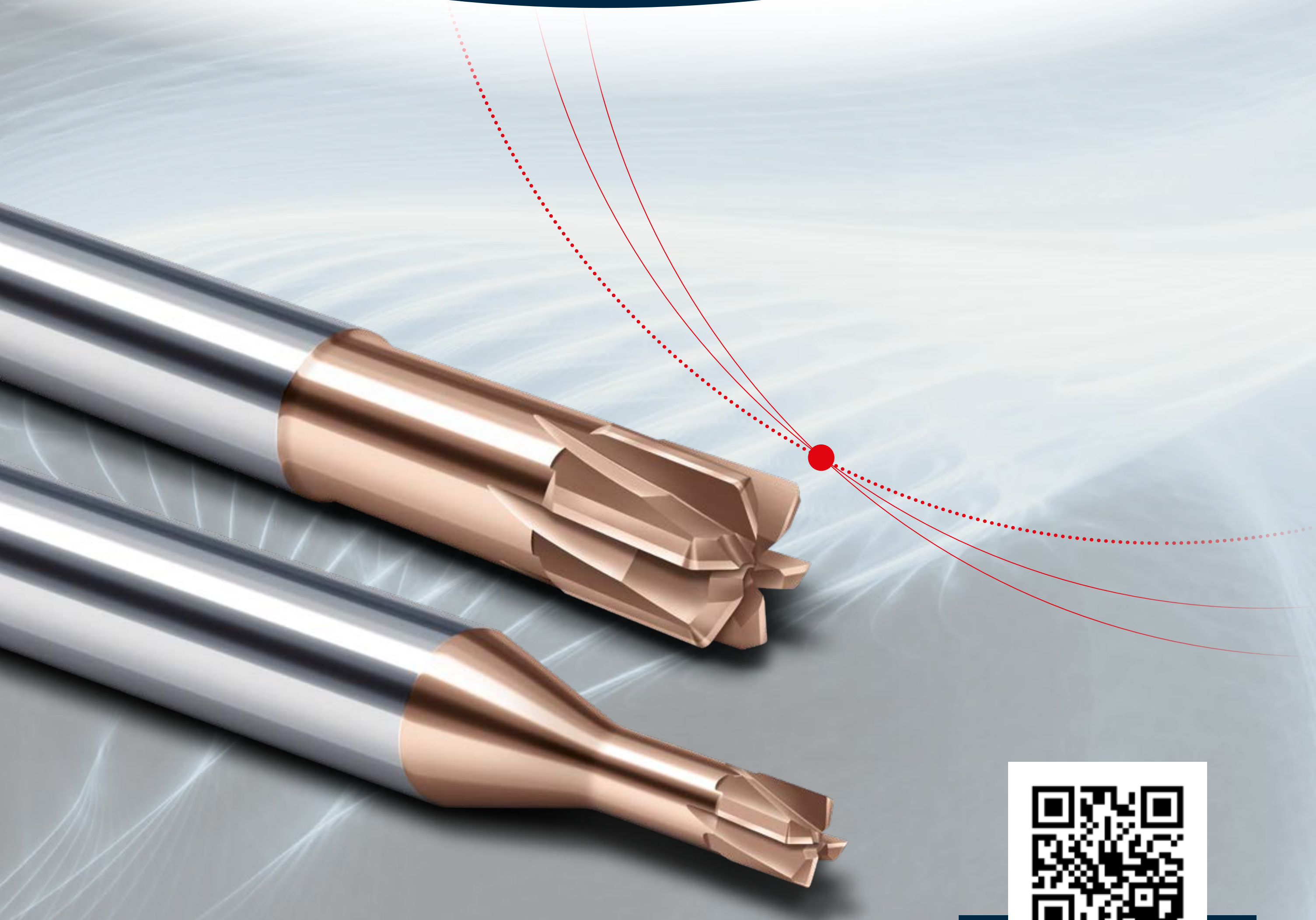
passion
for precision

fraisa

High-feed cutting in hardened steels with XFeed-H



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FRAISA ToolExpert®

XFeed-H – the specialist for high-feed machining

With the new **XFeed-H** milling cutter, FRAISA has produced the perfect tool for realizing HFC processes in hardened steels. Very high feed rates, high cutting speeds and minimal axial engagement depths characterize the strategy of High Feed Cutting (HFC). As a result, this milling concept allows the line-by-line machining of 3D contours in hardened steels – efficiently and quickly.

