
What Every Machine Shop Needs To Know About 3-D Milling Tools

Thanks to the greater rigidity and higher spindle speeds of today's machine tools, there are many applications where 3-D profile milling tools are a perfect fit.

Thousands of machine shops, foundries, and production operations are using these tools daily to increase productivity and reduce waste.

In many applications, solid carbide tools have been replaced by steel tool bodies with replaceable carbide inserts. This key development has lowered overall tooling costs.

But it presents a design challenge for the manufacturer. Now you have a multi-part **system** of tool body, insert, and screw that needs to come together as accurately and remain as rigid as the solid tool it replaces.

The Need for Tool Design Standards

Caught between the industry's conflicting demands for higher performance and lower costs, manufacturers have developed tool bodies and inserts in dramatically different combinations of price and performance.

Machine shop owners understand that cutting tool quality can have a big impact on their productivity. But most of them don't know what factors to look at...so they make false assumptions about tool quality.

Industry insiders know these simplistic assumptions are false. In truth, there are substantial differences in tool quality. Yet, if you know what to look for, you can find premium quality tools at reasonable prices.



Which of These False Assumptions Do You Make?

#1: All tools are alike.

So choose your tools based on price alone.

#2: Quality must relate directly to price.

So pay premium prices and HOPE that you're getting premium performance.

Six Ways Better 3-D Milling Tools Can Make You More Productive:

1. Quicker Setup
2. Faster Spindle Speeds
3. More Aggressive Cuts
4. Fewer Stops for Tool Changes
5. Less Tool Breakage
6. Less Bench Work

NOTE: The first five benefits all reduce machine time, the most important factor in determining job costs. The last benefit, less bench work, applies to complex parts where mid-part tool changes can leave visible lines that have to be smoothed out.



Supplier Performance Standards are Also Important

Whether you buy your 3-D milling tools from a distributor or directly from the manufacturer, the capabilities, policies, and attitudes of your supplier are also important.

Factors such as selection, pricing, delivery, and customer service affect the value received from your tooling investment. Plus, a good relationship with a high quality supplier can make your job easier and more enjoyable. So it's worth your time to carefully evaluate the source of your tools.

What this industry needs are specific Tool Design Standards for 3-D milling tools and Supplier Performance Standards for the providers of these tools.

Based on a review of relevant trade publication articles and interviews with machinists, shop foremen, shop owners, and plant managers, this report establishes those standards. It also explains why those standards are important and provides a set of questions you can use to evaluate suppliers.

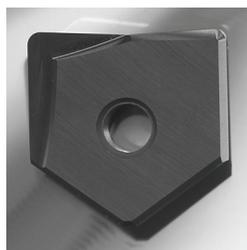
Tool Standards Are the Answer



In theory, tool quality can be tested and measured. But true apples-to-apples comparisons are not really possible in the machine shop world of short runs and constantly changing conditions. Furthermore, the

tool that performs the best under one set of conditions may not be the top performer under a different set of conditions.

The answer, therefore, is to look for basic design features that position a tool to work well under virtually all conditions.



Tool Design Standards

These six standards will help you identify well designed tools, regardless of price.

	Standard	Why It's Important
1	Inserts shall be available in both helical grind (contoured cutting edge) and neutral grind (flat cutting edge)	Both types are necessary. For aggressive cuts, contoured cutting edges cut more freely and peel chips away better, allowing faster speeds and feeds while providing longer life. For finish cuts, flat cutting edges never deviate from the center line, leaving a better finish and prolonging edge life.
2	Insert seating in tool body shall be fixed by design and not dependent on a locating screw.	Screws can shift and wear, making the assembly less rigid and more subject to vibration and chatter. Screws should merely HOLD the insert in place but never LOCATE it.
3	Tool shall use standard screws.	Specially ground screws and insert holes cost more and are only required if screws are attempting to locate the insert (See #2).
4	Screws shall be pre-coated with anti-seize compound.	Uncoated screws can seize, making it difficult or impossible to change inserts. Coating screws yourself is a messy process.
5	Tool bodies shall be finished to make them stand out from ordinary steel.	Special finishes, e.g. black oxide*, remind operators to handle tools carefully and avoid contact with other metal objects.
6	If Weldon flats are used on tool bodies, they shall be perpendicular to cutting edges.	This basic principle of good tool design allows faster, more accurate setup when tightening tools in most tool holders.

*Exception: Tools used in shrink-fit holders should always be ordered in bare steel.



“The higher cost of a precision-ground insert with the proper edge and coating is easily offset by increased tool life.”

“Longer lasting, more reliable cutters require less attention, allowing operators to tend multiple machines.”

Supplier Performance Standards

These 15 standards will help you choose a tool supplier that makes your job easier.

