INNOGRIND

EIFFICIENT GRINDING SOLUTIONS

INNOGRIND VIETNAM CO., LTD.

nqa.
ISO 9001
Registered

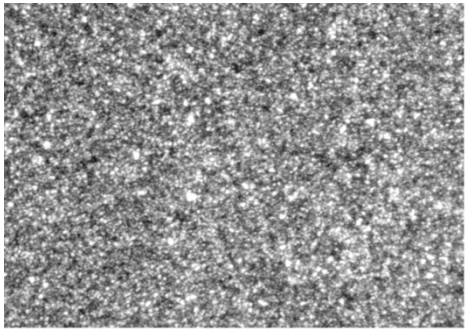
TCT saw blade industry

- TCT saw blade is made by TCT inserts and steel body, the TCT inserts are welded on the steel body, most of TCT saw blades are circular saw blades, some others are hand saw blades.
- TCT saw blades are also used in metal material cutting, usually the OD of saw blades are big.

TCT brief introducton

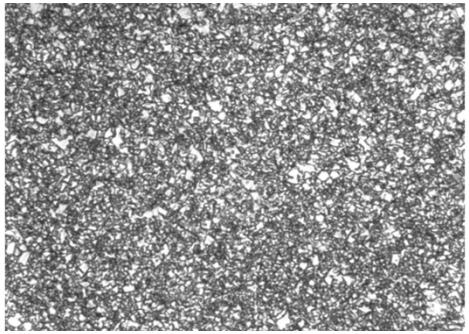
- TCT is sintered by hard powder material with some fillers.

- TCT includes the main metal element tungsten, titanium, tantalum and some other metal element. it can be much harder when increase the percentage of the carbide of tungsten, titanium, tantalum. It will much lasting if add more percentage of material cobalt.



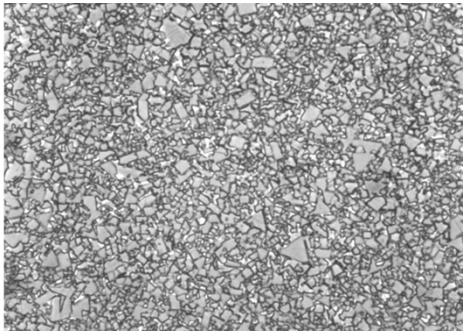
finest
Tungsten-6,5%

cobalt(SMG13)



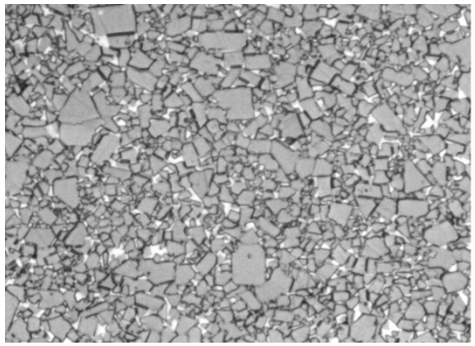
finer

Tungsten-6% cobalt
(MG12)

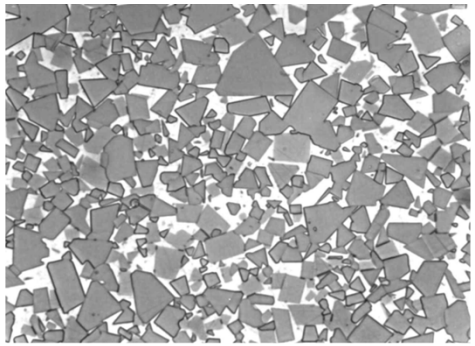


fine
Tungsten-6%

cobalt(GC10)

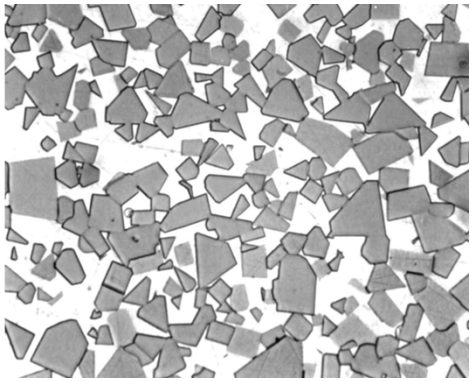


medium
Tungsten-6%
cobalt



fine
Tungsten-6%

cobalt(GC10)



rough
Tungsten-22%
cobalt(CE112)

Commonly used TCT grade:

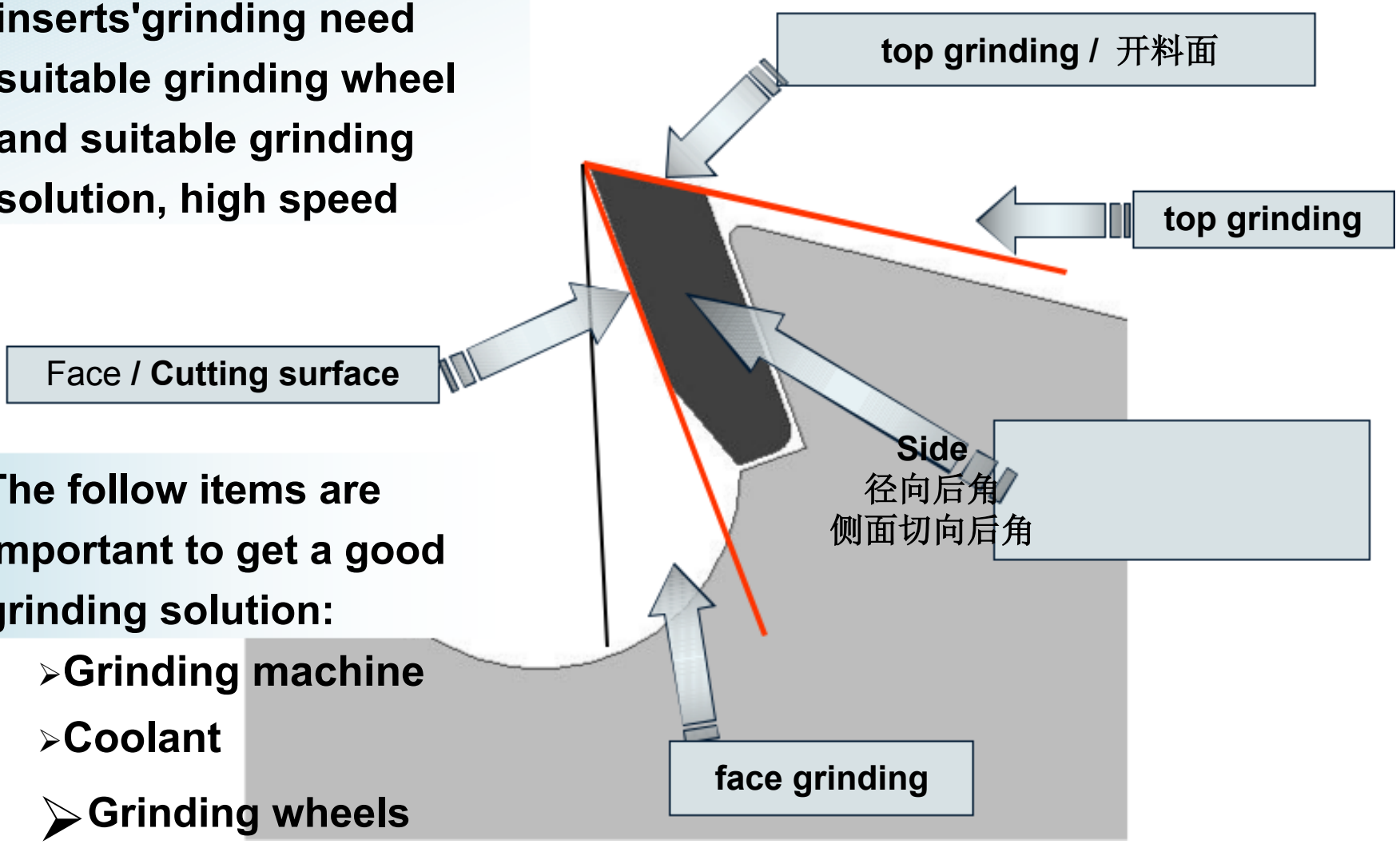
woodworking tools

ISO grade K

Grades Current- / Future- Designation		Code ISO	Code USA	Binder Binder Liant Legante Ligante (%)	Density Dichte Densité Densita Densidad g/cm³	Hardness Härte Dureté Durezza Dereza HV10	HV30	HRA	Transverse Rupture Strength Biegebruchfestigkeit Résistance à la rupture Resistenza alla rottura Resistencia a la ruptura transversal MPa	P.S.I.
HC03	CTF08-HC	K01	C4	4	15.15	1840	1810	93.1	2200	319.000
HC10	CTF11-HC	K10	C3	5.6	15.00	1760	1730	92.7	2300	334.000
HC20	CTF12-HC	K20	C2	6	14.95	1640	1620	92.1	2300	334.000
HC25	CTM14-HC	K20	C2	7	14.90	1550	1530	91.5	2600	377.000
HC30	CTM17-HC	K30	C1	8.5	14.65	1420	1400	90.4	3000	435.000
HC40	CTF24-HC	K40	-	12	14.30	1330	1320	89.7	3200	464.000
GC32	CTC20-HC	>K40	-	10	14.55	1170	1160	88.0	3000	435.000

circular saw blade'grinding

inserts'grinding need suitable grinding wheel and suitable grinding solution, high speed



The follow items are important to get a good grinding solution:

- **Grinding machine**
- **Coolant**
- **Grinding wheels**

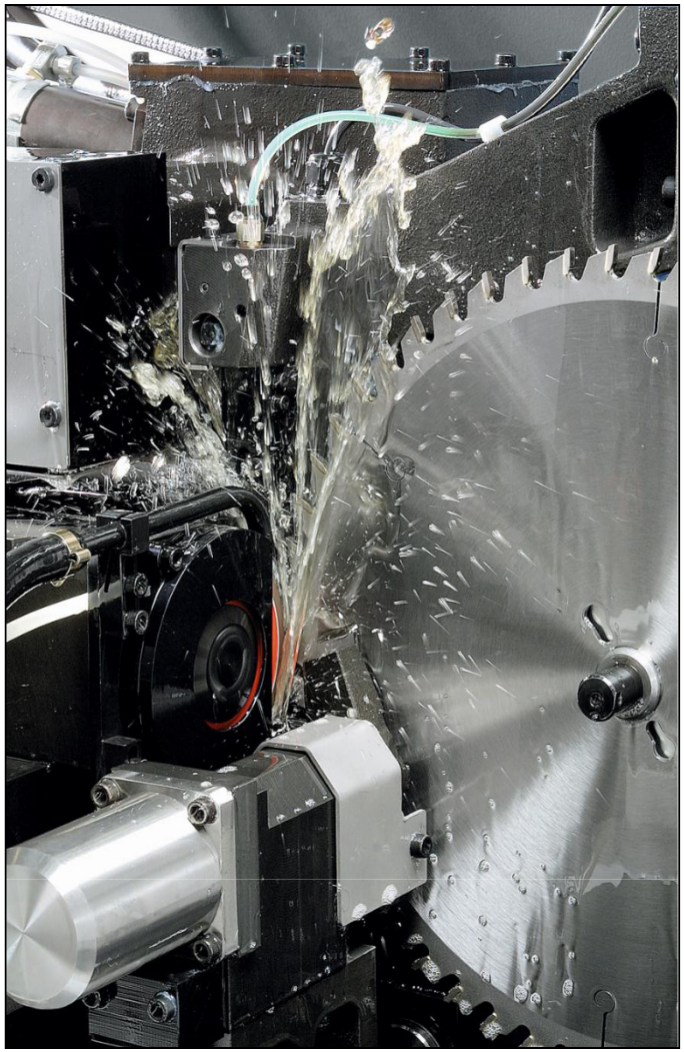
saw blade grinding machine

side grinding mchine

top/face grinding machine

saw blade with grinding coolant

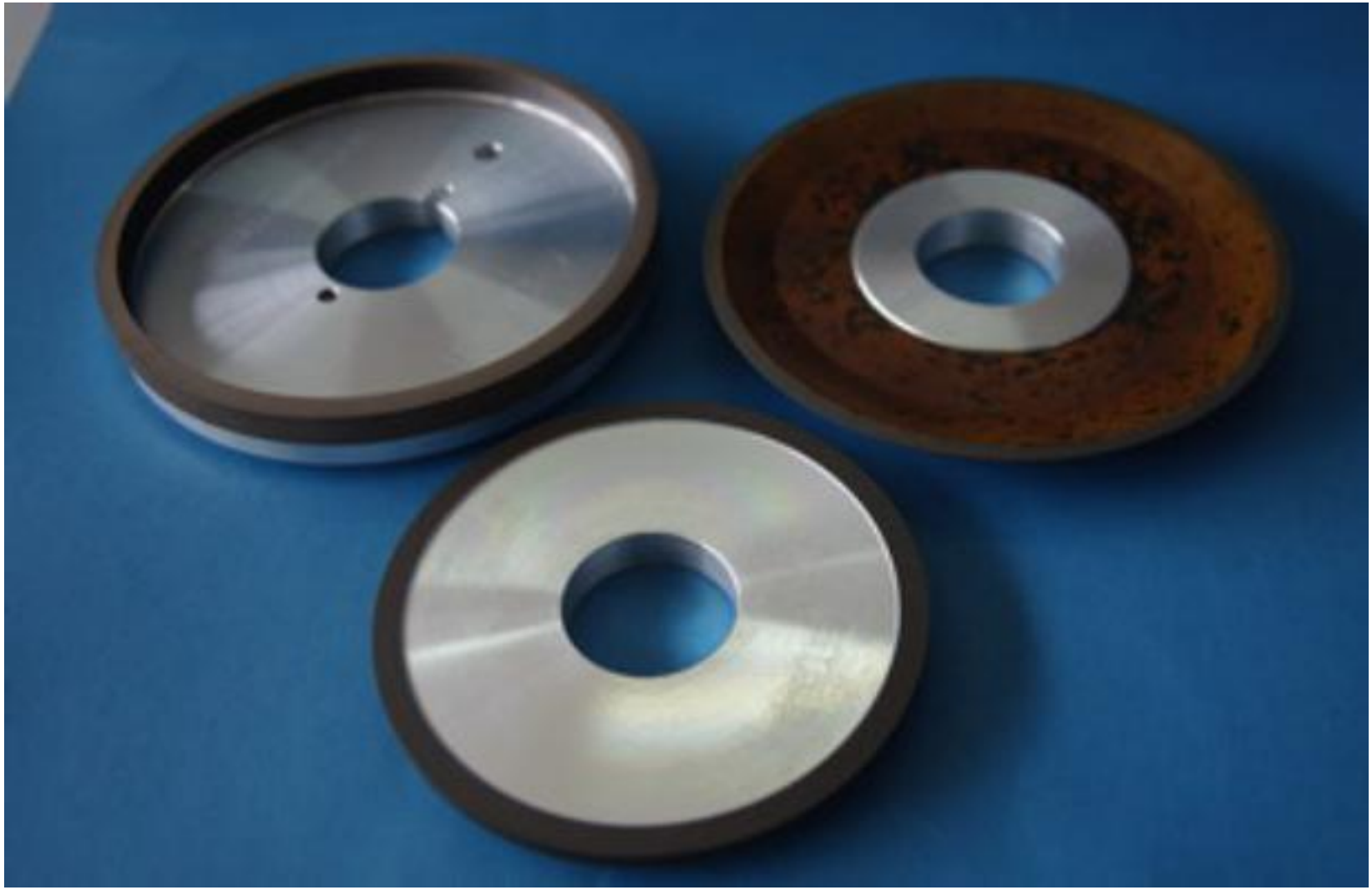
It will use water or oil coolant during grinding。 The advantage of oil coolant is less need for maintenance, because the machine lubrication is stable, less corrosion.



Coolant requires as below：

- The coolant will absorb the heat made by the grinding wheel and TCT。
- Remove the chippings during ginding，and reduce the waste of diamond wheel。
- It also help the wheel to keep the profile shape
- Better to eliminate the dust from the wheel and the tooth.

