Ontario School Boards' Insurance Exchange

ORACLE

Volume 15 Number 1 February 2003

Special Edition!

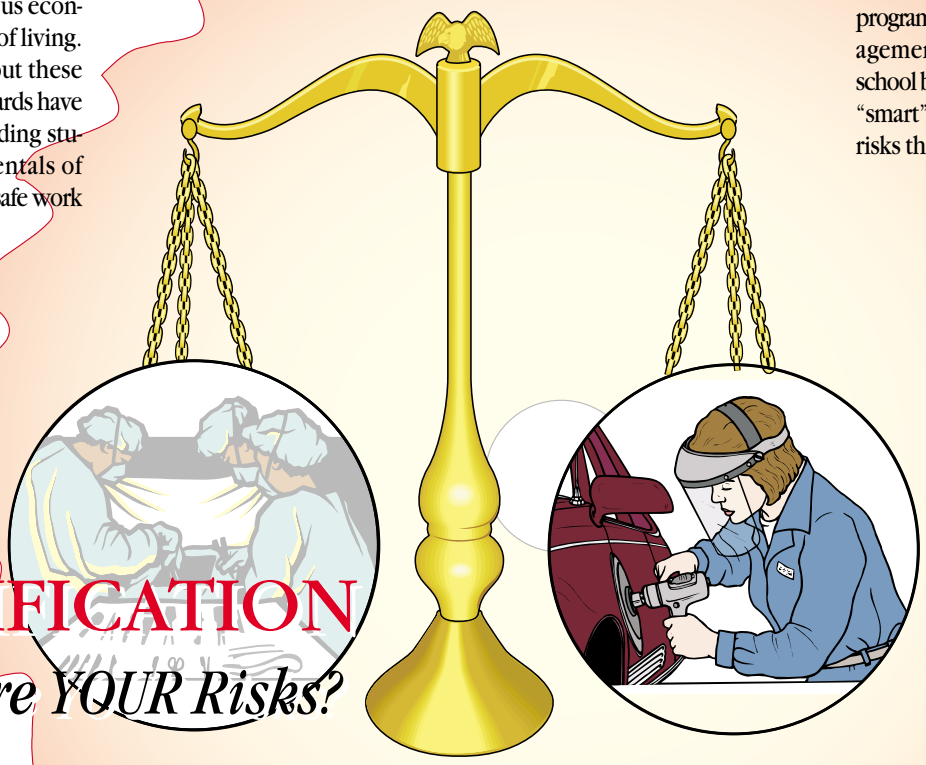
TECHNICAL STUDIES SAFETY

– Balancing Risks versus Benefits

Technical Studies programs have been around in various forms since formal public education was created. Among the many attributes of these programs, developing the technical skills and establishing a foundation for safe work practices has long been seen as beneficial to generate both a prosperous economy and a high standard of living. There is no question about these benefits, or that school boards have a very clear role in providing students with the fundamentals of technological studies and safe work practices, which can then be expanded and applied not only to the back yard workshop, but to the growing need for skilled labor in the modern day workforce, as well.

But with those benefits come risks that must be recognized, understood and addressed. School boards have an obligation to identify the foreseeable risks associated with any school activity, program or curriculum requirement, and to take all reasonable steps to remove or manage those risks. When it comes to injuries, we continue to find that there are very few true "accidents", but there are many poor choices – choices that are the result of a lack of appreciation or understanding of risk.

This special edition of the Oracle is dedicated to increasing the awareness and understanding of the risks associated with Technical Studies programs, to promote good risk management practices and to enable school boards and their staff to make "smart" choices with respect to the risks they must manage.



RISK IDENTIFICATION

– Where are YOUR Risks?

As with any risk management exercise, a good starting point in identifying sources of injuries (your "risks") is to look at incident report and claims data for Technical Studies.

The Technical Studies injury statistics are gruesome – particularly when it comes to wood shop injuries. From 1997 to 2002 more than ***six dozen*** fingers/thumbs were severed in school wood shops insured by OSBIE across Ontario, with many more serious injuries to hands, fingers and eyes. The two most significant observations about these injuries were:

- Most were preventable
- The activities leading to these injuries all fit the "high risk" profile

Preventable Injuries:

Although the scenarios describing the claims and incidents for Technical Studies injuries often cited "user error" or "accidental" as the cause of the injury when a student was operating equipment or machinery, a review of the circumstances usually reveals that the decisions and actions of one or more people were instrumental in causing the injury.

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Risk Identification
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Poor choices, such as removing guards, not following procedures, or not using protective equipment, account for the vast majority of student injuries in Technical Studies programs. These choices may have been made by the instructors, the students themselves, or some combination of both. Whatever the case, the consequences were very gruesome, and very permanent, injuries. But perhaps the biggest tragedy is that, had better, well-informed choices been made about the way risks were managed in these situations, most of these injuries could have been avoided.