	Standard	Why It's Important
1	Supplier shall offer same-day shipping on orders received by 5PM.	You never want to miss deadlines for lack of the right tool. When something new comes up, you want to get started immediately.
2	Supplier shall not backorder more than 2% of products ordered. 90% of backorders shall be shipped within 3 business days.	Unexpected orders can deplete any supplier's stock of some items. But if this happens a lot, or if the supplier is slow to replenish stocks, you're more likely to suffer long delays in getting the tools you need.
3	Supplier's catalog shall make it easy to find tool types, geometries, and sizes.	Standard items are available faster and at lower prices than special orders. You want most of your needs to be covered by standard items.
4	Supplier shall offer state-of-the-art coating options	The coating industry is evolving rapidly and coatings are becoming more application-specific. Yet some manufacturers are stuck in old technologies due to large investments in outdated coating machines.
5	Supplier shall be open to free tool trials under reasonable conditions.	In some situations you may want to try a new tool before you buy it.
6	Supplier shall be open to doing specials on runs as small as 6 tool bodies or 10-20 inserts and shall provide a Yes/No answer (and a quote if the answer is Yes) within two business days.	Large companies are often unwilling to make specials in small quantities. Yet their bureaucracies can take weeks to reach a final decision on your request.
7	Supplier shall not require a long term commitment for specials and shall not charge more than a 25% premium.	Many companies will not make specials without a long term purchasing commitment. Or they may charge double the standard product price.
8	Supplier shall complete 90% of special orders within three weeks.	Tool manufacturers with large production runs will only interrupt them at certain points, which can delay your specials for weeks or months.
9	Supplier shall have someone on staff with at least ten years of experience in 3-D tooling applications.	Knowledgeable technical support can be extremely important when you're getting into tool types or materials that you haven't worked with before.
10	Supplier shall provide specific technical services of value to the customer.	Supplier is equipped to do some things better than you are, e.g. sharpening solid carbide tools and making tool modifications to meet customer needs.
11	Supplier shall be willing to find and obtain related components for a customer application.	Supplier can save you time by finding and supplying extensions, collets, misting units etc. that he knows will work together as a system with your tools.
12	Supplier staff shall be accessible and return 99% of calls within two hours.	If key people hide behind voice mail and receptionists—then don't return your calls promptly—you can be left without support.
13	Supplier shall depend on 3-D milling tools for more than half of its business.	If most of its revenue comes from 3-D milling tools, a supplier will give this market more attention and try harder to please its customers.
14	Supplier shall have a track record of repeat business and long customer relationships.	Long customer relationships and a high percentage of repeat buyers are signs of high quality tools and good customer service.
15	Supplier shall be value driven with competitively-priced tools.	Your goal is to get premium quality tools and excellent customer service at less than a premium price.

1 Confirm that each supplier’s tools meet the Tool Design Standards Those that don’t should be eliminated. Accepting tools that seem “good enough” because they are priced right is no way to build competitive advantage in a tough market.

2 Use the Supplier Performance Standards as tie-breakers. Contact each supplier and ask the questions provided here. How you weigh their answers, e.g. better services vs. lower prices, is up to you. But you will arrive at your choice in a logical way that can be justified.

Questions to Ask Suppliers

The 15 points raised in the Supplier Performance Standards are restated here as 15 sets of questions. Be sure to ask these questions of your current supplier as well as any others that meet the Tool Design Standards.

	Questions to Ask	Sterling Edge Answers
1	How late in the day can I place an order and have it shipped that same day?	5:00 PM. If you place an order by then, we can pack and ship it that same day.
2	What percentage of tools ordered by customers last year was backordered? And what percentage of backorders was shipped within 3 business days?	1.3% of tools were backordered. 99.2% of backorders were shipped within three business days of original order date.
3	Do you offer _____? [<i>Ask about any important tool types or sizes that you could not find in the supplier’s catalog</i>]	In addition to common sizes, we stock uncommon extras from special orders, e.g. 7/8-inch tooling.
4	Do you offer _____ coatings? [<i>Ask about the coatings that interest you</i>]	Yes. We offer all the state-of-the-art coating options.
5	Do you offer tool trials?	Yes, we have a Try-Before-You-Buy program.
6	Will you consider doing a special run for me if I only need 6 tool bodies? What about 10-20 inserts? If I did request a special run, how long would it take before you could get me a Yes or No answer with a price quote?	Yes to both small quantities. If a special is requested, we will get back to you with an answer and a quote within 24 hours.
7	Do you require a long term commitment for specials? How much more expensive are specials than a similar standard product?	No long term commitment required. The typical premium for a special is less than 25%.
8	If I ordered a special today, how long would it be before you ship it?	Usually within three weeks.

	Questions to Ask	Sterling Edge Answers
9	If I need technical advice, do you have someone on staff that I can speak with who has at least ten years experience in 3-D tooling applications?	Yes.
10	Would you sharpen my solid carbide tools? Would you make other tool modifications that I might need?	Yes, we sharpen solid carbide tools for our customers. We also make other tool modifications, e.g. making tool shanks smaller than the tool diameter.
11	If I asked you to find and supply some complementary tool pieces for me, like extensions, collets, and misting units, would you do it?	Yes, we have provided complete systems for customers.
12	<i>(Note whether your call went to voice mail or a live person. How long did it take to reach someone who could answer these questions?)</i>	Try calling us at 800-403-0808. If you call during business hours, there's a 90% chance you will reach a live person. If you do have to leave a message, your call will be returned within two hours.
13	What percentage of your entire company's business comes from 3-D milling tools?	85%. We are specialists, dedicated to 3-D milling tools.
14	What percentage of last year's customers also bought 3-D milling tools from you the year before that?	95%.
15	What are your prices on ____? <i>[Ask about the items you buy the most]</i>	Ask us the same questions. You will find that our premium quality tools are reasonably priced.

About Sterling Edge

Sterling Edge is the fastest growing company that specializes in highly accurate, competitively priced profile milling tools for 3-D applications. Located near Detroit, we began selling 3-D milling tools in 1998. We ship products globally and have customers in many countries.

Our customers include production companies in aerospace, automotive, defense, medical equipment, and other industries. In addition, we're proud to serve machine shops of all sizes. Sterling Edge meets ALL the Tool Design Standards and Supplier Performance Standards noted in this report.



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