manufacturing.

Also, the special gear cams, special parts with curved surfaces, even the special gear, can be manufactured in this technology.

The authors of the present paper work show some technological possibilities of gear cam manufacturing, they having research activity in the five axes machining field. They intend to perform some new technologies based on five axes machining, more performing and more flexible, instead classical technologies, in order to can manufacture some of over mentioned parts.

INTRODUCTION

What are the cams, gear cams, or special parts, with similar configuration in the same great part family? What is the best technology for these parts? What is new on the field of the five axes manufacturing regard the possibilities of using or technological supporting for these complexes parts? So many questions can find the answer by this new technology.

Also, the special gear cams, special parts with curved surfaces, even the special gear, can be manufactured in this technology.

Some samples can prove this fact as follows:

- the special curved surfaces on the moulds;
- different cam profiles on basic surfaces as: cylindrical, front plane, conical, spherical, other curved basic surfaces;
- different gear cams: globoid curve, hyperboloid, cycloid, etc;
- different special gear as: conical gear on arc of circle, or on other basic curve;
- different cutting tool for worm gear;

All these samples can be performed on five axes machining principle, using special software applications on each technological case.

Theoretical, it is possible many combinations by the five axes technology, but what will be the machining precision, the price, the delivery time etc? All these were new questions, and to find the answer it need to search.

The authors of the present paper work show some technological possibilities of gear cam manufacturing, they having research activity in the five axes machining field. They intend to perform some new technologies based on five axes machining, more performing and more flexible, instead classical technologies, in order to can manufacture some of over mentioned parts.

DESCRIPTION

Two five axes milling machining type are as objective for the authors: TMA AL 550 – 5 axes (at Oradea University laboratory), CPFPM 1000 – 5 axes (at Stimin Oradea factory). These machines can be equipped with the devices, programs, and other technological components, as results from the preliminary research activity.

In **fig. 1** it is showed the machine TMA AL 550-5 axes version, and **fig. 2** showed the machine “CPFPH 1000-5 axes” with the table MRI 500-2CNC.

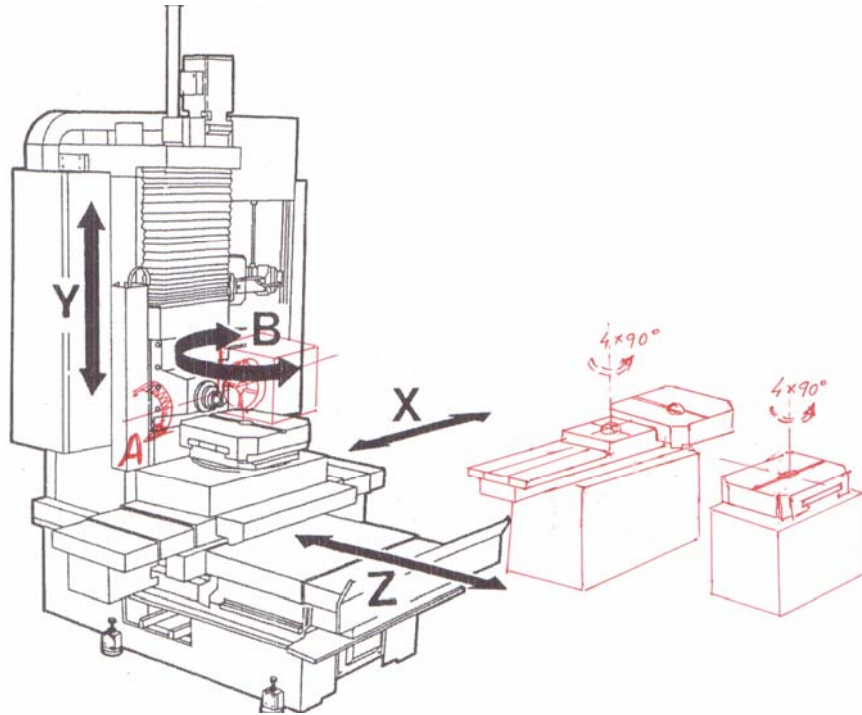


Fig. 1 – TMA AL 550-5 axes machine

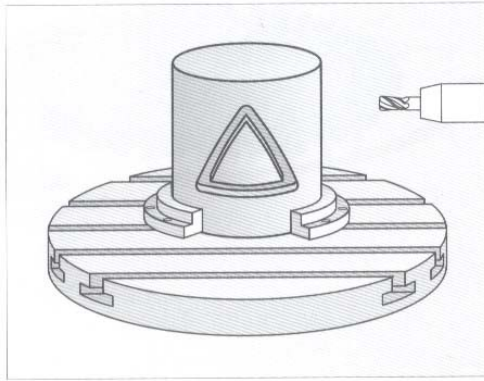


Fig. 2 – CPFPH 1000

The samples which can be showed regard the type of parts from the gear cam family are as follows:

- **fig. 3** – cylindrical cams (machine with 4 axes and generation in 3 axes);
- **fig. 4** – plane cams (machine in 4 axes and generation in 3 axes) ;
- **fig. 5** – roller gear cams (machine in 5 axes and generation in 4 axes);
- **fig. 6** – conical cams (machine in 4 axes and generation in 3 axes);
- **fig. 7** – conical gears (machine in 5 axes and generation in 4 axes);
- **fig. 8** – spherical cams (machine in 5 axes and generation in 5 axes).

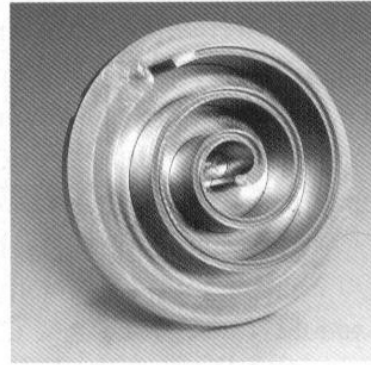
All these samples can be generated theoretical on five axes machining technology.



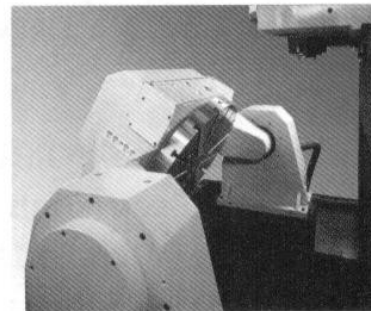
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Fig. 3 – (top) – cylindrical cams
Fig. 4 – (middle) – roller gear cams, [2]
Fig. 5 – (right) – plane cams, [3].