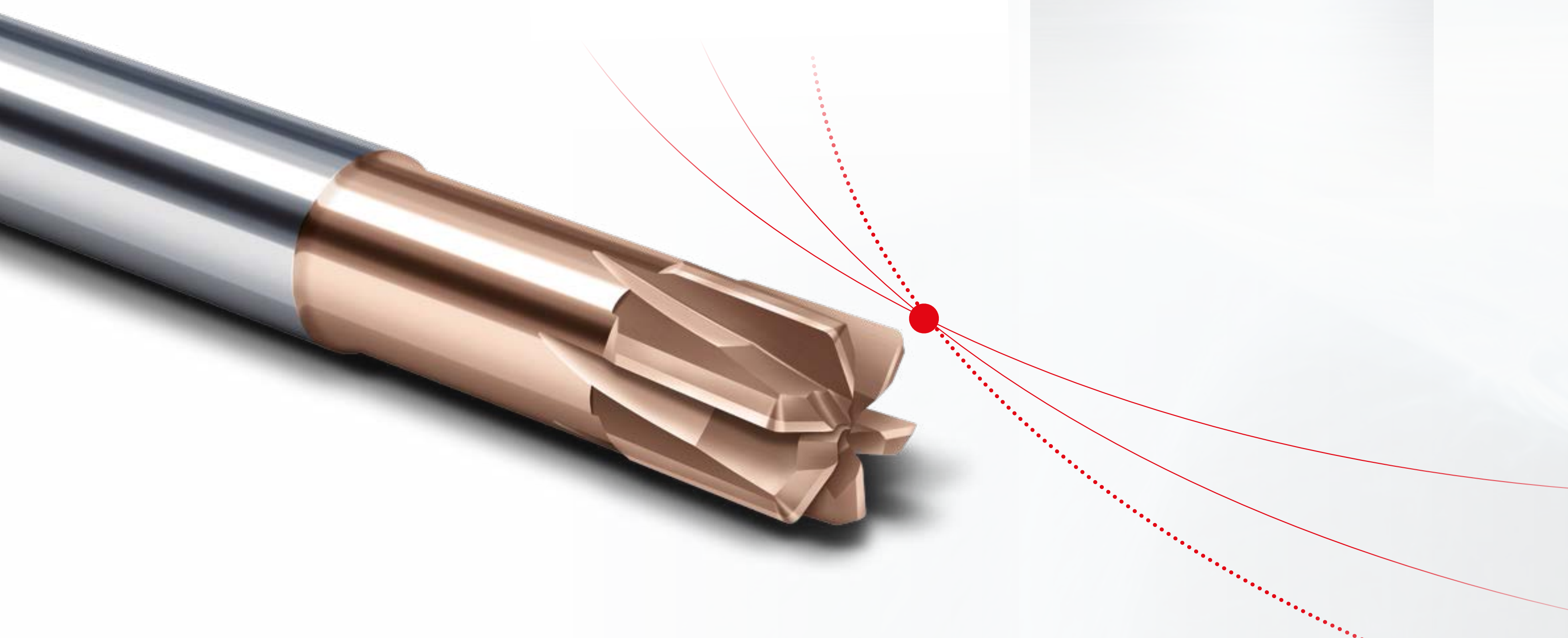
High chip removal rates are achieved by means of maximum feed rates, with the cutting geometry and the precisely configured machining parameters being coordinated perfectly with one another. The new HFC milling cutter has been designed especially for use in mold and tool making and for machining hardened steels.

The **XFeed-H** guarantees high productivity while keeping tool costs low – especially when high track speeds can be realized on highly dynamic machines. The high process stability of the **XFeed-H** means it is predestined for applications that run autonomously.