saw blade grinding wheels

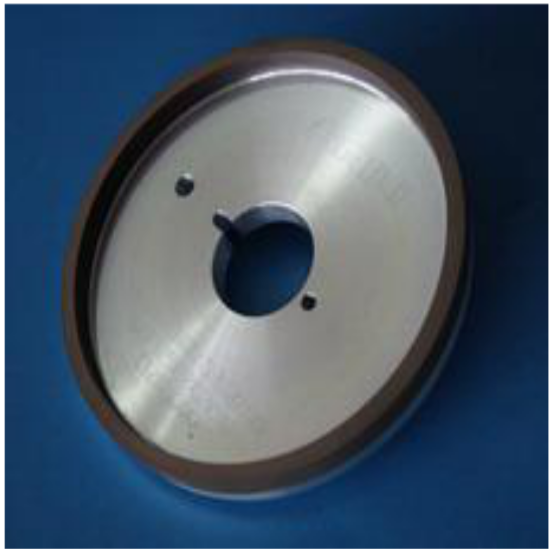


top grinding wheel

Normal specification：

6A9 D46/D126 125D-18T-32H-5W-8X

6A9 D64 125D-18T-32H-3W-8X



Grinding index example：

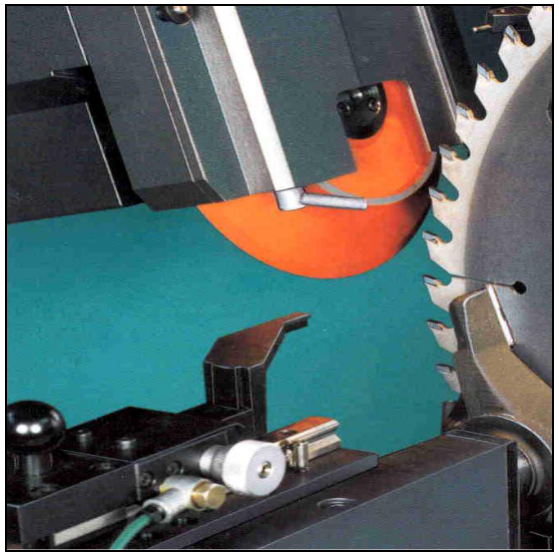
workpiece： TCT saw blade 300D-96T

Machine： Vollmer CP200\CHU

Wheel： E-Grind 6A9 D46/D126

Wheel speed： 22m/s

Max infeed： 0.5mm

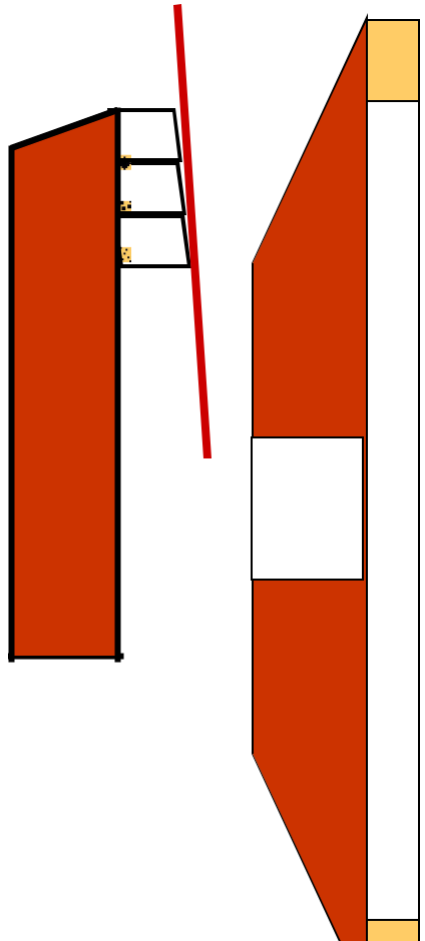


The diamond part design of Top （back angle）grinding wheel

At present, there are following design：

- Single Layer
- Double Layer
- Triple Layer

In this diagram, it is a top ginding wheel with a standard diamond layer（diamond layer required an angle），and excellent diamond layer can compelet the grinding.



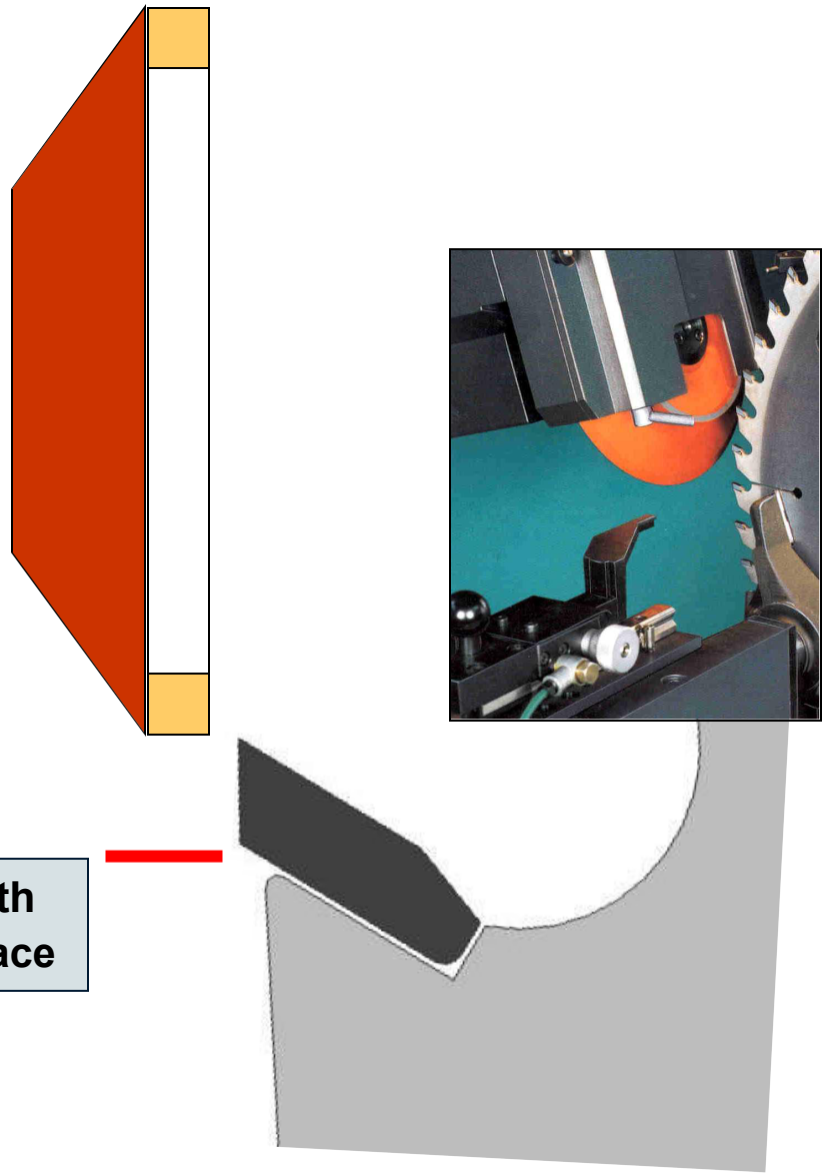
Top（back angle）grinding wheel's working diagram

Top grinding of different TCT insert

- Single cutting -Reset directly
- Multiple cutting-Reset
- Single cutting- Retract - Reset

The wheel face must be parallel to the top face during grinding, to avoid cutting edge distortion.

To avoid abrasive section distortion, the abrasive section must be in full contact with the tooth surface.



