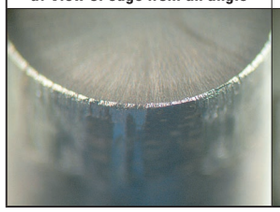
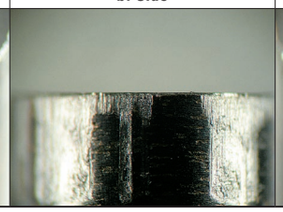
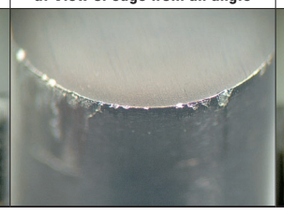
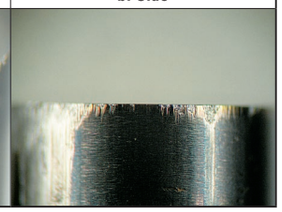
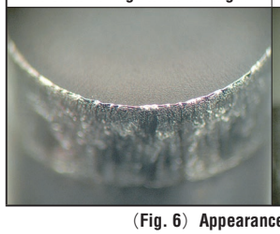
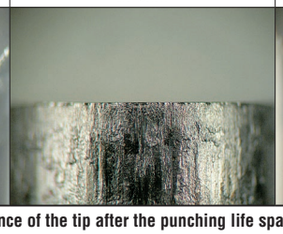
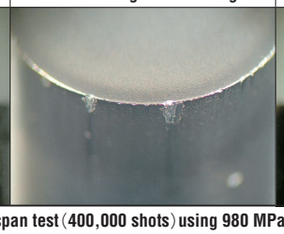
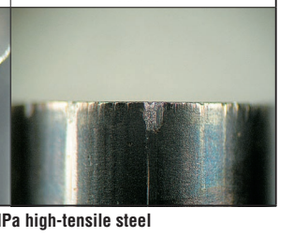
■Comparison of tip and side appearance at a punching life span test using 980 MPa high-tensile steel

When the appearance of the tips was compared after a punching test (400,000 shots) using 980 MPa high-tensile steel (Fig. 6), separation of the coating film and seizure were found on the tip of the conventional product. Also, there was chipping and wear of the edges over a broad area.
On the other hand, while separation of the film that was thought to be the result of edge chipping was found on the improved TiCN coating product, no seizure was found on the tip or side, and the tip remained in generally good condition after the test.
No chipping or seizure at all was observed on the improved HW coating product, demonstrating that good coating film conditions were maintained.
It is believed that the WPC® treatment contributes to improved fatigue strength of the punch tip. (※For details concerning the WPC® treatment, refer to P. 1237.)

From the above results, it was confirmed that the improved product is highly effective even with materials that are difficult to machine, such as 980 MPa high-tensile steel.

①TiCN coating: Conventional product		②TiCN coating: Improved product	
a. View of edge from an angle	b. Side	a. View of edge from an angle	b. Side
			

③HW coating: Conventional product		④HW coating: Improved product	
a. View of edge from an angle	b. Side	a. View of edge from an angle	b. Side
			

(Fig. 6) Appearance of the tip after the punching life span test (400,000 shots) using 980 MPa high-tensile steel