The design of the penetration edge of the **XFeed-H** is the key to its performance. A very fine-grained and high-hard carbide forms the basis of the cutting edge to enable it to safely absorb the high mechanical and thermal stresses it is subjected to. An extremely hard and temperature-resistant coating protects the cutting edge. The machining parameters, which are perfectly matched to the cutting edge, shift the main load away from the cutting edge, guaranteeing a long tool life and high process stability.

The advantages:

- **Shorter throughput times:** From the blank to very close to the final contour (near net shape) in one process – hardened workpieces can be machined efficiently and throughput times drastically reduced
- **Productivity increase** thanks to increased chip removal rates resulting from maximum feed rates and robust tool design
- **Near-net-shape result** thanks to small axial steps during roughing
- **Easy programming** in the CAM system
- **Optimum automation** thanks to reliable application

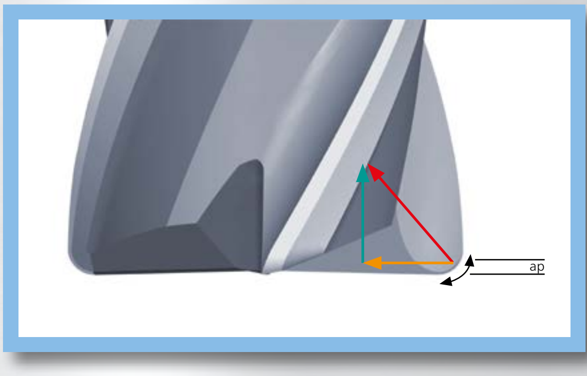


Penetration edge facilitates excellent performance

The shape of the end cutting edge of the **XFeed-H** greatly increases the effective length of the cutting edge. As a result, the mechanical stress and wear are optimally distributed along the end cutting edge. Feed rates and therefore also the chip removal rate can be significantly increased.

Due to the lack of a curved cutting edge, the tooth face width can be increased, giving the tool extra stability. The forces resulting from the high feed rate are consequently absorbed with ease.

Toric tool

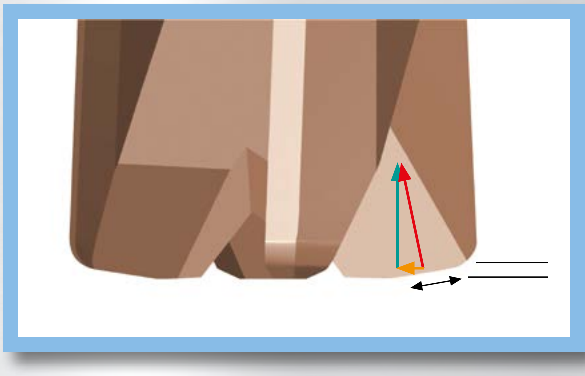


Low **axial forces Fa** do not help to stabilize the tool during operation.

A high **radial force Fr** ensures a high degree of displacement during machining.

The **cutting force Fc** acts only on the area of the radius, meaning **wear** is also concentrated only on the radius. This massively increases the risk of chipping of the cutting edge.

XFeed-H



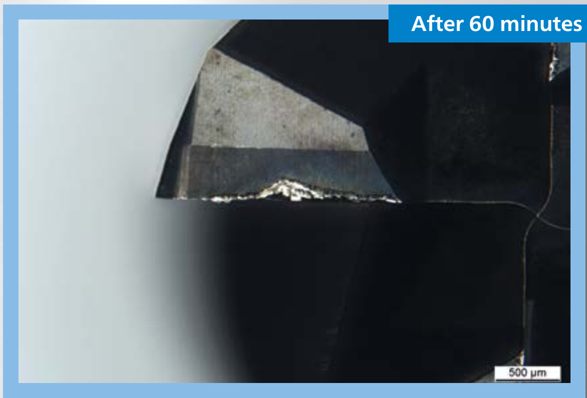
Axial force Fa stabilizes the tool and directs the cutting force in the direction of the tool holder.

Radial force Fr ensures minimal displacement during machining.

Result: The **cutting force Fc** is distributed across the end cutting edge (6x cutting depth ap) and this consequently reduces the degree of **wear** and the risk of cutting edge chipping at high feed rates.

