A Phoenix Risen from Its Ashes

by David Millson with Mark Smith

WE ALL KNOW that the pessimist says, "MY GLASS IS HALF EMPTY" and the optimist says, "MY GLASS IS HALF FULL." But the VISIONARY, beholding an empty glass says, "WHAT WONDERFUL THINGS THAT GLASS CAN HOLD!" One of the visionaries at Shiloh High School in Hume, Illinois, is Industrial Technology/WoodLINKS USA Teacher, MARK SMITH.

Shiloh Industrial Technology students represent their program at the 2002-2003 AWFS Student Competition in Anaheim Convention Center in California. From left to right, the students are: Paul Wilson, Emory Luth, Katie Weber, Heidi Kibbler, Brandon Draper and Adam Carrington. At right is their teacher, Mark Smith. Paul and Emory received their AWFS Finalist awards that year.

When Mr. Smith was interviewed for his current position in the last month of the '94-'95 school year, Shiloh's half-time metal/wood shop program was barely limping along. He was told frankly, "We have a program that is in decline. We want it to be better because our students need to succeed in an effective program in order to be employable."

This scenario has beset hundreds of schools across the nation as they confront the changes wrought by the expansion of trade – and jobs – to global proportions. Shiloh's story, however, takes on mythic proportions. From out of a rusty, dusty relic, Mr. Smith and his students, with the proactive support of school, administration and industry partners, created a first-rate wood-based Industrial Technology facility.

Today, Shiloh sends students out as interns in industry; places some graduates into production-grade jobs; and sends others into post-secondary and college study in fields ranging from design engineering to computer-animated graphics.

THE VISIONARY

Though the old shop had been spiraling downward as a metal/wood shop, "*My* thing was woodworking," Mr. Smith proclaimed, "and I prefer to concentrate on one thing and do it the best I can.

I knew I could teach problem solving, material handling, accurate measurement, product flow, floor management, and more, with any material. By using wood, we could capitalize on what woodworking tools were already there, add to them, and our students soon would be able to build complex projects that they'd be proud of."

Brock Duke, Chasidy Galloway, Dustin Watson and Ryan Nichols pose before a three-unit entertainment center built by the Production class for "paying customers," a couple in Sullivan, Illinois. All side components, shelf holes and the center section arch were toolpathed and machined with Mastercam. Once opened, the center section doors retract back into the cabinet for clear TV viewing.

What Mr. Smith *doesn't* say is that his own enthusiasm for the material and belief in the acuity of young minds would add an intrinsic factor of huge proportions in the growth of the curriculum. From the beginning, Mr. Smith felt that, "over time, the school would be proud of our students and they would serve as examples to the community of what our young people could do when given across-the-board support. I believe that if we can help adolescent students – kids at a very vulnerable stage in their lifetime development – gain confidence and feelings of self-worth from patently obvious results, we will have given them a gift for life."

Mr. Smith's goals for his students are nowhere more evident than in his influence on the school's present-day Industrial Technology Department Mission Statement:

The new millennium is bringing about swift and dramatic changes in the industry and economy of the United States of America. Because of these changes, the education and career opportunities of the population are also changing. Due to the complexity of society and the advancement of technology, the individual's security in the workforce is best achieved by providing a foundation of practical education based on the knowledge and skills needed by businesses, industries, and communities in our society.

THE EMPTY GLASS

Mr. Smith arrived at Shiloh High School in September of 1995 to a classroom that had nothing but drafting tables: no computers; a shop meagerly supplied with equipment, mostly moldering in a storage area; and what little they *did* have was in bad condition. Though aware that the shop was in total disrepair, School Board members and others who interviewed him shared Mr. Smith's high hopes for breathing new life into the program.

"When school started," Mr. Smith recalls, "I was going to build our shop literally from the ground up in partnership with the students." These students, who in years past had been treated like characters in "*National Lampoon's Wood Shop*," would now have "sweat equity" in a modernized and industry-respected program.