Recognizing the High Risk Profile:

In the introduction to this Special Edition of The Oracle, the benefits of school boards providing training in Technical Studies was recognized, and it must be stressed that the discussion is not about whether these programs should be offered. However, what must be recognized is that the activities associated with these programs do fit the profile of a High Risk Activity, and the Duty of Care owed to students in these programs must reflect this level of risk and be effective in removing or reducing the risk of injury.

There are several ways to determine if an activity is high risk – but the two traditional bench marks are frequency (number of occurrences) and severity (cost per occurrence).

Although severity is measured in dollars, it must be kept in mind that it is an indication of how serious the injury was to a student.

High risk activities can be situations where there is:

- *High frequency of injury and high cost per injury;*
- *High frequency of injury, low cost per injury;*
- *Low frequency of injury, high cost per injury;*

As illustrated in *Figure 1*, based on OSBIE Tech Studies claims from 1997-2002, when compared to an average OSBIE injury claim, the cost (severity) of a wood shop injury was twice that of an average injury claim, indicating the seriousness of these type of injuries. With wood shop injuries making up more than 90% of the cost of Technical Studies injuries (Figure 2), and with an average cost per claim more than twice the average OSBIE claim cost, wood shop activities clearly fall into the definition of "High Risk".

When trying to identify and assess risk profiles, it is easy to become detached from the reality of the serious nature of the injuries students suffer – the human element. The spectrum of injuries from Tech Studies ranges from cuts and burns to amputations, disfigurement and physical disabilities that the student must endure for the rest of his/her life. In addition to frequency and severity, the human cost of these types of injuries is also a major factor in measuring the high risk profile of these activities.

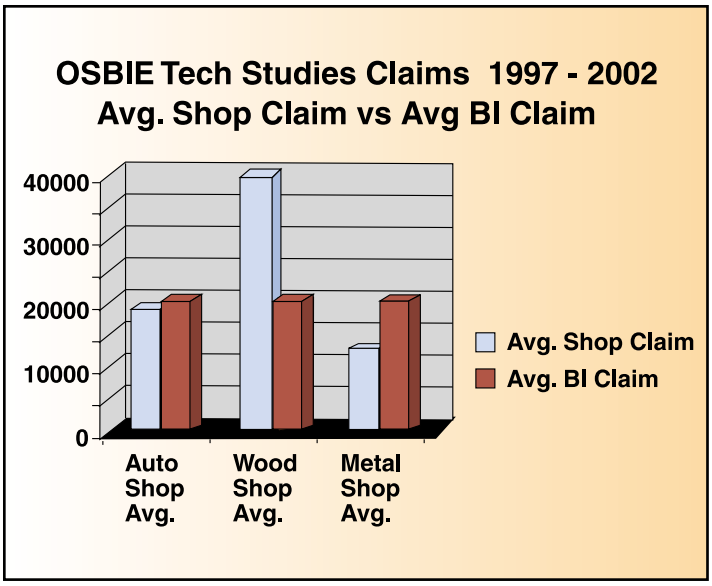


Figure 1

RISK ANALYSIS

It is clear that the inherent high risk nature of Technical Studies programs lies in the combination of inexperienced students operating powerful and dangerous equipment in an environment that challenges a teacher's ability to provide adequate supervision. In such a high risk environment, adequate supervision is extremely important in managing the students' activities to prevent horseplay, unauthorized or unapproved use of equipment, and to provide assistance if students encounter problems.

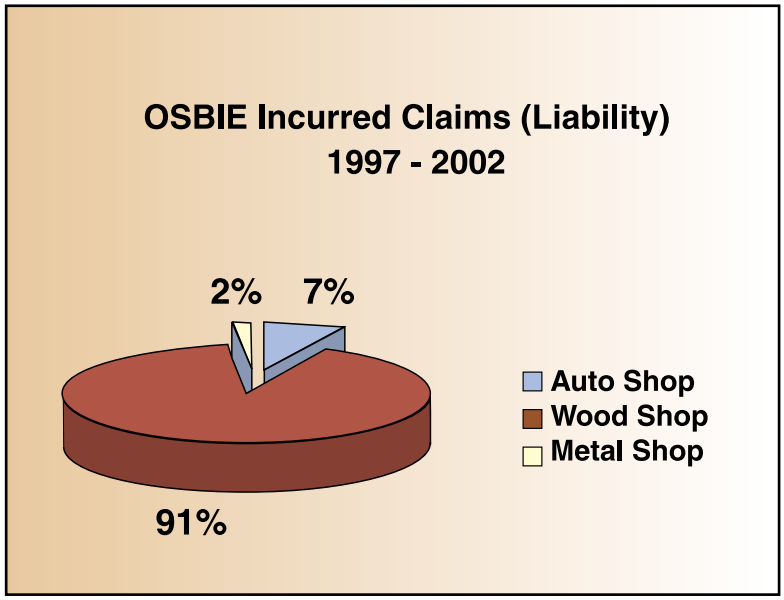


Figure 2

OSBIE Shop Incidents
– *by Type of Equipment*

Figure 3 gives a graphical breakdown of the injury incidents reported for the year 2001 by major category of equipment. Incident reports (as opposed to actual claims) are good predictors of claim potential, and can be very useful in targeting the sources of risk and identifying where risk management programs can be the most effective.