Wear on toric tool

After 60 minutes



Conventional geometry and coating

Vc = 60 m/min, n = 3,200 rpm
fz = 0.146 mm/z, vf = 1,890 mm/min,
ap = 0.15 mm, ae = 3.3 mm

Wear on XFeed-H

After 60 minutes

XFeed-H with DURO-Si coating

Vc = 60 m/min, n = 3,200 rpm
fz = 0.146 mm/z, vf = 2,790 mm/min,
ap = 0.15 mm, ae = 3.3 mm

XFeed-H – faster machining and high process reliability at the same time

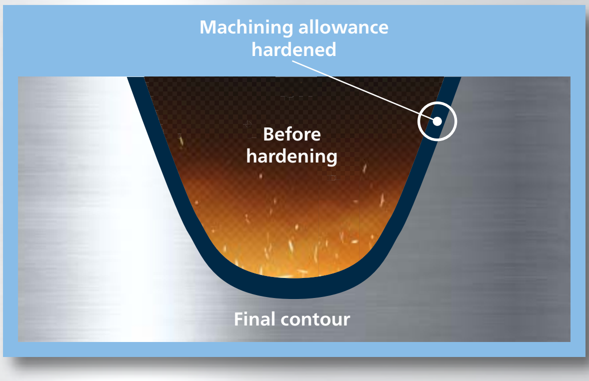
Shorter throughput times

In conventional work sequences, mold blanks are machined before being hardened and finished with a machining allowance. Idle times before and after the hardening process result in high throughput times.

The big advantage of HFC milling cutters is that the entire milling process can be carried out after the mold has been hardened.

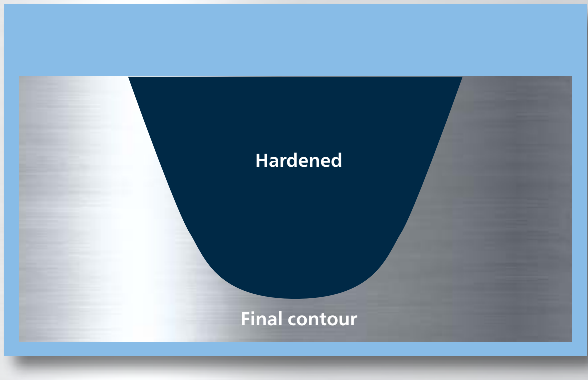
This significantly shortens the throughput time for mold production. Small, axial line steps ensure near-net-shape roughing of the hardened workpiece. This saves time and money as subsequent finishing processes can be implemented much faster.

Previous process steps



1. Machining before hardening
2. Hardening of the pre-milled mold
3. Final contour machining of the hardened mold

Reduced number of process steps thanks to HFC technology



1. Hardening
2. Roughing with XFeed tools, followed by finishing

Optimum automation

Autonomous manufacturing continues to gain ground. Process reliability is the key to success here The perfect interaction between the cutting parameters from FRAISA ToolExpert® and the tool geometry forms a sound foundation for long and highly productive operating times.

Advantages when using the tools:

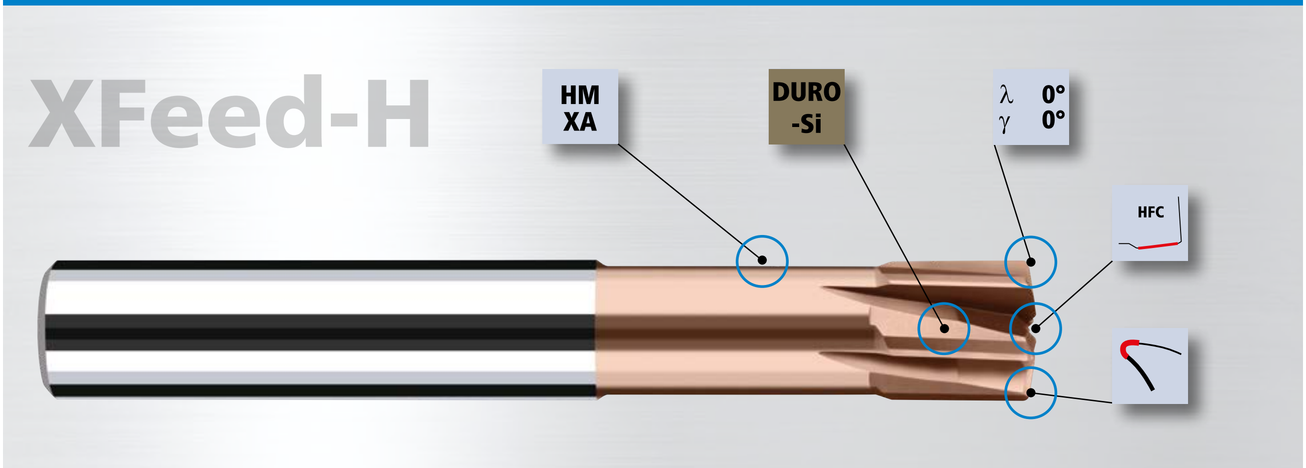
- Optimum operating parameters can be found quickly and reliably
- Use of perfectly coordinated, tool- and material-specific cutting data
- CAD data for selected tools is available for download

