passion
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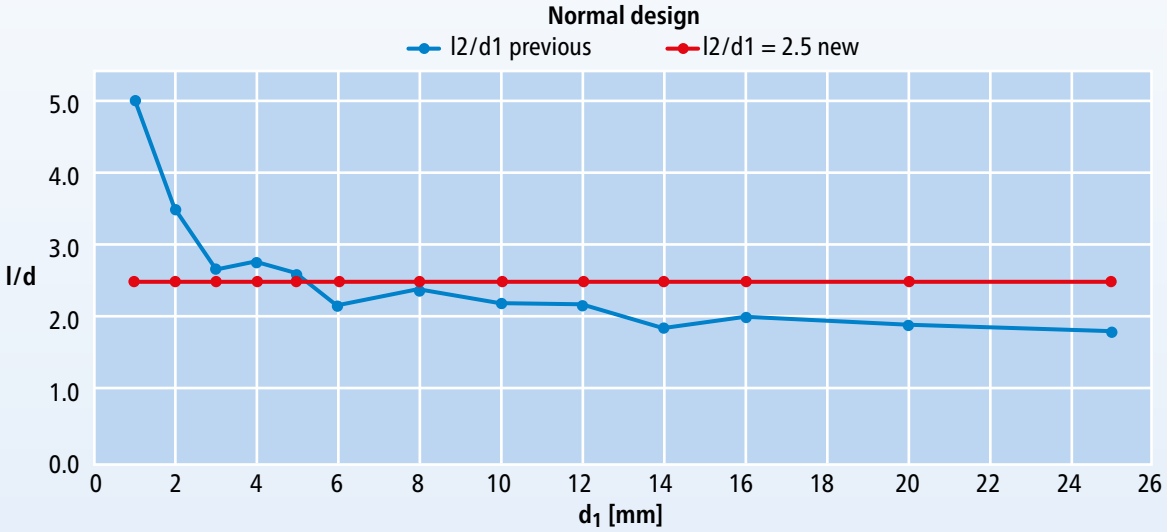
Geared up for the future:
Constant cutting edge length/ diameter ratios

FRAISA – Your partner for future-oriented technology

What is a 3xd tool? Simple question, complex answer:
In accordance with DIN 6527, the cutting edge length/diameter ratio is dependent on the diameter. As such, it cannot be kept constant over a continuous function, as shown by the blue curve:



In the CAM programming, consideration must be given to both the diameter-related and length-related decrease of stiffness.
This is particularly challenging with tools with small diameters – the cutting edge length increases disproportionately in relation to the diameter and the tool loses stability. Meanwhile, for large diameters, it is the other way around: The tool gains stiffness, but the cutting edge length/diameter ratio decreases. The relatively short cutting edge lengths limit the infeed options and have a negative impact on the performance.

Advantages of a constant l/d ratio:

- **Greater process reliability and performance**
- **Simple tool selection**
- **Greater cutting edge length with larger diameters**
- **Time savings (no need to compare lengths)**

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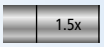
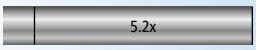
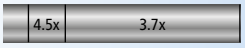
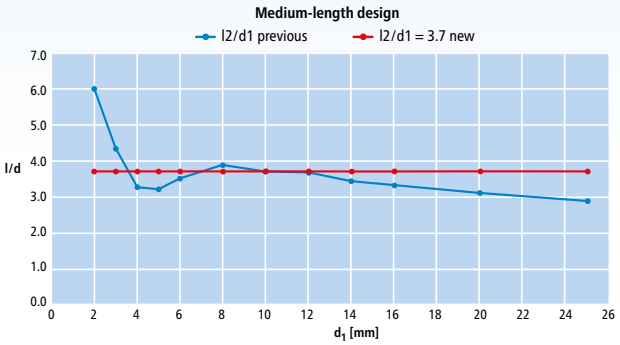
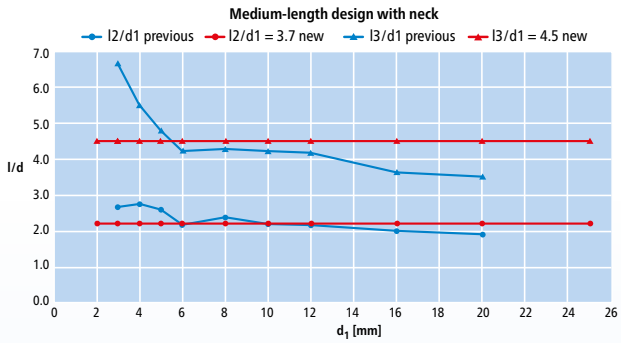
New tool structure

Quality that delivers:

Constant cutting edge length/diameter ratio in tools with and without necks

	Design short without neck	$l_2/d_1 = 1.5$ $l_3/d_1 = –$
	Design normal without neck	$l_2/d_1 = 2.5$ $l_3/d_1 = –$
	Design medium without neck	$l_2/d_1 = 3.7$ $l_3/d_1 = –$
	Design long without neck	$l_2/d_1 = 5.2$ $l_3/d_1 = –$
	Design normal with short neck	$l_2/d_1 = 2.2$ $l_3/d_1 = 3.0$
	Design medium with neck	$l_2/d_1 = 2.2$ $l_3/d_1 = 4.5$
	Design medium with short neck	$l_2/d_1 = 3.7$ $l_3/d_1 = 4.5$
	Design long with neck	$l_2/d_1 = 2.2$ $l_3/d_1 = 5.6$





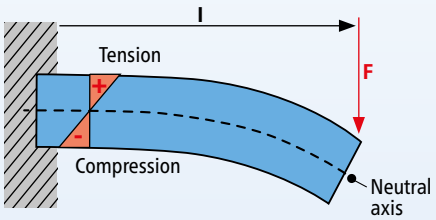
The calculation

The formula for bending stress shows very clearly that the length is connected linearly and the diameter to the power of three.

This means that when the diameter decreases, bending stress rises rapidly.

$$M_b = F \cdot l \qquad W_b = \frac{\pi}{32} \cdot d_1^3 \qquad \sigma_b = \frac{M_b}{W_b}\ [Nm^2]$$

σ_b – bending stress
M_b – bending moment
W – moment of resistance



Advantages for the customer

- **Logical, coherent, clear**
- **Even more precise application data**
- **Simple tool substitution**

Information on the length/diameter ratio in the new catalog 2023: fraisa.com