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Aspects of current technologies for processing of chain wheel teeth

Constantin Bucur
"Petru Maior" University of Târgu Mureş, România
E-mail: cbucur@engineering.upm.ro

Abstract

Industries, which are the largest user of chains have developed new manufacturing technologies required for different chains of transmission by high functionality. Manufacturing technologies currently used-n processing chain wheel are miscellaneous as will be seen below.

1. Introduction

Chain wheel disc consists of wheel, which has peripheral teeth arranged equidistant, and the wheel hub that is mounted on the shaft can carry a piece wheel or two small pieces (disk, that block), joined by welding, screws or other fasteners. Tooth profile it is determined by the type of chain. The geometry of teeth is defined by shape and size of tooth profiles in the frontal and axial planes and she is listed below(figure 1-2):

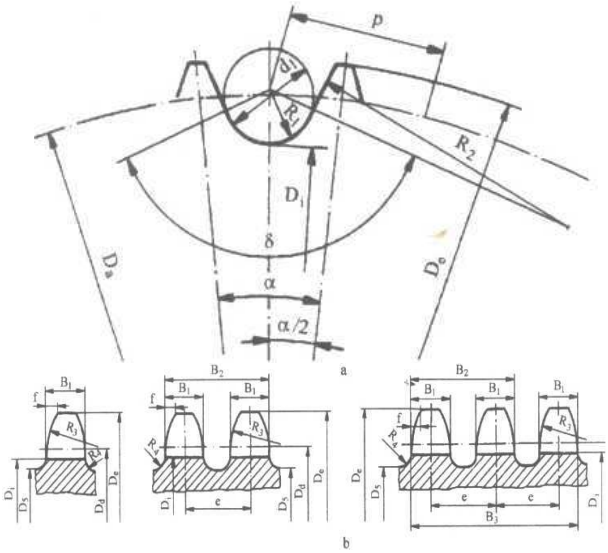

Figure 1 [2]

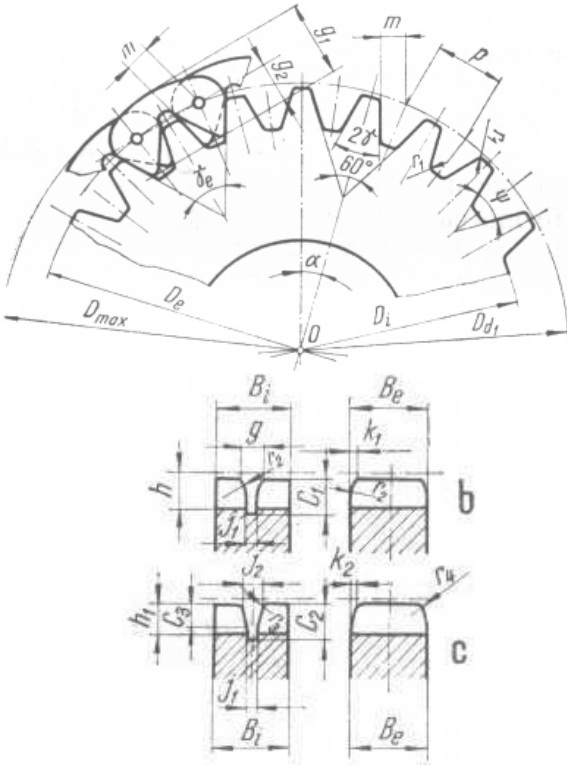

Figure 2 [2]

Chain wheel geometry is defined and reflected in national and international standard as follows: STAS 5013/5-91, SR ISO 606:2000 – Romania [2], ISO 606:2004 - International standard [11], DIN 8192 Berichtigung 1:2006-11 - Germany; ANSI B29.2M-1982 – USA [10];

Making teeth chain wheels are made by several processes, which are chosen depending on the configuration of parts, material nature and the production batch.

The following will review the technological processes used most commonly in the manufacture of chain wheels.

Keywords: *chain wheel, technologies, milling screw*

2. Processing chain wheel with precision stamping and hot rolling (plastic deformation)

Processing by punching accuracy, whether or not the calibration of the cutting contour with precision requirements of wheel related steps IT 9-12, this can be achieved by a process of stamping

Gear made by rolling the section has a fiber who conferring mechanical and wear characteristics superior to those made by cutting processes [1].

Figure 3 is represented by the chain wheel fiber scheme to:

a) cutting the bar,

b) cutting the forgings,

c) hot rolling.

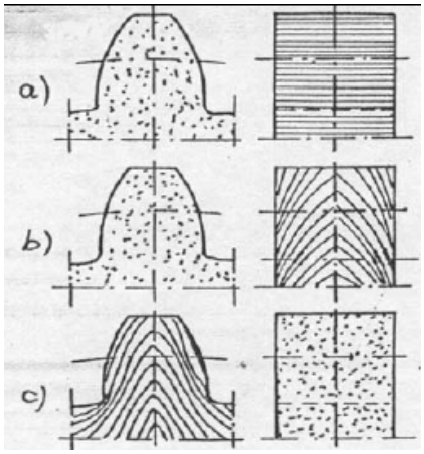

Figure 3 [1]

Fiber of the half-finished and the wheel (chain) obtained by hot rolling (figure 4):

a) half-finished;

b) wheel run.