Available online

FRAISA ToolExpert®

High productivity thanks to effective edge geometry

The technologies



HM XA — **High-hard, temperature-resistant cutting material HM-XA**
- Reduces increase in wear

λ 0° γ 0° — **Compact end cutting edge**
- Combines cutting ability and stability

HFC — **HFC edge geometry**
- Allows high feed rates

Cutting edge conditioning
- Stabilizes the cutting edge
- Counteracts chipping of the cutting edge

Duro -Si — **Superhard coating containing silicon**
- Significantly reduces abrasive wear

High number of teeth (d1 ≥ 6 mm)
- Allows high feed rates

XFeed-H tool family

The new HFC milling cutters from FRAISA are available in three different lengths with throats 3xd, 4.5xd and 6xd long.

All HFC milling cutters can be reconditioned after use.

FRAISA ReTool® offers an all-round service that restores used tools to their original performance level – using the very latest technology and in a resource-friendly way. Our ability to provide this performance guarantee is a priority of our team of experts right from very early on in product development.
The outcome: mint-condition tools as productive as they were the first day they were used.

Over 30 years' experience in tool reconditioning:

Our competence center in Germany is Europe's largest service center for carbide milling tools.

Video on our service product: FRAISA ReTool®

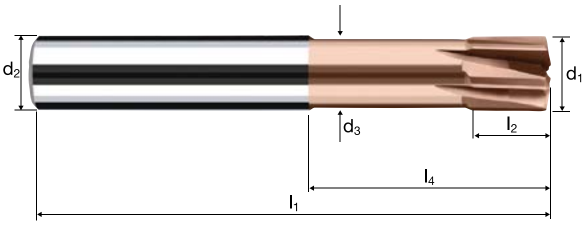
High feed end mills XFeed-H

Cylindrical neck, 3xd

X-Generation X

HM XA	λ 0° γ 0°

HFC



ReTool®

				HRC 48-56	HRC 56-60	HRC > 60			HSS

Example:
Order-N°. Coating **H** Article-N°. **7610** ø-Code **100**

Ø Code	d1 e8	d2 h5	d3	l1	l2	l3	l4	ap_{max}	$R_{theo.}$	α	z		DURO-Si H7610
100	1.00	6.00	0.95	57	1.00	3.00	13.08	0.04	0.09	11.5°	4		●
140	2.00	6.00	1.90	57	2.00	6.00	14.31	0.08	0.18	8.5°	4		●
180	3.00	6.00	2.80	57	3.00	9.00	15.63	0.12	0.27	6.0°	4		●
220	4.00	6.00	3.70	57	4.00	12.00	16.95	0.16	0.36	3.8°	4		●
260	5.00	6.00	4.60	57	5.00	15.00	18.27	0.20	0.45	1.8°	4		●
300	6.00	6.00	5.50	57	6.00	19.34	20.00	0.25	0.54	0.0°	6		●
391	8.00	8.00	7.40	63	8.00	25.29	26.00	0.33	0.72	0.0°	6		●
450	10.00	10.00	9.20	72	10.00	30.20	31.00	0.41	0.90	0.0°	6		●
501	12.00	12.00	11.00	83	12.00	36.13	37.00	0.50	1.08	0.0°	6		●
610	16.00	16.00	15.00	92	16.00	42.13	43.00	0.69	1.44	0.0°	6		●