"We cleaned the shop first," chronicles Mr. Smith, "and we rebuilt machines that weren't performing properly: an 8" joiner and the table saw. We adapted a maple lab tabletop into a double-sided 5' x 5' router table and ordered some small hand tools. That first year we also purchased a 37" surfacing sander. Together, we got our shop up and running to the point where we could do more than just build a bird house; we wanted to build things like coffee tables and living room furniture!"

Paul machined the tabletop contours, pockets and underside parts-locating pocket with Mastercam. Paul's first-ever entry in the 2002-2003 AWFS Student Competition, his table was selected for exhibit by an 8-person professional committee as one of the top 50 entries from all educational levels.

A year after completing his glass-topped coffee table, now-junior Paul Williams inspects the routed top for one of two end tables he's making to complement the original.

FILLING THE GLASS WITH PERFORMANCE

"In the first few years," Mr. Smith relates, "our students did superior work on fix-it projects around the school because we didn't have all the equipment to do the elaborate projects we were aiming toward. The very first year, they accomplished the equivalent of $10,000 in repairs for the school." Their investment of time and talent, backed by Mr. Smith's ingenuity, gained them the reputation among their fellow students as helping to make school better. They worked at keeping it in good shape despite the damage done by others and soon that, too, was stopped when the perpetrators realized they could be part of the positive school image Smith & Co. were establishing.

IT student-made cabinets create the workspace for a fifth Family and Consumer Science classroom. This project was the beginning of Industrial Technology's trust relationship with the school administration, built on timely and professional completion of school improvement projects like this.

"We started making a yearly report to the school board outlining the accomplishments of the program," Mr. Smith continues. "The students also began making items such as mantle clocks to give to people who had helped the program. This generated good will in the school district and community."

Cole Grafton, John Myers and Taylor Craig, all currently Parkland College http://www.parkland.edu/est.html students, show off Shiloh IT pride with a new school sign they made in CAD/CAM class in the 2002-2003 school year. Cole is the first First Semester Parkland College IT student ever to be given an internship at Frasca International (http://www.frasca.com), designers and manufacturers of simulators for all types of aircraft and training tasks.

Considering space constraints against the equipment necessary for efficient, up-to-date library operation, Industrial Technology students created this functional yet attractive multipurpose unit over the summer of 1998. This was a year before Thermwood and Mastercam.

MAKING THE DEAL

The 1998-1999 school year was the first for the district's new superintendent, Dr. Mary Bourne Cerra who, Mr. Smith reports, was also quite the visionary. Dr. Cerra allowed Mr. Smith's students to begin working on projects other schools might have considered overly complex.

At the time, Shiloh had four Family and Consumer Science kitchens in operation but the school had been built with room for six. Making the cabinetry for the fifth, which the administration hoped would help the FCS curriculum flow more smoothly, would require – for starters – a shaper. In addition, Mr. Smith proposed a fine unit for the school's librarian: a cube-shaped desk with paneled construction, baseboard, and crown molding. Armed with these school improvement projects, Mr. Smith struck a deal with Dr. Cerra: If the school would buy the shaper, Mr. Smith guaranteed that his students would earn money to pay back the cost. It must have been an offer the administration couldn't refuse because Shiloh got its shaper, its new kitchen cabinets, and the students paid back their half from the profits of their first job.

Job?

Oh. We didn't mention the hidden agenda here: With the shaper at the ready, Mr. Smith could teach his students how to build the cabinets. But he had sold the cart before the horse and now he had about a month to research how kitchen cabinets are to bring the whole "deal" together.

A QUICK STUDY

"In 1998 I went to cabinet manufacturers and other craftspeople for information and help with learning to design and build professional quality cabinetry," recalls Mr. Smith. "After building kitchen cabinets for two school years, in 1999 our program moved toward the next phase: purchasing our Thermwood CNC Router and acquiring Mastercam®. I spent two days at the Thermwood facility learning to use Mastercam with their router."