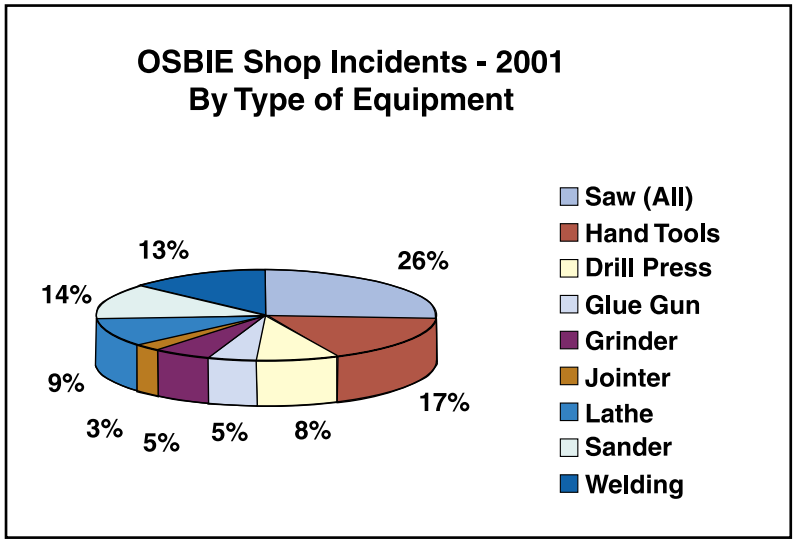
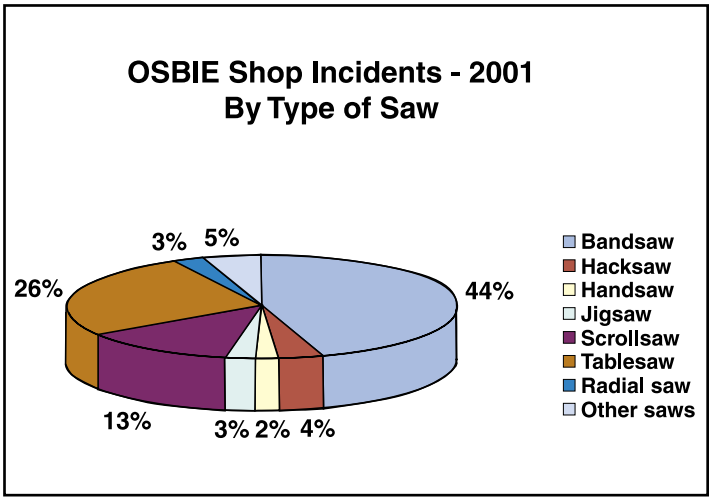


Figure 3

OSBIE Shop Incidents
– *By Type of Saw*

Figure 4



According to Figure 3, about 26% of Tech Shop incidents occurred while students were using some type of saw. Since this represented the highest source of injury incidents, *Figure 4* provides a breakdown of incidents by type of saw – indicating the two most common types of incidents occurred while using band saws (44%) and table saws (26%).

When analyzing sources of risk, consideration must also be given to the combination of high severity, low frequency situations. An analysis of injuries from table saws and jointer/planers demonstrates that the use of these types of equipment are of particular concern.

Although incidents from table saws make up about 7% of the total incidents from Technical Studies, from a claims cost standpoint, table saw injuries made up 50% of wood shop injuries, or $1.9 million for the period 1997-2002 (figures exclude adjusting and legal defense costs).

Injury incidents from the jointer/planer made up an even smaller portion of the Tech Shop incidents – only 3%, but the claims costs for injuries from this equipment account for 30% of the claims payments for wood shop injuries, or $1.1 million for the period 1997-2002 (figures exclude adjusting and legal defense costs). This over- representation of injury costs in comparison to the relatively low frequency is explained by the fact that the mechanical actions of the equipment itself causes such damage to fingers and hands that re-attachment or restorative surgery is often not possible, as compared to those injuries caused by the table saw.

These statistics show that table saws and jointer/planers are very efficient at producing serious injuries that result in law suits. User error (such as not using proper, approved push sticks) and missing machine guards were the two leading explanations for the injuries on these two pieces of equipment.