Face grindind wheel

Normal specification：

12V2/23 D46 125D-13T-32H-3W-13X

12V2/25 D46 125D-10T-32H-2W-2X

A exampe of Face grinding Index：

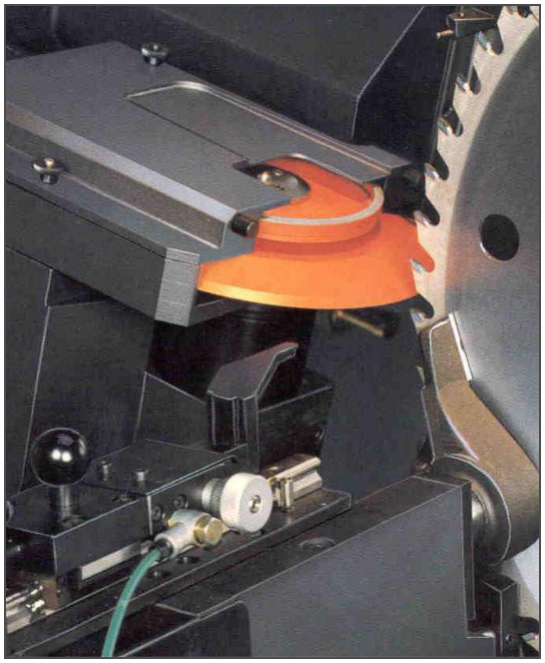
workpiece： TCT saw blade（hand saw） 300D-96T

Machine： Vollmer CP200\CHU

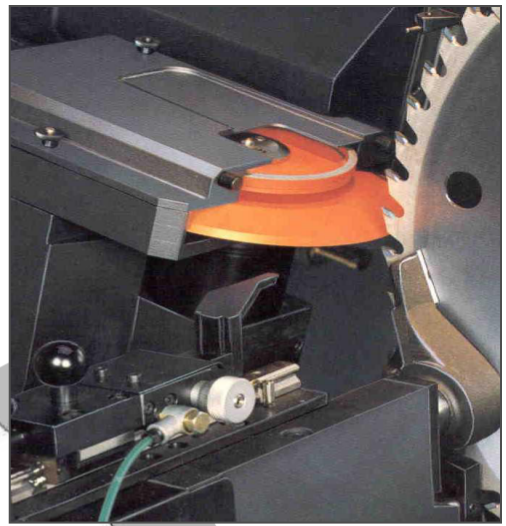
Wheel producer： E-Grind 12V2/25 D46

Wheel speed： 22m/s

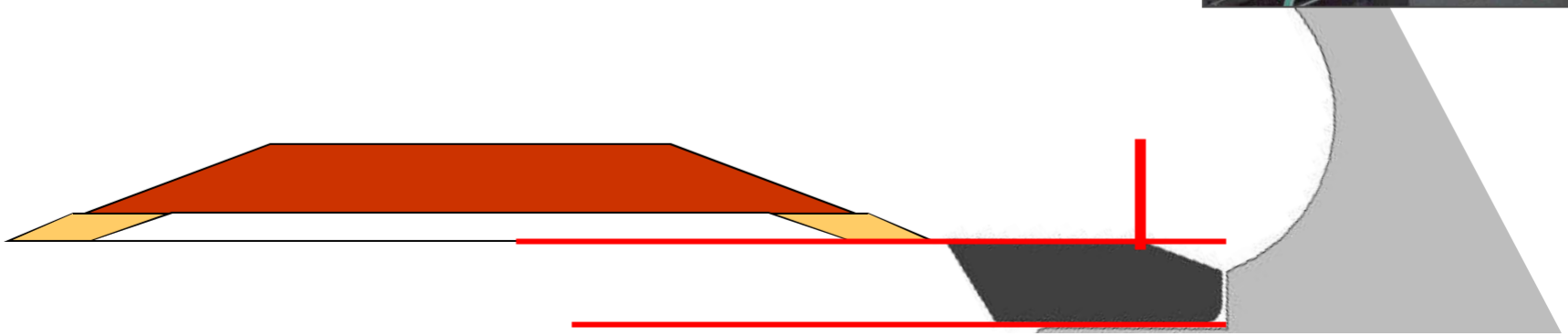
Max Infeed： 0.15mm



Face grinding wheel's working diagram

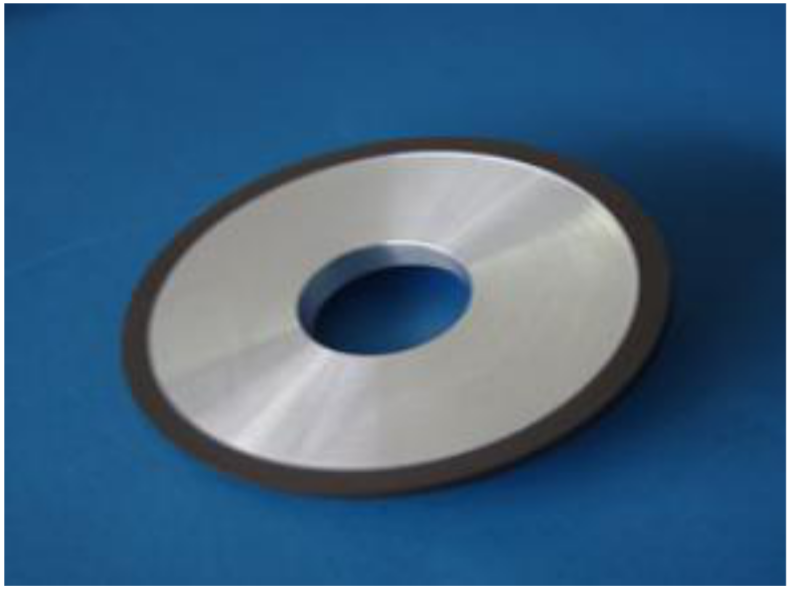


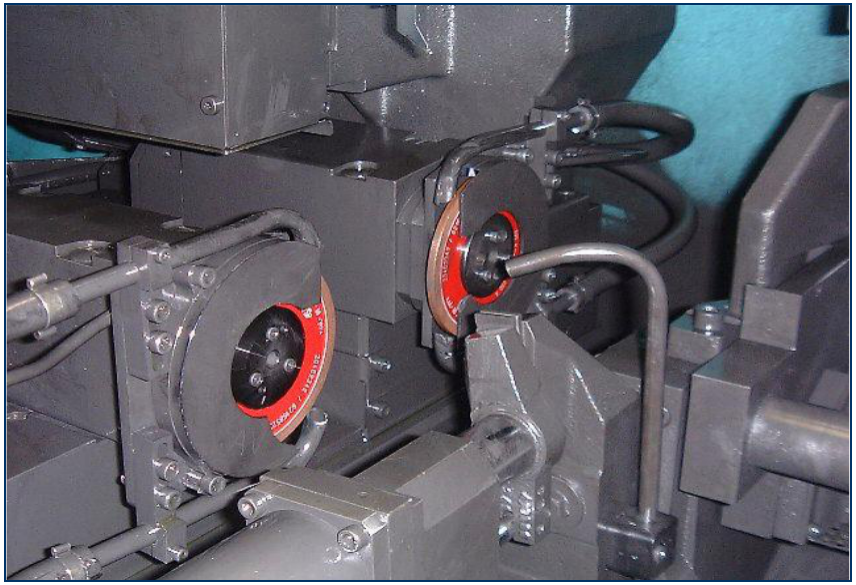
- Single cutting -Reset directly
- Multiple cutting-Reset
- Single cutting- Retract - Reset



