Ten Tips For Setting Up A School Machine Shop

It’s probably not a stretch to suggest that most students back in high school shop class didn’t expend a great deal of mental energy wondering how those lathes, drill presses, and grinders made it into the classroom for their enjoyment and educational experience. We’ll assume, however, that most were too busy learning how to manipulate metal, wood, and other materials in a safe and effective manner to care about how the tools got there.

Students at Petrolia High School working diligently on a milling.

Nevertheless, the machines on which the next generation of metalworkers cut their teeth didn’t just arrive magically. They were selected and sourced by balancing the school’s present and future technical needs with ever-important budgetary restrictions. Whether we’re talking about a small high school or a huge technical college, careful consideration is required to ensure the right equipment is chosen to meet the needs — and endure the abuses — of metalworkers-in-training.

For 45 years, KBC Tools & Machinery has been privileged to work with countless educational institutions across North America to establish or upgrade their campus machine shops. We’ve learned a great deal from our partners in education about common shop requirements, and we wanted to share some of this knowledge. Not just with schools, but with anyone interested in setting up — or improving — a shop of their own. Below you’ll find KBC’s list of ten essential tips for setting up or enhancing a school machine shop. From budgets to blackboards and everything in between, if you’ve covered all of the items on this checklist you’ll avoid surprises and have a better machine shop for it.

1. Machine Shop 101

Though curriculums vary considerably from province to province, most programs offer courses that examine machine shop and basic tools, materials for machine shops, welding, CNC machine programming, and certification. By determining the kind of work that will be done as part of the program, schools can avoid buying

equipment they don't need and acquire the machinery that is best suited to their training environment. We can be pretty sure a milling machine, lathe, grinder, drill press, and band saw will all be necessary, but what size/capacity of each machine do you need? Let's face it: a lathe with a 16" swing over bed and 40" distance between centers is probably going to be overkill for the kind of work being done in a school shop. As for CNC, the cost of this technology has dropped significantly over the last fifteen years, so more students than ever before can train on state of the art machinery. Decisions, decisions!

2. Be True to Your Budget

One of the advantages of being a machinist in the modern era is the wide selection of quality machinery available at very different price points. At KBC, for example, we offer machines that fall into *good*, *better*, and *best* categories. This means that no matter what the budget, you're going to find a machine that will get the job done at the price point you desire. If you've considered all of your requirements (something this article hopes to help you with) there's no excuse for coming in over budget.

3. Make the Floor Your Friend, Not Your Enemy

The funny thing about the floor is that you use it more than other part of a shop and yet it's usually the farthest thing from your mind (about 5'11" inches away, to be exact!). If you've got the right floor it's good not to have to think about it, but if you're installing a new one it's crucial that you make sure the right construction material is used for your application. There is a huge difference between the type and depth of the cement poured into the basement of a house and that used in a machine shop. The shop floor needs to be able to support thousands of pounds of heavy machinery and materials, as well as stand up to the less than gentle way these things get moved around. Getting the floor right from the beginning will save you major dollars and a major headache later on.

4. Benjamin Franklin Would Be Proud

We've come a long way since the founding father's early experiments with kites and lightning, but electricity still needs to be thought hard about, especially in a school machine shop. You'll need to have different voltages available at strategic spots in the room (North American equipment operates in and around 115v, 230v, 460v, and 575v) depending on the machines to be used and whether they are single or three phase. Also, see if you can get away with machines that don't require an expensive phase converter. KBC has just released a new 3 horsepower lathe with single phase electrics (the GRIP-1440HD 14" X 40" Heavy-Duty Lathe) — just the type of machine a school might choose to cut costs without cutting quality.

5. Living in a Material World

With priorities like machinery and electricity to think about, it can be easy to forget the problem of where — and how — to store raw materials, incomplete projects, and waste. Are you going to give the excited fingers of students uncontrolled access to

materials, or will you store them under lock and key? Either way, you need to budget for storage containers as well as enough shop space to accommodate them. And don't overlook the fact that students who are working on machines for the first time will produce a large amount of material waste. This can't always be disposed of quickly, so safe and convenient storage is a necessity.

6. Tools, Rules, and Regulations

Machinists-in-training at Holland College pose with their KBC sales flyers.

When you think about all that can go wrong when students begin operating heavy machinery, you've got to be thankful for the many rules and regulations that govern school machine shops. School boards, colleges and universities all have their own unique standards for health and safety, and they must be fully understood when planning your shop. Institutional rules come in addition to government regulations concerning workspaces and machinery. For example, does your state require a minimum walkway? What are the ventilation requirements for your particular shop activities? These and other concerns should be on your "need to know" list.

7. Doorways Can Deceive

This may seem like a no-brainer, but you'd be amazed at the number of times a machine has been ordered, paid for, and delivered to a facility that lacks an opening large enough to receive it! What looks at first glance like a nice wide doorway can leave you cursing the fact that you didn't pull out the tape measure to make sure the machine would fit through. And don't underestimate the need for a dedicated loading area if the machine does clear the opening. Shop real estate is precious, particularly if written course work shares the same space as the machinery, but you'll be thankful you've left room for loading when the time comes to rearrange or add equipment.

8. The Little Things Add Up

Did you hear the one about the busy machinist who forgot to buy consumables for

his shop? Of course you didn't — he doesn't exist! A machinist can't possibly be busy in the shop without the right tooling on hand to make use of his machinery. We call these 'consumables,' because they get worn out or used up in the course of a shop's work, and production simply can't continue without them. Drill bits, end mills, band saw blades, taps, dies, cutting inserts, coolants, cutting fluids, lubricants, tape measures, clamps, calipers, vises, chucks, and a host of other supplies will need regular replacement (some sooner than others) and are therefore a significant expenditure for any shop. Be sure to keep this in mind as you budget, and ask your supplier whether any discounts are available on such items. KBC offers educational institutions 10 percent off of consumables, and a discount like that can add up to tremendous savings over just a year in the life of a school machine shop.

9. A Safe Bet

A good instructor will tell you that the most important tools in a school machine shop are not the machines, but the safety products that keep both amateurs and pros protected in the potentially dangerous workspace of the shop. We all know how excited young people can become when put in charge of powerful machinery — ever seen a student driver? Without gloves, guards, eye glasses, floor mats, and a variety of other safety gear on hand, you're breaking rules and asking for disaster. As a big part of your consumables expense, safety products need to be budgeted for at the planning stage so they can be kept in ready supply.

10. **Interior Decorating**

You've got your machines picked out, material storage is decided upon, and you've discovered that your doorway's not going to spoil the whole plan. Great. Now you need a strategy for the layout of the room. Where will your eyewash stations be located relative to the machinery? Will you design a central hub into the room? Is there to be a centralized area for bench work? How about wall space? The blackboard might seem like a relic from the 19th century, but it's still a relevant learning tool which needs to be planned into the room (nothing says learning like chalk dust in the air). Finally, how about lighting? Simply put, a well-lit space is non-negotiable.

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