KYOCERA

THE NEW VALUE FRONTIER

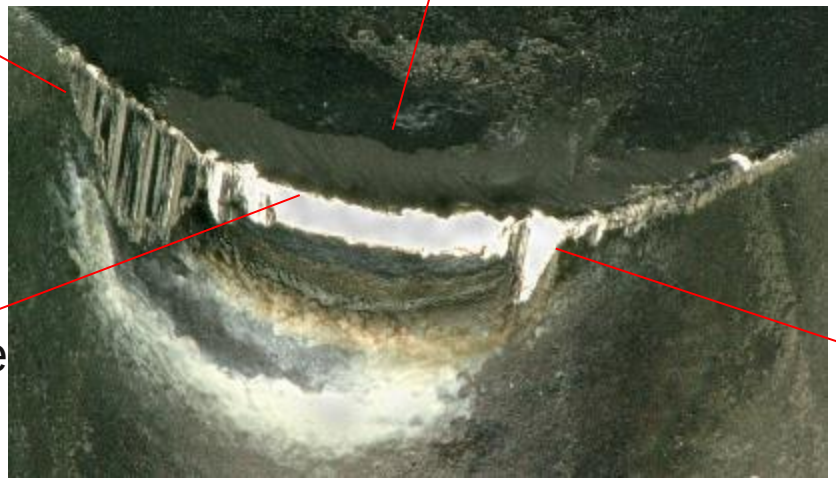
PVD coated carbide grade for HRSA and Stainless steel PR115S／PR120S

KYOCERA Corporation

HRSA/SUS cutting challenges

Secondary notch wear
→ Poor surface finish
→ Dimensional defects

Crater wear
→ Poor chip control



Abrasive wear
→ Cutting force increase
→ Cutting heat increase

Primary notch wear
→ Large burr

Fig. Typical Damaged cutting edge at HRSA or Stainless steel

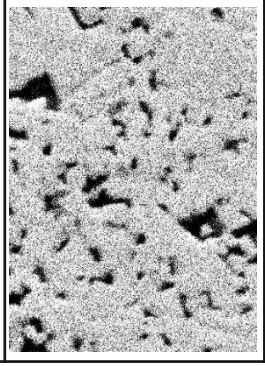
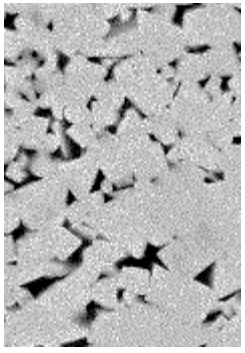
Insert grade design is necessary for each damage type

Features

New PVD coated carbide grades to prevent edge damage in HRSA
→ Substrate ：Carbide with high heat resistance
→ Coating : PVD coating suitable for HRSA machining

・Special carbide substrate

→ Substrate with excellent heat resistance

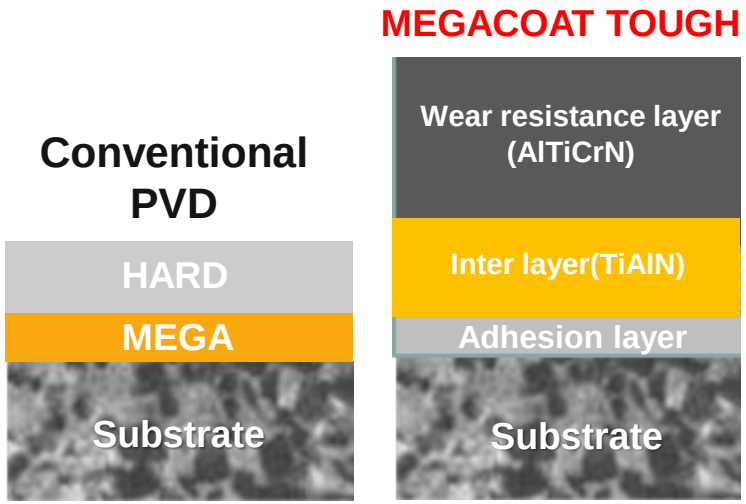
	PR115S	PR120S
Structure		

・PVD coating_**MEGACOAT TOUGH**

→Thicker；Wear resistance
(Twice as thick as conventional coating)