The wheel face must be parallel to the tooth bottom during grinding, to avoid cutting edge distortion.
To avoid abrasive section distortion, the abrasive section must be in full contact with the tooth surface.

Side grinding wheel

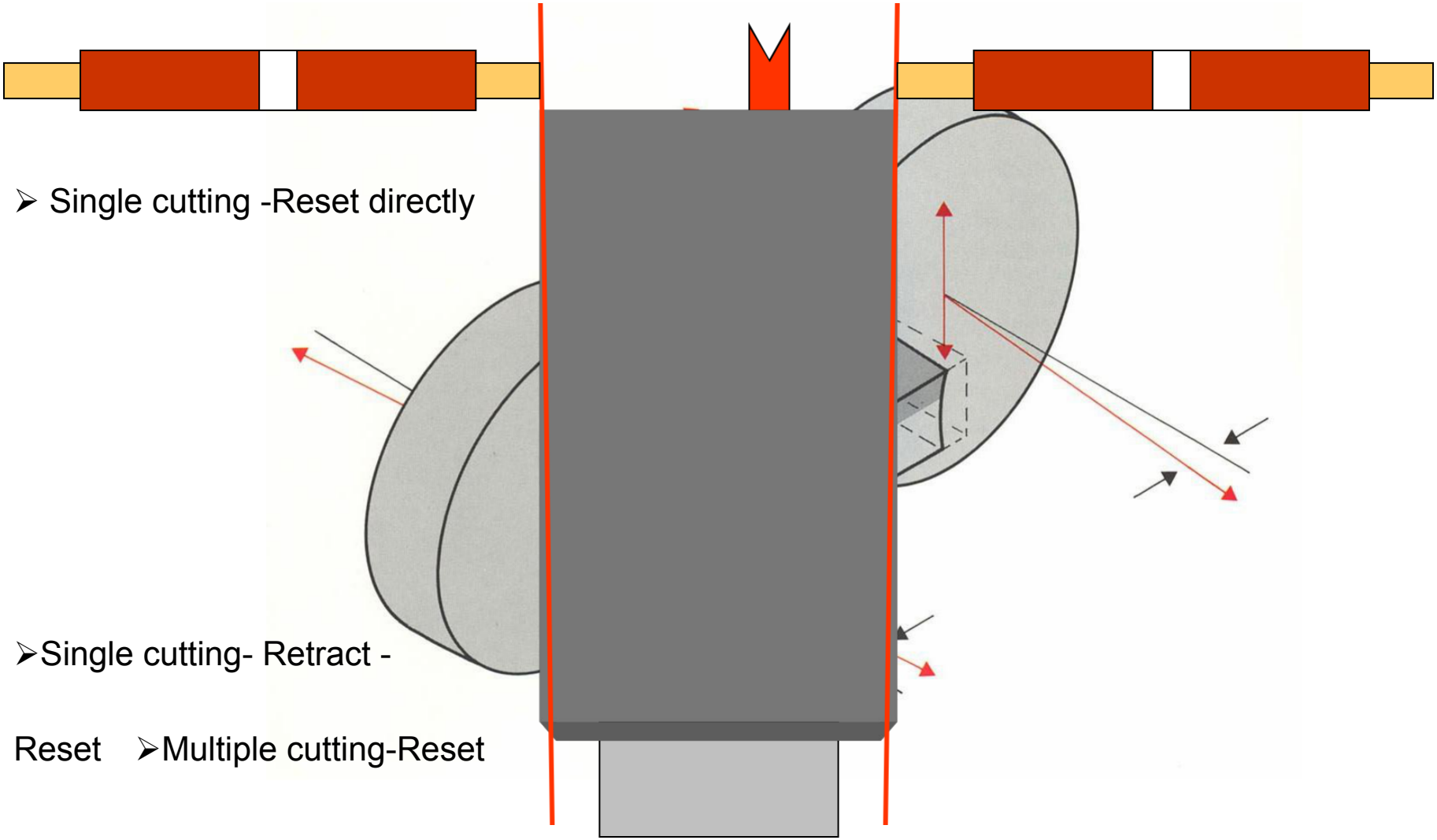




General specification

3A1	D46	100D-10T-32H-5W-5X
1A1	D46	100D-5T-32H-5X

Side grinding's working diagram



- Single cutting -Reset directly

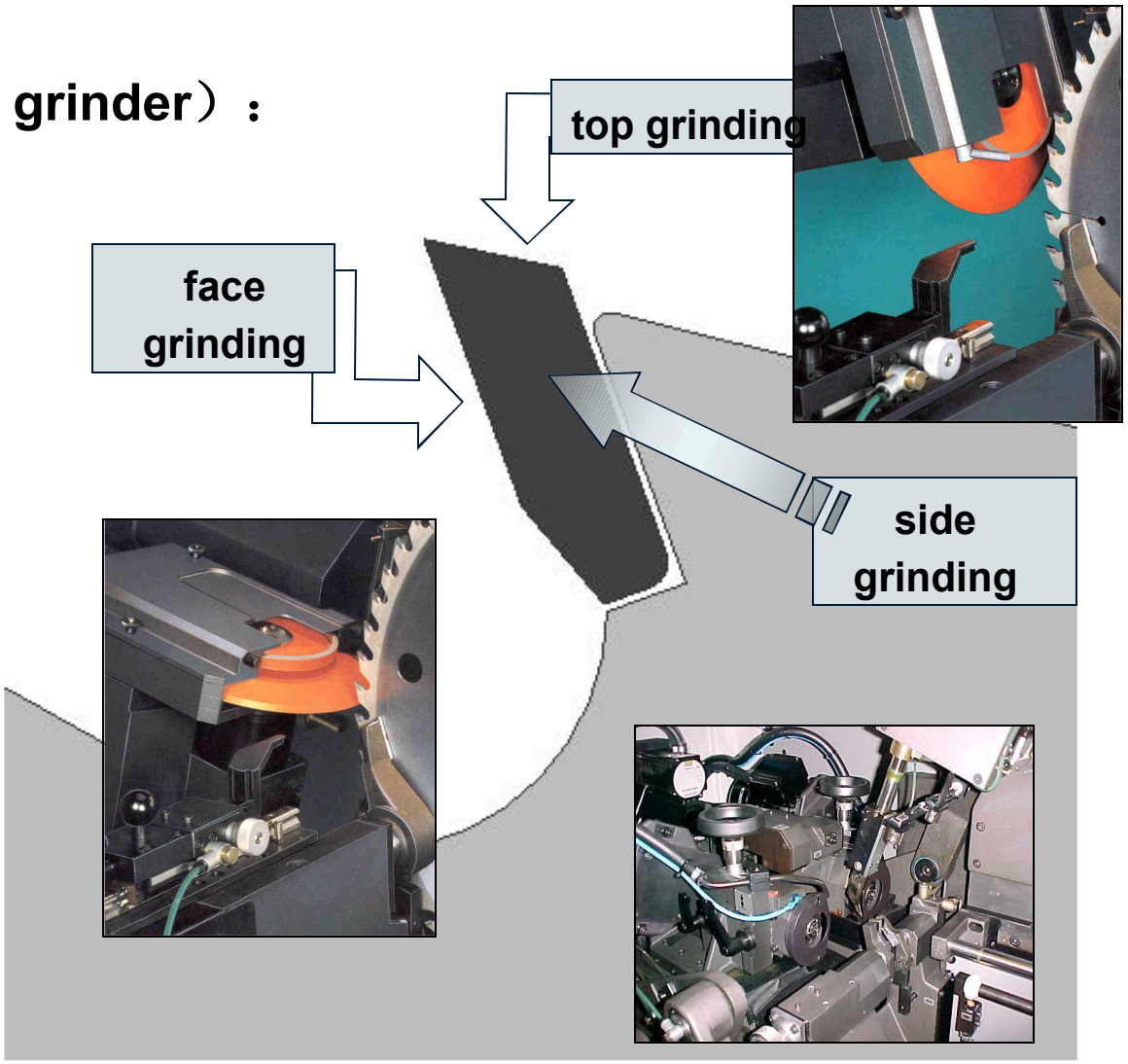
- Single cutting- Retract -

Reset

- Multiple cutting-Reset

Modern processes（CNC grinder）：

- double side
- face grinding
- top grinding



Mid and High-grade saw blades

Item	Mid-grade saw blade	High-grade saw blade
Alloy hardness （HRA）	92°——93.2°	93.2° above

The saw blade's using life is estimated to be increased by 20% when the carbide tips' hardness increased by 0.5 ° ,

Mid and High-grade saw blade's quality elements

- Tooth shape: Observed under 300 times magnification, no chipped edge, no chipped tip.
- Straightness: Observed under 300 times magnification, showing a straight line.
- Roughness: Ra <0.15
- Texture: uniform and consistency texture on tips' surface, no obvious scratches.

Mid and High-grade saw blade tooth shape

Alternate Top Bevel(ATB)

Triple Chip(TCG)

Remarks:

1、The stock removal of the ATB teeth is bigger than TCG teeth.