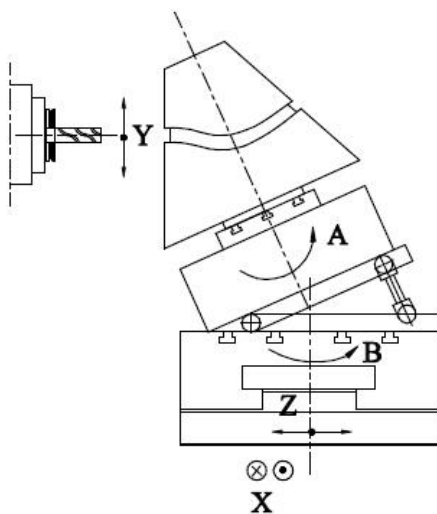


EXEMPLU DE PRELUCRARE
IN 3 AXE PE MIKRON
VCP 710
SPIRALA DE COMPRESOR
 $t = 2 \text{ min}$



MASA ROTATIVA SI
BASCULANTA DE
PRELUCRARE IN 5 AXE
DE CONTURARE

TMA AL 550 5 axes



CPFPH 1000 5 axes

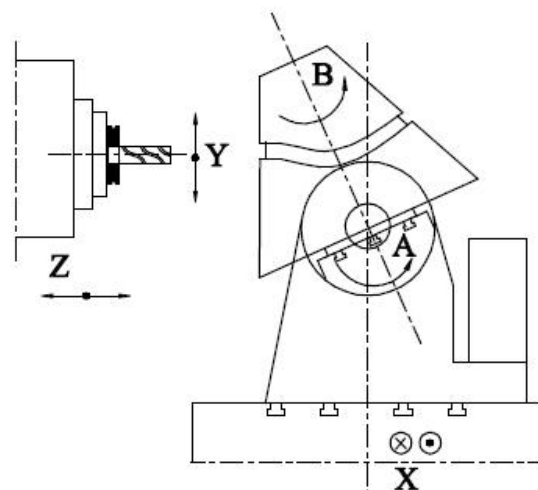


Fig. 6 – conical cams

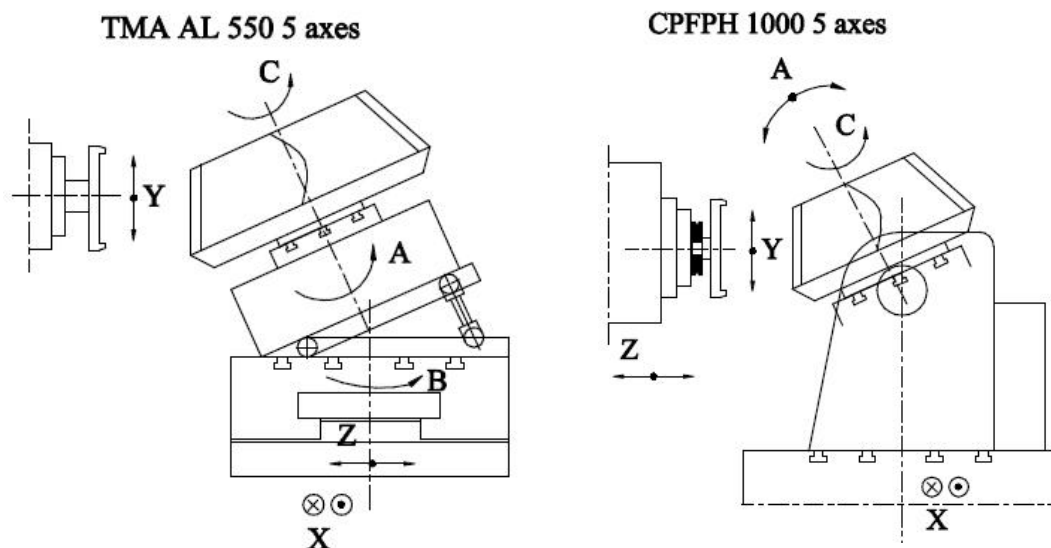
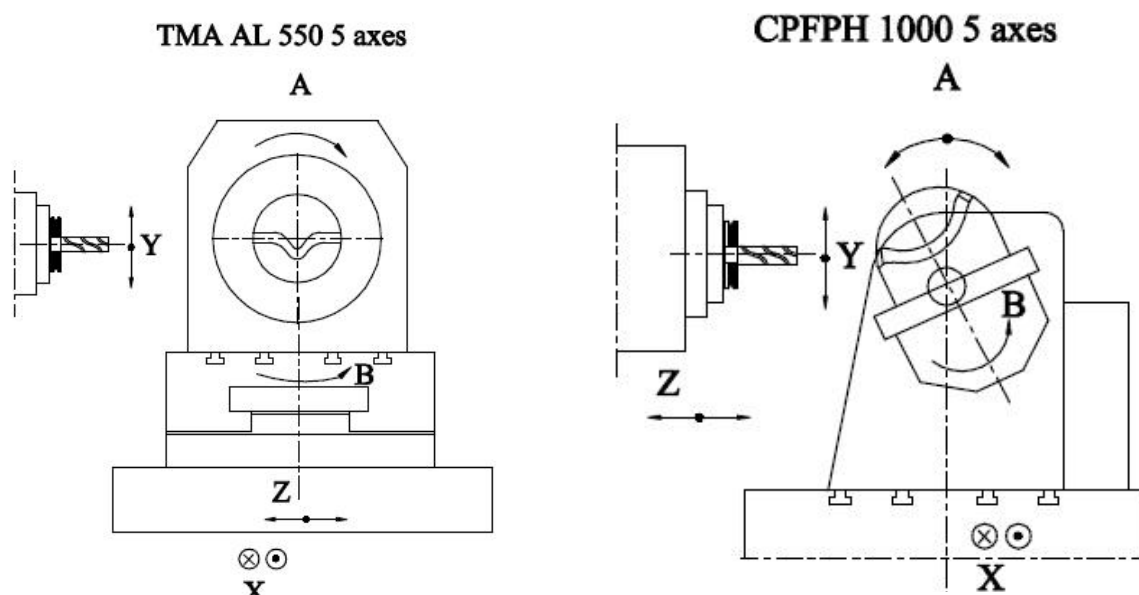


Fig. 7 – Conical gears

Fig. 8 – Spherical cams
CONCLUSIONS

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The authors of the present paper work are working in the field of five axes machining technology, having large possibilities for the technological movement combinations, for very special part configurations. They are ready to find your technical best solutions at your most difficult technological problems.

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