→Fine crystal grains；Wear resistance(High hardness)

→Adhesion layer；Reduce notch wear(Reduce film peeling)



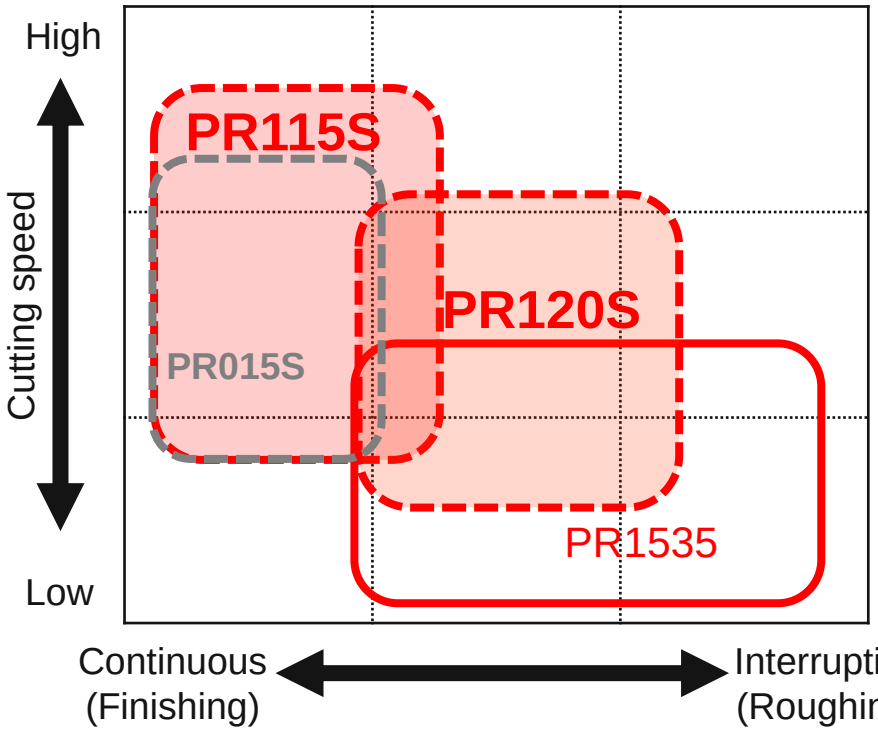
Layer image

Application map

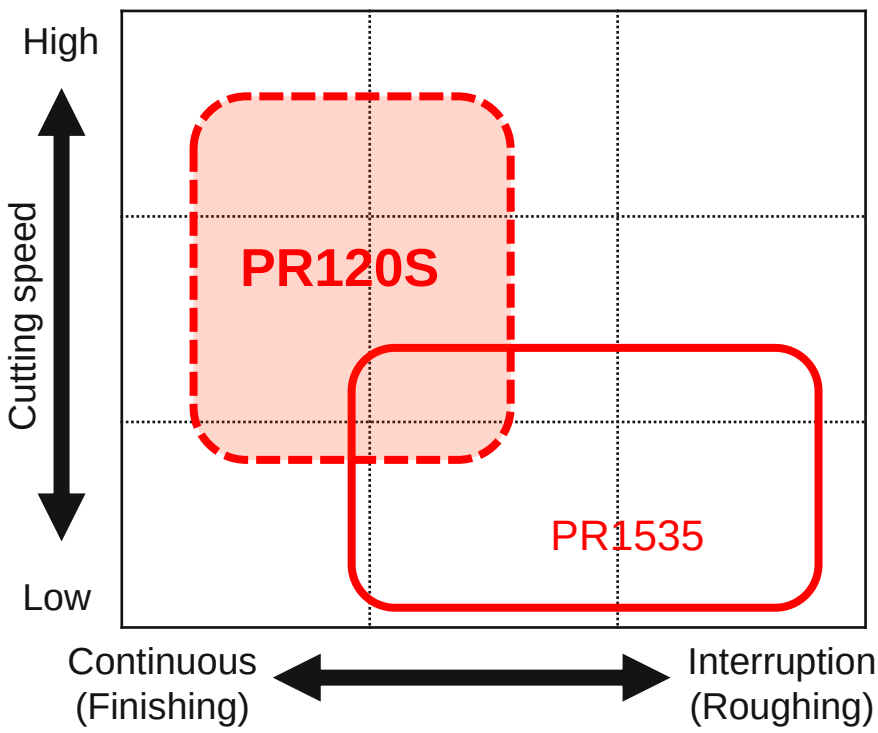
PR115S：1st recommendation for continuous finishing and high speed machining in HRSA