Reference: List of punches for which improved coating products are available

Improved punch	M	TiCN coating: Improved product		HW coating: Improved product		Improved punch	M	TiCN coating: Improved product		HW coating: Improved product	
Shoulder punch	M2	●	P. 57	●	P. 59	Punch for heavy load	M2	●	P. 113	●	P. 115
	Powdered high-speed steel	●		●			Powdered high-speed steel	●		●	
Jector punch	Powdered high-speed steel	●	P. 67	●	P. 69	Jector punch for heavy load	Powdered high-speed steel	●	P. 123	●	P. 125
Jector punch (spring-reinforced type)	Powdered high-speed steel	●	P. 67	●	P. 69	Jector punch for heavy load (fixed B type)	Powdered high-speed steel	●	P. 131	●	P. 133
Shoulder quill punch	M2	●	P. 77			Tapered head punch	M2	●	P. 135	●	P. 135
	Powdered high-speed steel	●					Powdered high-speed steel	●		●	
Shoulder short punch	M2	●	P. 79			Tapered head jector punch	M2	●	P. 137	●	P. 137
	Powdered high-speed steel	●					Powdered high-speed steel	●		●	
Key flat shank shoulder punch	M2	●	P. 85	●	P. 87	Punch for heavy loadwith dowel hole	M2	●	P. 141	●	P. 143
	Powdered high-speed steel	●		●			Powdered high-speed steel	●		●	
Key flat shank jector punch	Powdered high-speed steel	●	P. 89	●	P. 91	Jector punch for heavy loadwith dowel hole	M2	●	P. 147	●	P. 149
Key flat shank jector punch (spring-reinforced type)	Powdered high-speed steel	●	P. 89	●	P. 91	Tapped punch	M2	●	P. 155 P. 163	●	P. 157
Punch with locating dowel hole	Equivalent to D2	●	P. 97	●	P. 99		Powdered high-speed steel	●		●	
Jector punch with locating dowel hole	Equivalent to D2	●	P. 105	●	P. 107	Punch with key groove	M2	●	P. 167	●	P. 169
Jector punch with locating dowel hole (spring-reinforced type)	Equivalent to D2	●	P. 105	●	P. 107		Powdered high-speed steel	●		●	
						Straight punch	M2	●	P. 176		
							Powdered high-speed steel	●			

※The above punching test used an ISIS 20-ton precision press and precision progressive dies. With actual dies, because a broad range of factors including press accuracy and variation in clearance accuracy are involved, it is expected that wear will occur earlier than in this punching test. Please use the results here as reference data.

■Coating punches —TiCN—

MISUMI´s coating punches receive a TiCN coating applied by ion plating, which is one type of PVD (physical vapor deposition).
TiCN coating has a number of advantages, including high hardness and low friction coefficient. It improves punch wear resistance, contributing to higher productivity and improved product quality.
Because these punches are treated in high vacuum at temperatures of 500℃, coating of base materials tempered at temperatures of 500℃ or higher can be achieved with no loss of base material hardness and no thermal deformation. This ensures that the tip remains sharp after coating, which is one of the large advantages of this method.
Because the dimensions and accuracy of MISUMI coating punches after coating are guaranteed, there is no need to control dimensions in consideration of the coating thickness.

Technical data of TiCN coating

Hardness (HV)	3000
Coating thickness (μm)	3～5
Friction coefficient (with steel, when dry)	0.3
Heat resistance (℃)	～400
Color	Blue gray

■Features of TiCN coating punches

1. High hardness
TiCN coating has a hardness of 3000HV, which is harder than carbide. This high hardness provides the cutting edges with good protection from wear, extending the life span before regrinding by up to 10 times.

2. Small friction coefficient
TiCN coating has a small coefficient of friction with steel, and is chemically inert. This makes it possible to avoid the surface fatigue that leads to cracking. This coating treatment keeps the punch surface away from the workpiece surface, therefore even after the cutting fluid has lost its chemical activity, it still provides lubricating effects. Also TiCN has superior sliding characteristic, allowing pressing with high-speed strokes. Greater benefits can be expected from TiCN coating punches with workpieces that have a strong tendency toward sticking (such as light metals, nonferrous metals, and stainless steel).

3. Product quality improvements
TiCN makes it possible to produce products with little burring and with long punch life spans, and to deliver smooth cut surfaces with few streaks.

■Notes concerning the use of TiCN coating punches

Please pay attention to the following when using a TiCN coating punch.

- The effective coating punch range (length) is B dimension (tip length), however an extremely thin and incomplete coating of 0.5 μm or less is also formed for approximately 10 mm beyond this range.
- Slight variation occurs in the thickness of the coating film at the corners of the tip shape.
- When regrinding, avoid strong grinding in order to prevent separation of the coating layer.