2、It requires more aggressive to grind ATB teeth than grind TCG teeth.

Formulation for Mid and High-grade saw blades

- SH: To meet the requirements of the mid-grade saw blade, general wheel sharpness, long life

- JY6-1: To meet the high-grade saw blade requirements. Good wheel sharpness, general using life. When consider the blade's quality primarily, you can use this formulation.

- TL-2: Combines wheel sharpness and using life, to meet the requirements of high-grade TCT saw blade for cutting aluminum materials.

Grinding wheels for High grade saw blades

Workpiece：Carbide circular saw blades

Carbide grade：YF5、A30N 、YG6XTB(hardness92-92.7） Black TeflonB86 TeflonYG6XTB(92-92.7)

Working condition：Wet

grinding Face、Top、Side

Working effect: can meet all the customer's requirements for teeth edge, straightness, sharpness etc.

High-grade saw blade——
Face grinding wheel for dense teeth saw blade

Wheel specifications：4A2　SDC400/500 125X11.5X32X2X1.2

Formulation：TL-2

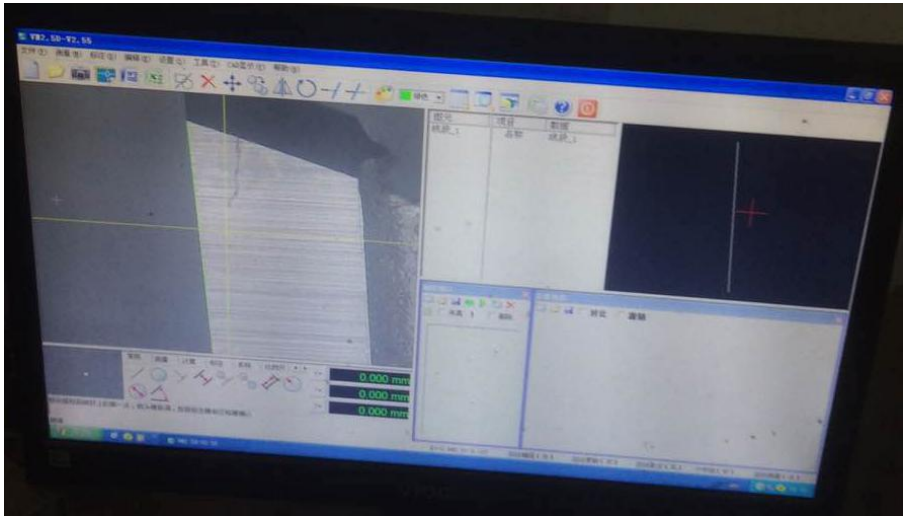
Machine：Fuermo

Saw blade：　305D-120T　　405D-120T

Teeth material：Carbide　（OKE403　）　　Hardness：94.2

Cuting depth：0.15mm　　Cooling method：Water-cooled

Test results: Observed under 300 times magnification, the straightness, teeth edge and surface finish are good and can meet the customer requirements.