PR120S：General-purpose grade with both wear resistance and stability, applicable to both HRSA/Stainless steel

◇Heat resistant super alloy

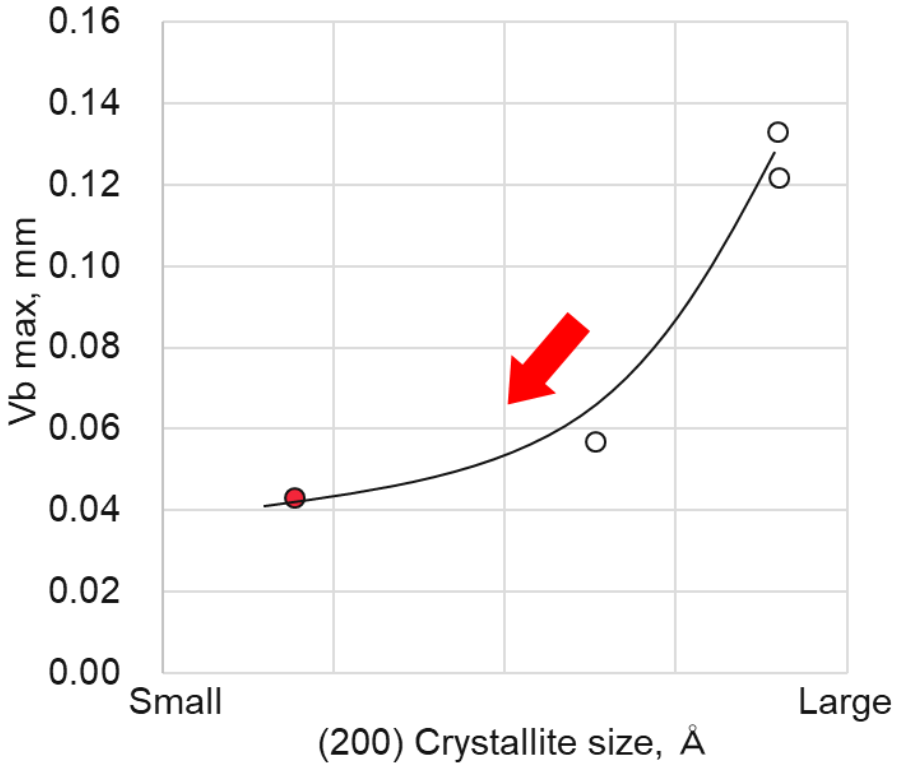


◇Stainless steel

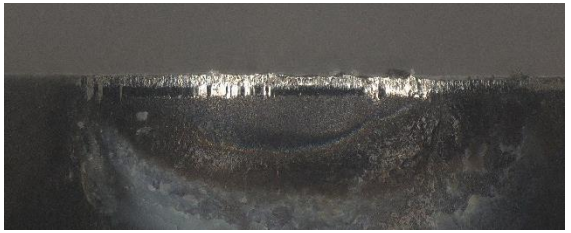


New PVD coating

1 .Reduce abrasive wear due to thicker PVD coating
2 .Reduce notch wear by fine crystal grains



New PVD coating_MEGACOAT TOUGH



Conventional PVD coating

Fig. Relationship between film crystallite size and primary notch wear
Vc=30 m/min, f=0.10 mm/rev, ap=0.5 mm, WET,
Inconel718, CNMG120408**