"We now cut all upper and lower *corner* cabinet side, tops, shelves and decks, and all upper and lower *along-the-wall* cabinet sides on the Thermwood. I still like to reserve the remaining straight-wall cabinet pieces for beginning students to cut on hand-fed power tools – partly so they can begin to participate in major projects and also so that we are using all of our tools during the school year." Mastercam-toolpathed operations included cutting contours, dadoes, moveable shelf-pin holes, and rabbet joints. "Today," Mr. Smith says, "if we have a customer who wants a unique cabinet, we just design and toolpath in Mastercam. Routing a distinctive cabinet shape couldn't be simpler."

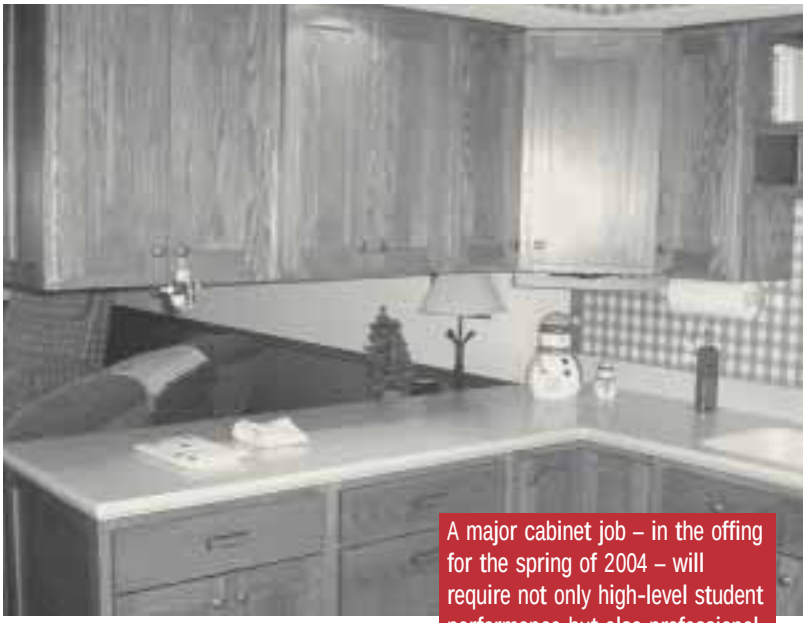
Over the summer of the previous year Mr. Smith and a small student crew installed a dust collector in the shop. Before then, production volume was nonexistent; now, students were tracking sawdust all over the school. The following summer, Mr. Smith recalls, "We cut over 200 sheets of plywood and raised LOTS of dust – so the dust collector improved relations with the school's custodial staff as well as improving our working environment."

This section of the cabinetry built for a couple in Naperville, Illinois, is graphic proof of Mr. Smith's drive toward professional-quality production.

"After we built the school's first cabinets, we created a set for Carol and John Edstrom, my sister-in-law and brother-in-law, in Libertyville, Illinois. We charged them cost plus enough to pay back our half of the shaper. We also were able to add a new table saw and additional hand tools. We were well on our way to assembling a fairly nice manufacturing facility."

WOOD GETS AROUND

Word of mouth spread the message that individuals could get new, high-quality kitchen cabinets for cost plus a $2,000 donation to the Shiloh build-a-shop project. All cabinets were built with top-of-the-line materials: Blum hardware (Blum specializes in concealed hinges and drawer systems), plywood construction, dovetailed drawer boxes, five-piece raised-panel doors, and *real wood* interiors and shelves – *no* particleboard. For Mr. Smith, "This is manufacturing technology at its best. It has to be, first, because we're teaching; secondly, it would be a community relations disaster to ask a homeowner for $6,000 for cabinets built by high school students unless the results were top-of-the-line."



A major cabinet job – in the offing for the spring of 2004 – will require not only high-level student performance but also professional help to complete the installation of 30+ units in a timely fashion so that the job doesn't interfere with the students' study/class time.

Students custom-measured each job, built the units in Production class, and then installed the cabinets in their customers' homes. "We soon developed a backlog of work," Mr. Smith recollects, "and over the past six years, we have had at least two to three people on our waiting list. We have installed jobs as far away as 200 miles but, typically, we work within a 50-mile radius.

