

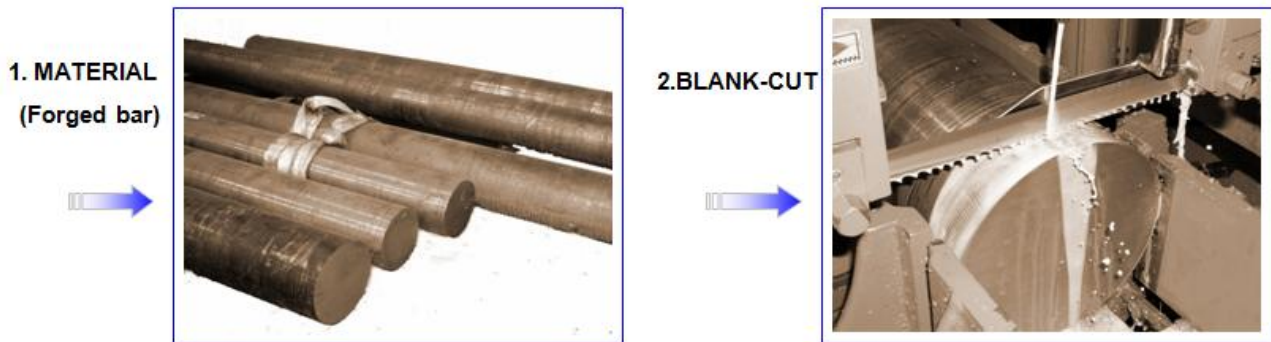
## Manufacturing steps for shaving cutters

From the steel bar to a finished shaving cutter there are many steps. Here we give some information about the gear shaving manufacturing process.

### 1)- 2-) Bar cutting

Normally the blank has obtained from a bar, but some time can be obtained from a forged disk. In this last case the quality of material is better.

It's possible to use a belt saw machine or, better, a hack sawing machine.



### 3)- Turning

By the modern machine all turning operation are made in the same time, including bore.



### 4)- Key Way cutting

It's possible to use a slotting machine with a single point tool or a broaching machine with a flat broach.



### 5)- Hobbing

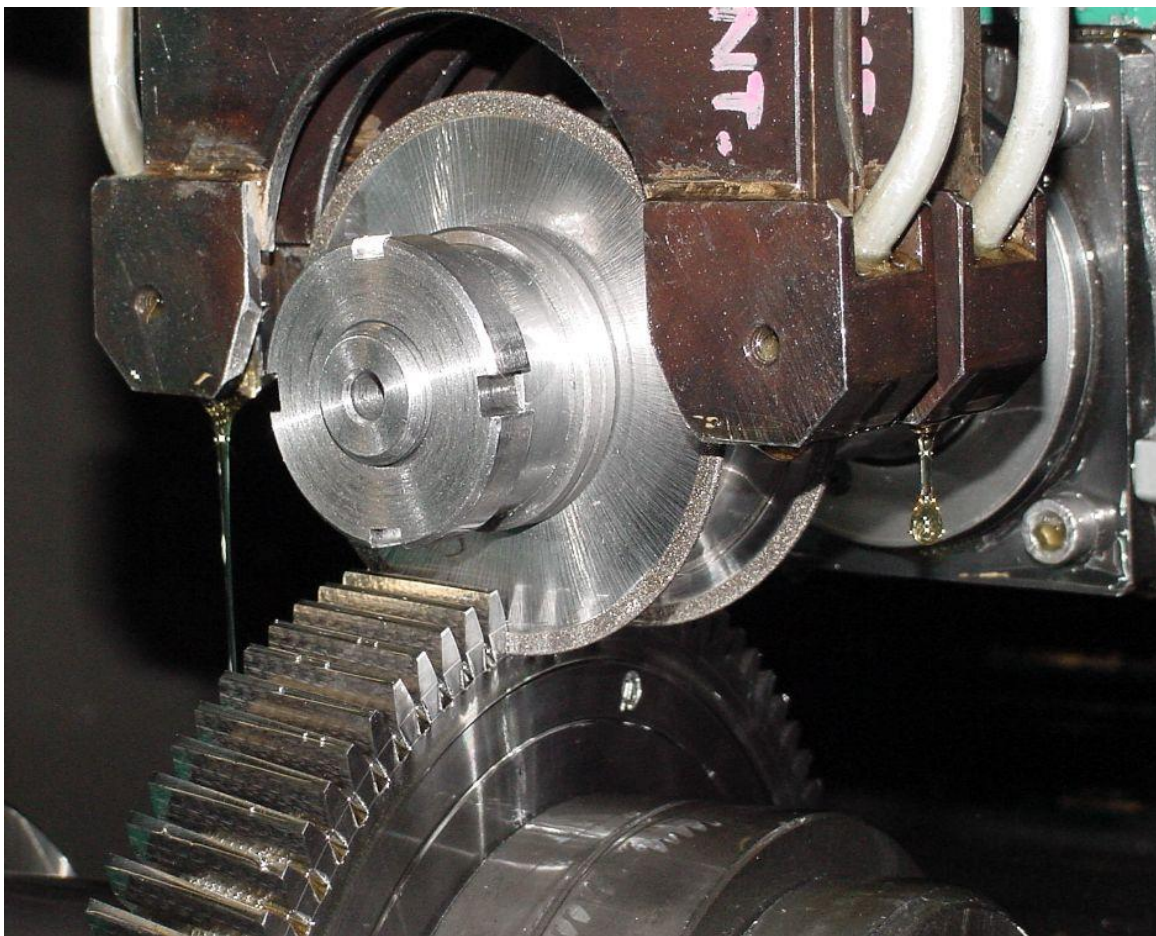
In the hobbing machine can be work, normally, a pack of two or more shaving cutter, in the same time fin order to save time.