New PVD coating

3. Adhesion layer is used at the interface between substrate and film
   → Improved adhesion and reduced notch damage

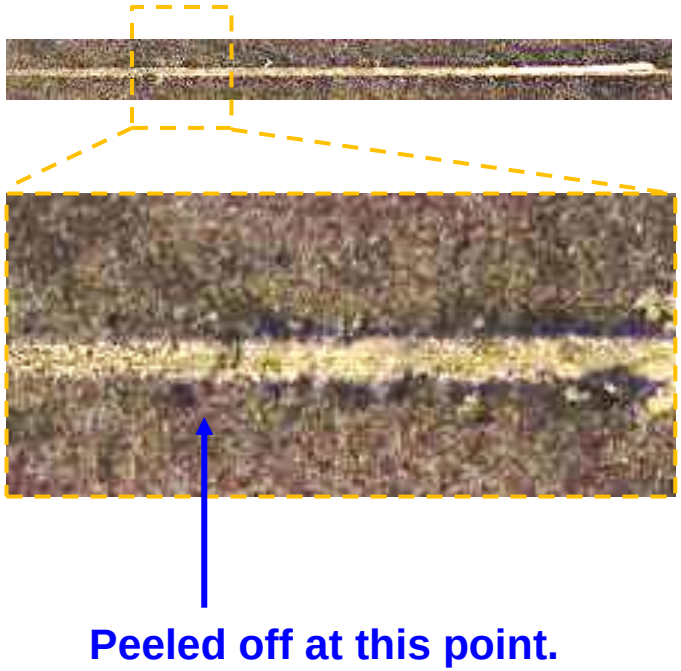