"When it's time to install, we set up a firm date. The students know the job has to be done as scheduled: the customers have already yanked their old cabinets out!" The student/teacher crew shows up on a Friday morning and they drive back home or stay over in a hotel, then meet back at the job site on Saturday to finish the job."

On more complicated installations, professional installers are hired for additional help, since the student crew does not work on Sundays and must be back in school on Monday. One such job will feature 35 cabinets: complete kitchen, laundry room, three baths, and a built-in buffet in the living room. "Hired hands" will install all but the kitchen, which the students have reserved for themselves.

MAKING IT WORK

Soon after installing the first cabinet job, Mr. Smith contacted Simington Windows, of Paris, Illinois. A very education-minded company, Simington frequently donates materials and funds to technical education. They also have had good experience hiring high school Tech Ed students so they know their investments result in a better worker pool.

In 1999, Simington allocated $3,500 to Shiloh for the purchase of two seats of Mastercam. This was also the year that Mr. Smith began to work with the District Board and Superintendent to purchase a Thermwood CNC Router Model 40. The students committed to generating half of the cost of the router, for which the school has already paid with the help of a deep discount from the manufacturer. Three students went with Mr. Smith to Thermwood's Dale, Indiana, headquarters for a week of intensive, on-site industrial CNC training on the Model 40 that summer.

Student-built elementary classroom shelving.

Emory Luth prepared this extendable headboard (shown in its double-bed position) as his first-ever entry at the AWFS show in 2003. It was among only 50 from secondary through college levels selected for exhibition.

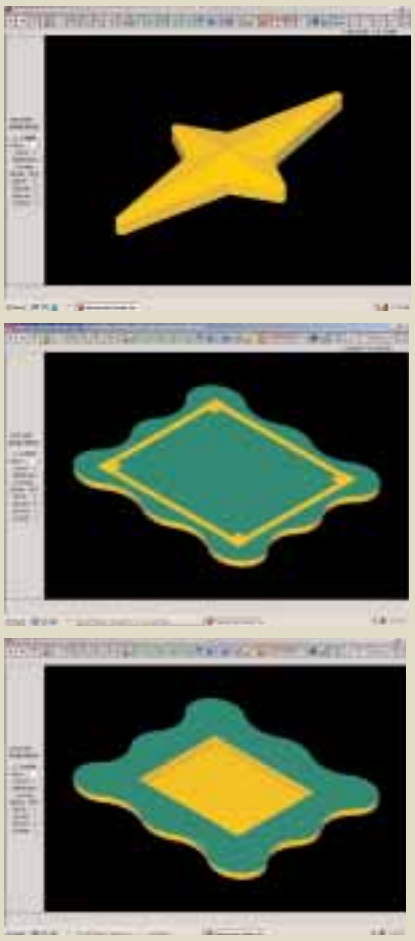
Paul Wilson, whose French provincial table achieved for him first-time-out recognition at AWFS, displays a Rococo mirror frame he Mastercam/Thermwood-routed from four pieces of African vermillion (padouk) cut and fixtured so that the grain is vertical throughout the assembled piece.

Industrial Technology/WoodLINKS USA Teacher Mark Smith stands by proudly as Mark Luth and Paul Wilson display the WoodLINKS USA certificates they received at the 2003 AWFS show. Shiloh High School was the first in Illinois to become a WoodLINKS USA center.

Mr. Smith reports that, as of this printing, the students' balance from their original $20,000 commitment is $6,000; the next three cabinet jobs will pay off the bill. "We use the router, programmed by Mastercam, in all of our manufacturing, production, and CAD/CAM classes," says Mr. Smith.