High feed end mills XFeed-H

Cylindrical neck, 4.5xd

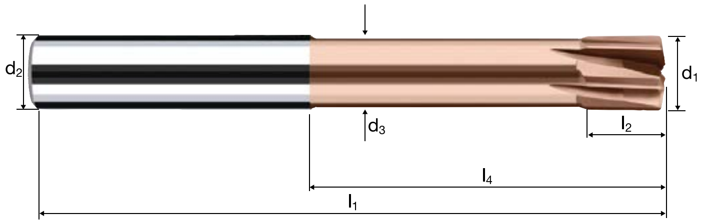
Cylindrical neck, 6xd

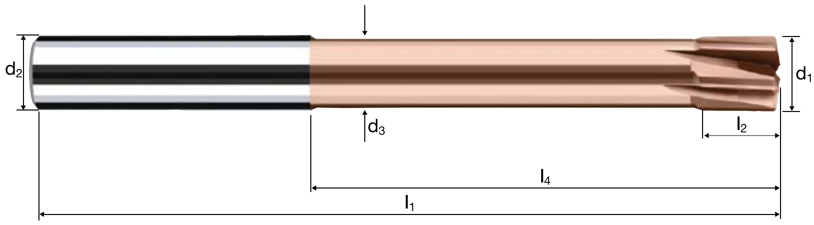
X-Generation X

HM XA

λ 0°
γ 0°

HFC





HRC 48-56 | HRC 56-60 | HRC > 60 | HSS

Example: **Order-N°.** — Coating **H**, Article-N°. **7612**, ø-Code **100**

Ø Code	d_1 e8	d_2 h5	d_3	l_1	l_2	l_3	l_4	ap_{max}	$R_{theo.}$	α	z	DURO-Si H7612
100	1.00	6.00	0.95	61	1.00	4.50	14.58	0.04	0.09	10.0°	4	●
140	2.00	6.00	1.90	61	2.00	9.00	17.31	0.08	0.18	6.8°	4	●
180	3.00	6.00	2.80	61	3.00	13.50	20.13	0.12	0.27	4.5°	4	●
220	4.00	6.00	3.70	66	4.00	18.00	22.95	0.16	0.36	2.7°	4	●
260	5.00	6.00	4.60	66	5.00	22.50	25.77	0.20	0.45	1.3°	4	●
300	6.00	6.00	5.50	69	6.00	30.34	31.00	0.25	0.54	0.0°	6	●
391	8.00	8.00	7.40	80	8.00	39.29	40.00	0.33	0.72	0.0°	6	●
450	10.00	10.00	9.20	90	10.00	47.20	48.00	0.41	0.90	0.0°	6	●
501	12.00	12.00	11.00	105	12.00	54.13	55.00	0.50	1.08	0.0°	6	●
610	16.00	16.00	15.00	125	16.00	74.13	75.00	0.69	1.44	0.0°	6	●

Example: **Order-N°.** — Coating **H**, Article-N°. **7614**, ø-Code **180**

Ø Code	d_1 e8	d_2 h5	d_3	l_1	l_2	l_3	l_4	ap_{max}	$R_{theo.}$	α	z	DURO-Si H7614
180	3.00	6.00	2.80	66	3.00	18.00	24.63	0.12	0.27	3.7°	4	●
220	4.00	6.00	3.70	69	4.00	24.00	28.95	0.16	0.36	2.1°	4	●
260	5.00	6.00	4.60	75	5.00	30.00	33.27	0.20	0.45	1.0°	4	●
300	6.00	6.00	5.50	80	6.00	42.34	43.00	0.25	0.54	0.0°	6	●
391	8.00	8.00	7.40	90	8.00	52.29	53.00	0.33	0.72	0.0°	6	●
450	10.00	10.00	9.20	105	10.00	63.20	64.00	0.41	0.90	0.0°	6	●
501	12.00	12.00	11.00	120	12.00	73.13	74.00	0.50	1.08	0.0°	6	●
610	16.00	16.00	15.00	135	16.00	85.13	86.00	0.69	1.44	0.0°	6	●

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