Fig. Coating surface after peel test

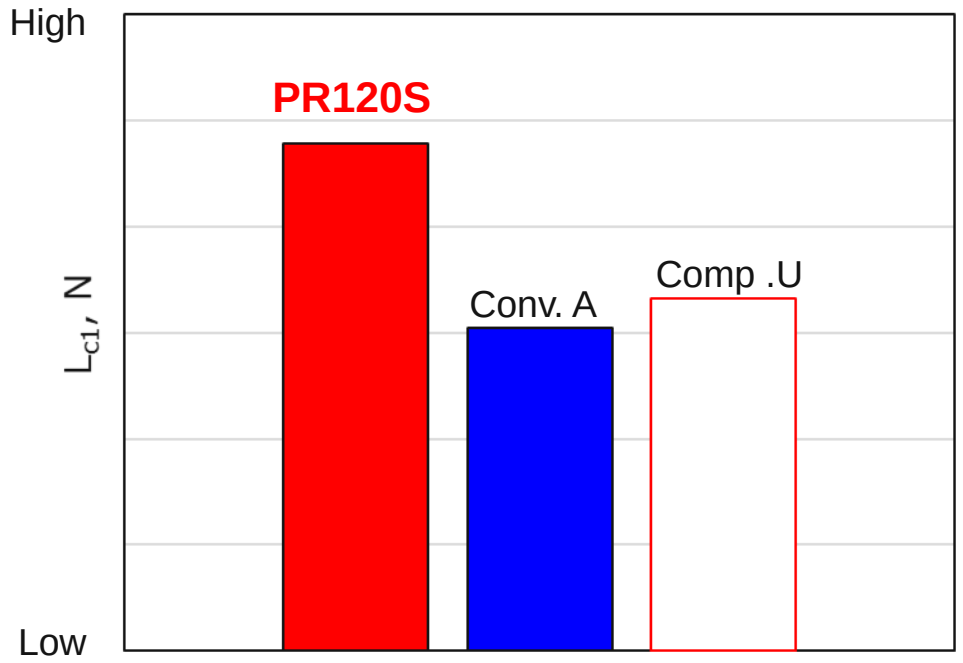
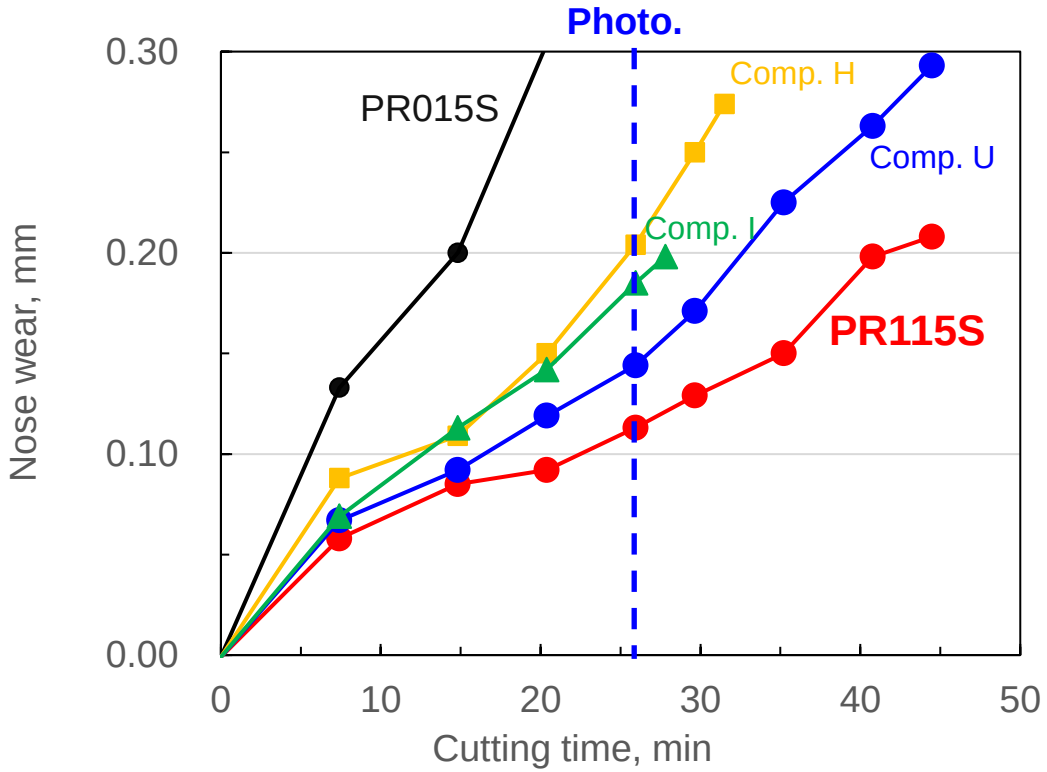


Fig. Peel off load(L_{c1}) comparison

*Higher values indicate higher film adhsion strength.