RAMPING UP THE PROGRAM

By the fall of 1999, in addition to the Thermwood and Mastercam, the shop had most of the basic wood manufacturing tools including a pocket hole machine, saws, and sanders, and Mr. Smith began teaching AutoCAD. The Shiloh administration was very excited about the technical and professional advances Mr. Smith and his students were making. So were many community people and, of course, the parents of the "industrial arts" students. Dr. Cerra suggested the feasibility of a summer program to add greater scope to the program while filling school-related needs. Thus was born the Industrial Technology Department.



As with the building of most new schools, some items on the wish list for this K-12 school were cut for budgetary reasons. Though every classroom was built with a 2' recess in one wall to receive 20" x 8' shelving units, no shelves were installed. Mr. Smith met with the faculty and worked out a uniform design for all the rooms. Mr. Smith prepared a bill of materials and presented it to Dr. Cerra, who met with District Board and authorized hiring four of Mr. Smith's best students.

The Classroom Cabinet Cadre worked from the first day school was out for the summer until just before classes in the fall. They built shelving units in 4 elementary school rooms; a full set of cabinetry and shelving for the art room; a new school podium; and new service desks for three reception areas. They also built a spray room within the shop area.

"Then, during the 2000-2001 school year," Mr. Smith reports, "we formed an Industrial Technology Advisory Committee composed of local business and community leaders, school administrators, parents and students. We are hoping to generate ownership, direction and support through this committee."

THAT WAS THEN...

Today, Shiloh High School's Industrial Technology program offers eight different CAD/CAM programs but our major focus is on Mastercam and AutoCAD. The eight are included in three levels of AutoCAD; three levels of Manufacturing Technology; two levels of Production; and one level of CAD/CAM. Our CAD/CAM class teaches machine code and Mastercam toolpathing, as well as the basics of CNC machine operations.

Students who advance to the upper level of AutoCAD spend their class time learning and working for the school district, local businesses and contractors producing architectural drawings and shop drawings. And students learn many additional marketable skills in the manufacturing classes. By the end of each year, students have a project they can take home as an example for their families of the quality of their work.

The CAD/CAM and Manufacturing classes prepare students students who have had both the computer side of study and the hands-on shop classes for our two Production classes. We have expanded and solidified the program so that we continue to build custom kitchen cabinets for homeowners locally and around the state each year, *raising thousands of dollars for our program*. The students face many of the real-world challenges and pressures any company would face, among them material handling, safety issues, quality control, time management, precise measurement, preparation processes, combination processes, materials selection, coating technology, and customer service.

UP AND OUT

Now that the Industrial Technology program had the means, backing and experience to give students a comprehensive secondary technical education, Mr. Smith felt it was incumbent on him to go one step further. He wanted to begin to place graduating students in construction or wood manufacturing work so, as he put it, "they could get paid for the skills they had learned – earning a living doing the kind of work they enjoy." He also encouraged those who showed aptitude and interest in further education to apply for post-secondary and/or degree programs.

Mr. Smith remembers, "It took some time to show results because I had made no further industry contacts than the people from whom we bought cabinet materials, software and equipment. I started spending lots of time e-mailing, phoning, and sending letters to every manufacturer, every educational entity – anyone I could think of – in order to develop relationships that could lead to placement of our IT graduates. I was also looking for industry partners in current-use areas: field trips, technical support on machine set-up, software, additional materials, technical know-how, etc."

JUMP-START!

Student job placement began slowly as a result of Mr. Smith's contact base but the limited range of his personal resources frustrated him. Hoping for a boost, he decided to go to woodworking industry trade shows. During school year 1999, Mr. *and Mrs.* Smith attended their first, what Mark called "Industrial Strength Woodworking Show," in Wisconsin.