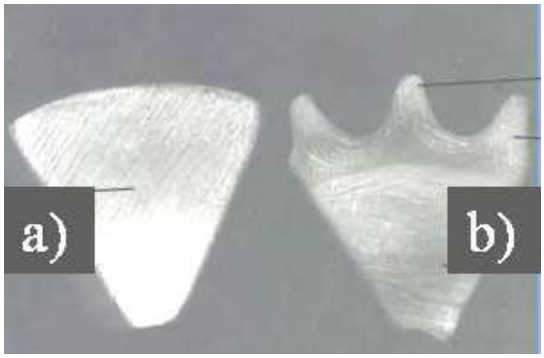

Figure 4 [1]

A variant of processing chain by pressing the wheel is observed in figure 5:

Figure 5 [3]

3. Working on milling machines, toothed chain wheels with screw cutter mode:

Figure 6 [3]

- Positioning relative to the tool axis of semi-product:

-On chain wheels processing the angle between the tool and semi-product is 90 °;

- Closing kinematics chain to achieve the desired relative movement:

-To process chain wheels, be sealed with two hand wheels kinematics chains;

a) kinematics chain running - connecting milling snail to piece,

b) kinematics chain of threading - binds the screw head of the sled vertical whit the piece;

- Adjust the cutting procedure:

a) determining cutting speeds,

b) longitudinal advance gear processing throughout its length is achieved by a kinematics chain

that provides a continuous movement of the tool on a direction parallel to the axis of semi-product;

Figure 7 [8]

- Approximation semi-product to the tool and cutting depth adjustment (figure 10);
- The choice of method of work: machine allows to work within the meaning of the advance or reverse the advance. Forming the purpose of the advance has the advantage that we get a better quality of surface and processed provides greater durability of the tool.

Figure 7 shows milling screw to generate the chain wheel teeth.

Figure 8 [4]

Image above (figure 8) shows the four aspects of chain wheel shape evolution during the manufacturing process (process of cutting).

4.Processing chain wheels on numerically controlled machines:

Steps performed in manufacturing on the CNC machines:

a)Chain wheel designed in a CAD program (AutoCAD, Inventor, Catia, SolidWorks, etc.).

b) Preparation for processing by "saving" the chain wheel in an newly-designed machine program CAM (Mastercam, SolidCAM, etc..), but there exist possibility of designing-processing on the CAD-CAM, such as Catia's softwer . All this provided the program to be recognized by the CNC machine.

Figure 8 [9]

Sprocket profile, processed on the CNC machines (figure 9):

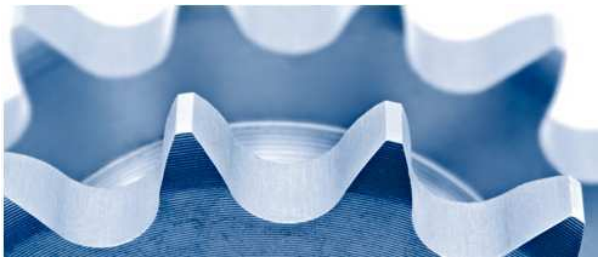

Figure 9 [9]

Figure 10 [6]

The figure above (figure 10) shows the processing chain wheel on the CNC Plasma Cutting Machine.

Plasma cutting was invented as the result of trying to develop a better welding process. Many improvements then led to making this technology what it is today. Plasma cutters provide the best combination of accuracy, speed, and affordability for producing a variety of flat metal shapes. They can cut much finer, faster, and more automatically than oxy-acetylene torches.

Basic plasma cutters use electricity to superheat air into plasma (the 4th state of matter), which is then blown through the metal to be cut. Plasma cutters require a compressed air supply and AC power to operate.

Operation:

- Initially, the electrode is in contact with (touches) the nozzle.
- When the trigger is squeezed, DC current flows through this contact.
- Next, compressed air starts moving the electrode back and flows out the nozzle.
- A fixed gap is established between the electrode and the nozzle. (The power supply increases voltage in order to maintain a constant current through the joint.) Electrons arc though the gap, turning the air into plasma.
- Finally, the regulated DC current is switched so that it no longer flows to the nozzle but instead flows from the electrode to the work piece. Current and airflow continue until cutting is halted.

Virtually any metal can be plasma cut including steel, stainless steel, aluminum, brass, copper, etc. Any thickness from 76,2 gauge through 2,54 millimeters can be cut, depending on the plasma cutter used.

Plastics and wood are not electrically conductive and cannot be plasma cut. However, you can use a rotary saw, router, or other tool if you want to cut these materials in the PlasmaCAM machine[7].

When the machine is coupled with a plasma torch, part accuracies as high as ± 0.127 millimeters can be achieved, depending on material and setup conditions. Cutting speed can range from 2.54 millimeters to 25.4 meters.

5. Conclusions:

The analysis of literature can express the following conclusions:

- In terms of batch to batch, prevailing wheels flat configuration, used in machine building;
- The development of numerically controlled machines, their use is becoming more present in the implementation of small and medium series production;
- Also in the same context of the emergence of new technologies for manufacturing wheels chain and improve manufacturing conventional systems, there is a reduction in manufacturing time, it brought benefits in terms of energy and labor cost per marker made.

6. References

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[6] http://www.youtube.com/watch?v=FHUs_u27IpE

[7]http://www.plasmacam.com/faq.php#computer[8]

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