Test result_PR115S

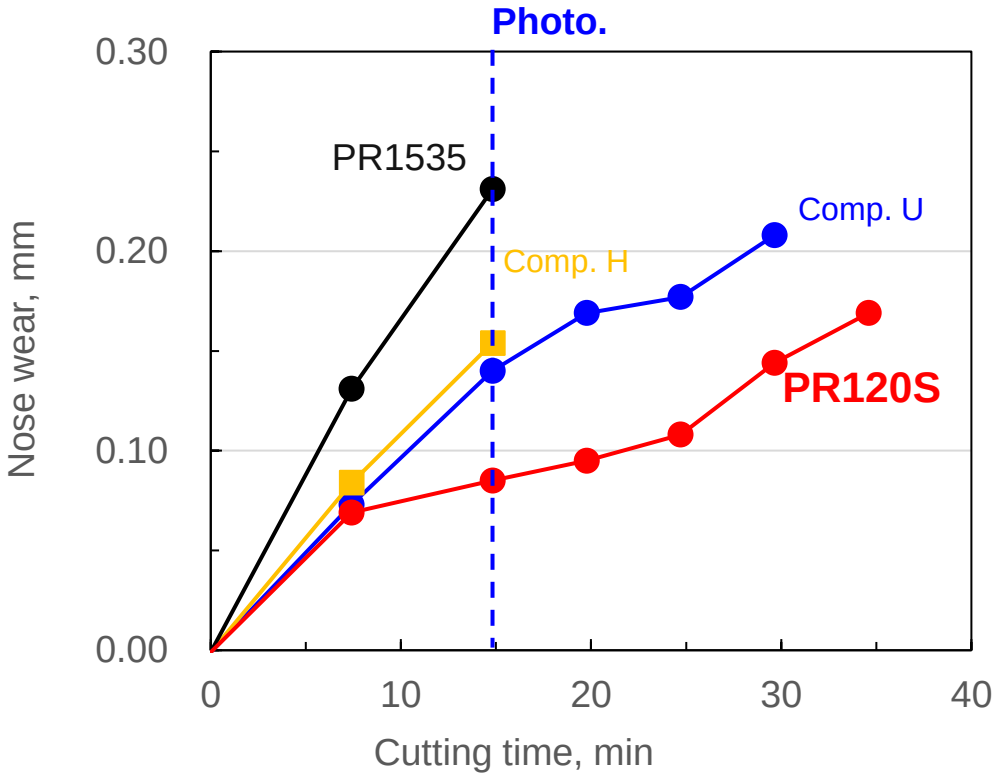


Cutting condition
Vc=40 m/min, f=0.10 mm/rev, ap=0.5 mm, Wet,
Inconel718, CNMG120408**

Fig. Wear comparison

Cutting time 26 min

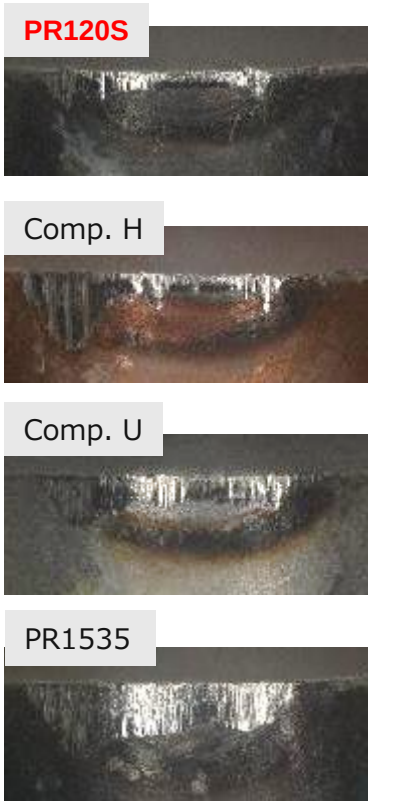
Test result_PR120S



Cutting condition
Vc=30 m/min, f=0.10 mm/rev, ap=0.5 mm, Wet,
Inconel718, CNMG120408**

Fig. Wear comparison

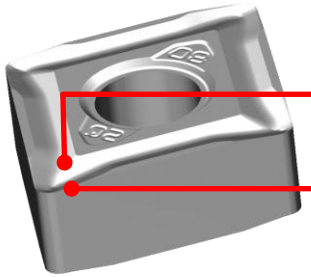
Cutting time 15 min



■ Chipbreaker for HRSA

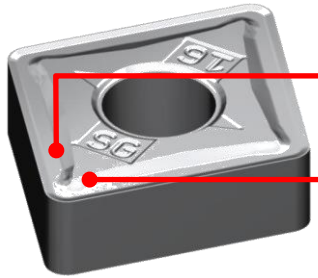
Chipbreakers for HRSA provide longer tool life and higher efficiency

SQ Finishing ~ Medium



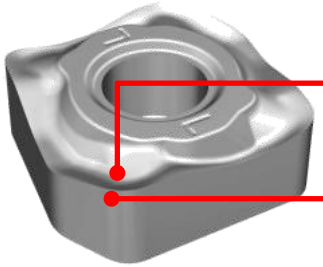
- Special rake face design decreases cutting edge temperature
- Slant cutting edge: Effective for burr suppression and reducing notching

SG Roughing



- Stable chip control during heavy machining applications
- Well-balanced rake face shape: High-strength land and low cutting force design

SX Roughing・High efficiency



- Rake design decreases temperature at the cutting edge
- Unique cutting edge design(handed insert)
  Resist chattering and improves efficiency