#### 5. HOBGING



### 6)- Clearance milling on root diameter

This operation can be made by a milling machine or b a grinding machine with a CBN wheel. In the past time the clearance was a hole made by a drilling machine.



### 7)- Serrating

This operation has made by a special slotting machine and with a special tool.

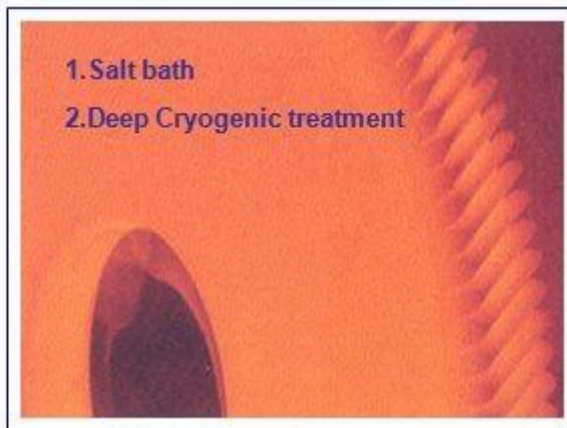
## 7. SERRATING



## 8)- Heat treatment

Heat treatment can be made by a salt bath or with a vacuum furnace. In order to increase the quality of the structure it's often made a Deep Cryogenic Treatment.

## 8. HEAT- TREATMENT

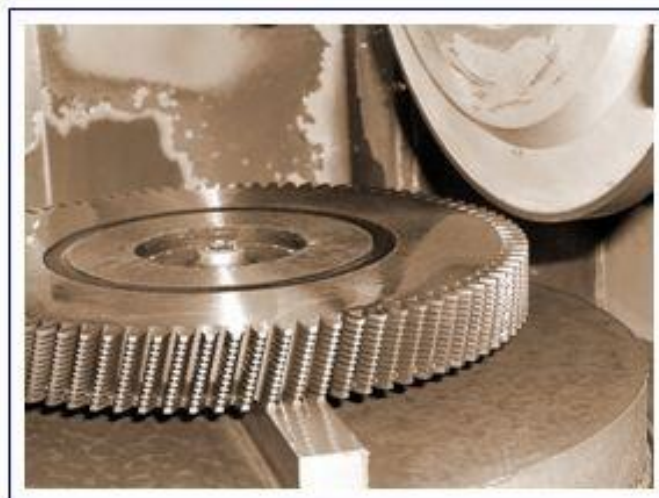


## 9)- Surfaces grinding

Both faces of cutter are ground.

The most important parameter to consider is the parallelism of the faces

## 9. SURFACE - GRINDING



10)- Bore diameter grinding

**10. BORE DIA.  
-GRINDING**



11)- Profile grinding

This is the most important operation in gear shaving manufacturing.



12)- Outside diameter grinding

**12. OUT DIA.  
-GRINDING**



13)- Profile checking