High grade saw blade——Top grinding wheel

Wheel specifications：12A2　SDC200/500 125X18X32X5X6

Formulation：SH-2 series

Equipment：Vollmer

Teeth type：ATB teeth

Tooth material: Carbide Hardness:93.6 Cutting depth: 0.15mm -0.20mm
Cooling method：Water-cooled

Using Life：130,000 teeth

Working effects: the straightness, teeth edge and surface finish are good and can meet the customer requirements, with the same level of importing wheels.

For Cold saw

Formulation series：

BSC-01 series：Can meet the requirements for resharpening cold saw blades with the low and large cutting depth (0.8mm), sharp, long using life.

BSC-02 series： To meet the requirements for resharpening cold saw blades with large cutting depth, and producing new cold saw blades, combines sharpness and using life.

Cold Saw——Resharpening、Producing

Resharpening

Wheel specifications: 250×8×65×8×2　B140　C100

Formulation: BSC-01

Machine: Vollmer

RPM: 5000-8000 r/m

Saw material: HSS　　Hardness: HRC 65

Cutting depth: 0.8-1mm

Working effects: grinding wheel is sharp, no burns, to meet customer requirements.

Producing

Wheel specifications：14F1　200×8×55×8×2　B140　C100

Formulation: BSC-02

Machine: Vollmer

RPM: 5000-8000 r/m

Saw material：HSS　　Hardness：HRC 65

Cutting depth: 5-7mm　　Teeth per minite: 3-5

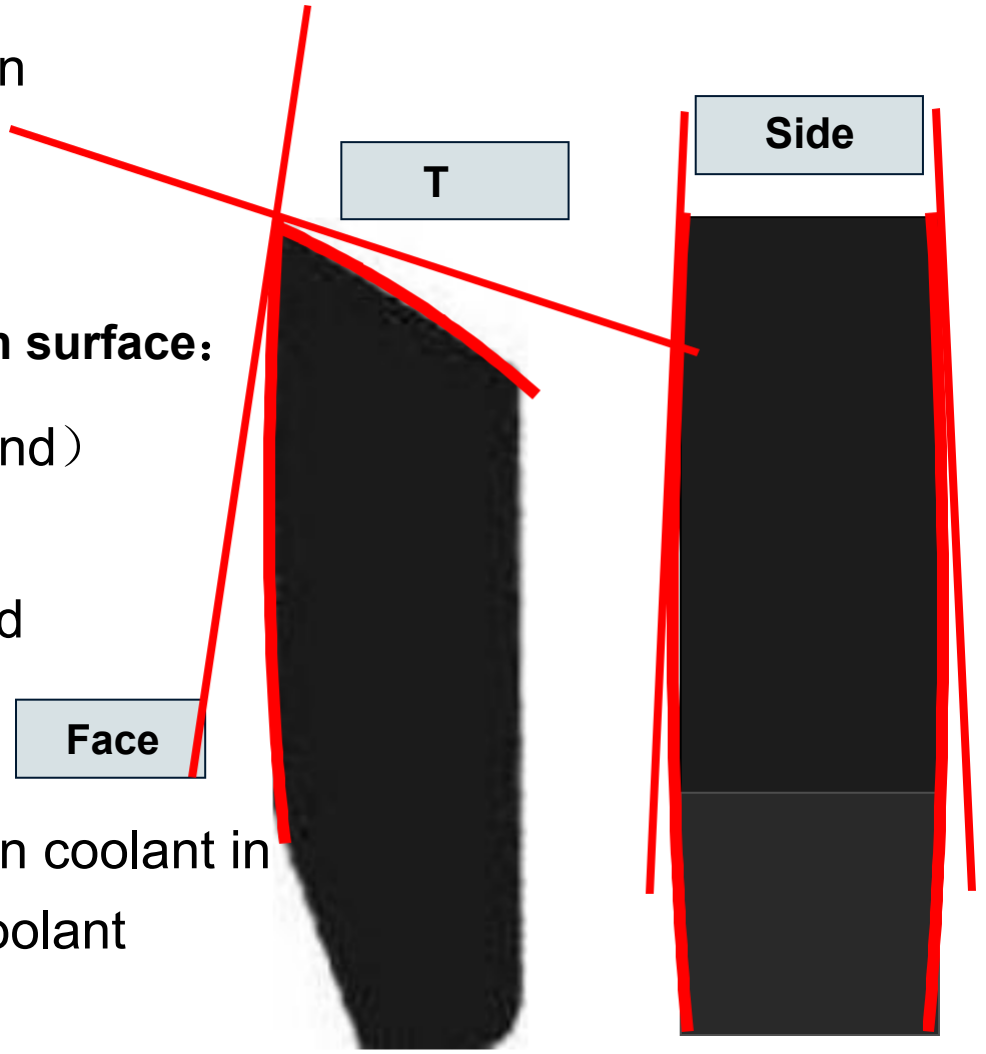
Working effects: grinding wheel is sharp, no burns, to meet customer requirements.

Some question happed during working

Surface bump leads to deformation in grinding, and as a result, the cutting performance and using life decrease dramatically.

The possible reasons of bump on tooth surface：

- ➢Unsuitable Wheel（Too hard bond）
- ➢Incorrect wheel position adjustment
- ➢Too fast feed speed
- ➢Too large stock removal
- ➢Too high RMP
- ➢Haven't removed the impurities in coolant in time
- ➢Incorrect position of the coolant
- ➢Insufficient coolant flow



THANKS !