■ How to select chipbreaker

□Heat resistant super alloy

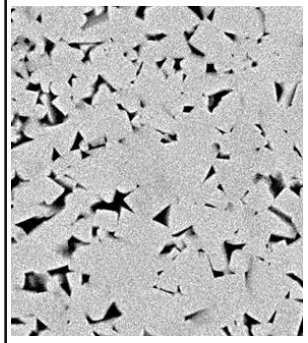
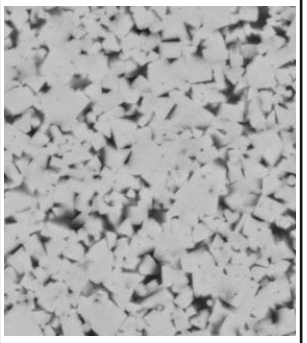
	1st recommendation	2nd recommendation
Finishing ap=0.2-1.0mm	SQ (Reduce notch wear)	MQ (Low force/Good chip control)
Medium/Roughing ap=0.5-4.0mm	SG	※Recommendation ap= 0.5-2.0mm MS (Stable machining) MU (Low force/ Good chip control)
	SX (High efficiency)	

□Stainless steel

	1st recommendation	2nd recommendation
Finishing ap=0.5-1.5mm	MQ	
Finishing/Medium ap=1.0-3.0mm	MS	MU

■ Precautions in stainless steel processing

■ Grade characteristics comparison

	PR120S	Conventional
Structure (×5000)		

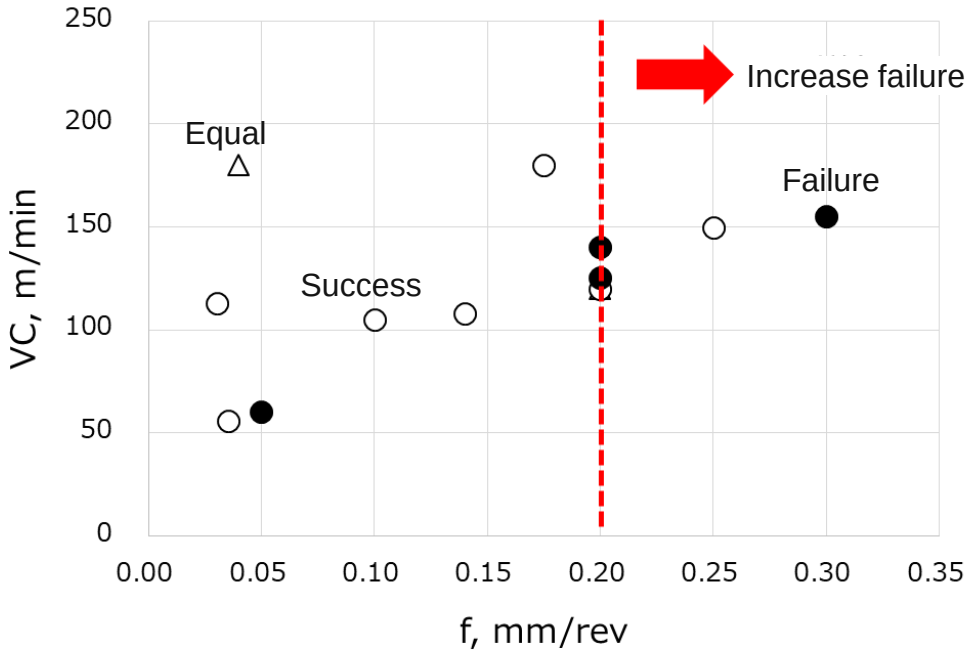


Fig. Field test results based on cutting conditions

Failure rate increases at f=0.2 mm/rev. or higher
→ PR120S is not suitable for high-load machining

PR120S
→ High heat resistant oriented grade
→ High heat conductivity with low metal binder(Co)

- Continuous: 1st recommendation, while feed rate may limit capability
- Interruption: Possible if ap & f is not much.

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京セラ株式会社