"I was walking around the show trying to develop relationships one-on-one, when I saw a booth for

WoodLINKS – a national organization that started in Canada and was migrating into the US. According to its Web site www.woodlinks.com/USA/home.html,

"WoodLINKS is a non-profit society created to respond to the wood industry's need for better-qualified, entry-level employees. Its mandate is to ensure that students, teachers and parents are knowledgeable about the value-added wood industry and the career opportunities it provides. WoodLINKS works with high schools, post-secondary institutions and industry to develop wood manufacturing programs in schools, and provide practical training opportunities, career counseling and information for students and teachers"

Mr. Smith was VERY excited thinking about having their clout behind him. Representatives there introduced him to what was then "Wood-in-the-Box," a CD-ROM-based woodworking curriculum (now at WoodLINKS Curriculum), plus other materials highlighting the woodworking industry and its opportunities for students. In the summer of the 2000 school year, Mr. Smith received a call from Larry Hilchie of WoodLINKS in the US. Mr. Hilchie volunteered as the organization's leader on top of his full time job. This kind of personal commitment gives some indication of the seriousness of purpose of the organization; woodworking manufacturers desperately need people with manufacturing skills, among them CAD/CAM-trained people, if they are to regain their competitive position in the world market against cheap offshore labor.

Mr. Hilchie invited Mr. and Mrs. Smith to the Association of Woodworkers and Furnishings Suppliers (AWFS) show in Atlanta. There he stood amid, as he put it, "monster floor space." We walked around for three days, all day, and saw only three-quarters of the show. It was a real eye-opener; I saw processes there that were completely new to me."

"We attended WoodLINKS USA meetings and met some of the organization's movers and shakers. We listened to them and heard the industry leaders serving as guest speakers. We also learned what practical steps were needed for Shiloh High School to become a WoodLINKS USA site. We were excited because of the potential WoodLINKS could offer our program and, once we began to use their resources and curriculum, what that would do for our students."

LINKING UP

Shiloh High School's Industrial Technology Program became the first WoodLINKS USA high school site in Illinois. Mr. Smith is certain that the information and leverage gained from the organization will help him reach the Industrial Technology Department's goal of linking education with industry. He says, "Our students will be exposed to exciting careers, receive national certification recognized by industry, and obtain jobs right from school, or a preferred standing in post-secondary programs. WoodLINKS USA donations of equipment and supplies will assist students to connect with post-secondary wood programs."

Four of Mr. Smith's students received their WoodLINKS USA certificates during the 2002-2003 school year. Two of them, Emory Luth and Paul Wilson were selected to exhibit their work in the AWFS Student Design Contest and received their WoodLINKS USA certificates at the banquet honoring all the AWFS award winners on August 1, 2003.

...AND MORE TO COME

Indeed, it has already begun. Mr. Smith pursued the WoodLINKS USA opportunities and made contacts with woodworking industry leaders; he was like a politician on the campaign trail. His energy seems boundless… and there is yet more of his odyssey to be revealed in Ties Online in June. Some highlights:

- Students caught Trade Show Fever from Mr. Smith and began raising funds to attend and participate at the student level in shows around the country.
- Shiloh has been offered a CNC Point-to-Point Router ***free*** and can't find a place to put it. James M. Aklin, the District's current superintendent, has encouraged Mr. Smith to find support for building an addition onto the shop in which to put the Point-to-Point and other future items. "If we can fit this new piece of technology," says Mr. Smith, " we will be able to start teaching the manufacture of 32mm cabinets." Mr. Smith promises to highlight the importance of teaching to the 32mm standard in our June report
- Emory Luth continues at Shiloh during this 2003-2004 year and has embarked on an ambitious project: his original design for a *moderne* table [Photo #18] with compound-curve drawers and top. His project requires independent study of the shaping, jig making, materials selection, complex toolpathing, and adhesive techniques necessary to create a piece of professional quality furniture.

Mark Smith has become a man with a mission, one he wants to share with as many other Technical Education professionals as possible. In June, we'll flesh out helpful details of Shiloh's IT evolution and follow Emory Luth's Louis XVI project which he began in preparation for the 2004 AWFS Student Design Contest. Despite the organization's recent decision to exclude students at the secondary level, Emory continues his research and practical experimentation… in pursuit of his Personal Best.

And, perhaps through some timely feedback, in June we can learn of more teachers who have been handed a decrepit shop – a pile of ashes – and watched it take flight like a Phoenix: a new, viable Technical Education curriculum dedicated to student success. Please let me hear from you.

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