RISK MANAGEMENT STRATEGIES

From the statistics and the known risk profile of Technical Studies programs, we can begin to determine which risk management strategies can be applied to these situations.

The three main strategies that can be applied to Technical Studies programs are:

Avoidance:

Simply stated - if an activity does not take place, then injuries can not occur from that activity.

Since the preceding risk identification process identified table saws and jointer/planers as high risk, applying this strategy to table saws and jointer/planers in wood shop, risk avoidance may take the form of having the instructor perform difficult cuts, or having students use alternative methods or tools that avoid the need to use this dangerous equipment. It can also take the form of locking out any piece of equipment that has missing or defective guards or any other mechanical defect until it is properly repaired.

Risk Control:

This strategy is also known as "Loss Prevention" and can involve a series of different steps that, if followed properly, will act to minimize or manage the risks of injury. Examples of this strategy as it relates to a Tech Studies program include, but are not limited to the following:

- ✔ *Define general shop safety rules for all students to follow during Tech Shop classes – have each student sign a Shop Safety Agreement whereby they acknowledge they are aware of these rules and that they will follow them. Review periodically.*
- ✔ *Define safety rules for each piece of equipment – e.g. use of safety goggles, push sticks, machine guards in place at all times, use of proper safety gloves/equipment etc.*
- ✔ *Provide training for users about safety rules. Document student attendance to ensure all students were present for these lessons.*
- ✔ *Review safety rules periodically.*
- ✔ *Test users and document results – issue "certificates" to validate satisfactory completion of safety training for each piece of equipment.*
- ✔ *Demonstrate correct techniques on how to use each machine – document student attendance to ensure no student has missed this aspect of the training.*
- ✔ *Supervise students carefully at all times.*
- ✔ *Difficult or unusual cuts or procedures should be performed by a skilled instructor.*
- ✔ *Post safety signage*
- ✔ *Install emergency "STOP" buttons on all machines*

Four fingers required partial amputation when this student used an improper push stick while operating a jointer/planer.

Loss Reduction:

This strategy essentially translates into having an emergency procedure if, in spite of the best efforts under the Risk Control strategy, an injury still occurs. It may include, but not be limited to:

- ✔ *First Aid procedures*
- ✔ *Emergency notification procedures, and*
- ✔ *Automatic lock-out procedures for all equipment if an emergency situation occurs.*

Implementation and Monitoring

Combinations of these three strategies in some form may already exist in your school board's policies and procedures. The preceding recommendations should be incorporated into board policies and procedures to help reduce the risk of student injuries. Annual teacher in-servicing should be conducted to provide orientation to new teachers and to reinforce these strategies for experienced staff.

The monitoring process is important in that it ensures the best practices outlined in your board's policies and procedures are being followed. The following documentation can be used to monitor compliance with board polices and procedures on Tech Studies programs:

- ✔ *Copies of signed Shop Safety Agreements should be retained by the teacher or school administration for each student;*
- ✔ *Copies of completed Safety Certificates issued for each machine should be retained by the teacher or school administration for each student;*
- ✔ *Student attendance records should be cross checked with lesson plans to ensure students were in attendance during safety training lessons, and to document students who were not in attendance and/or received subsequent training.*

AUTO SHOPS

Although the dramatic injuries associated with Wood Shops has attracted most of the interest, many of the recommendations outlined in the preceding risk management steps are applicable to Auto Shops as well.

There is, however a major difference in the risk profile between Wood Shops and Auto Shops. Although Wood Shop injuries tend to be gruesome and disfiguring, they are usually not life threatening. The major concerns about Auto Shop risks, however, relate more to the life safety aspects resulting from students being struck or pinned by vehicles.

A Coroner's Inquest into the tragic death of a student who was struck by a vehicle being moved during an Auto Shop class illustrates the exposure facing students, and the recommendations provided by the Jury have set safety standards for school auto shops across Ontario.

The following is a summary of the Coroner's Jury Recommendations:

Auto Shop Safety Recommendations

1. Limited Class Size (automotive)

a) recommend only 20 students per qualified teacher

b) non-automotive students should not be present in the shop area.

2. Teacher has sole authority to dispense keys. Keys are to be kept in a locked, unbreakable plexiglass cabinet.

3. We recommend further study of protective barriers, such as concrete-filled steel posts to be incorporated into work areas.

4. Moving Vehicles

a) Before moving vehicle, area is to be swept clean of students and equipment.

b) Vehicle is to be moved only by instructor or insured vehicle owner with spotter present.

c) It is strongly recommended this be done outside of class time.

5. Warning Devices

a) When a vehicle is being moved in or out of the shop, audio and visual warning devices should be activated inside and outside shop area.

b) Steering wheel cover to be placed on car before entering shop area. This will contain moving procedures such as reminder to activate warning devices.

6. Wheel blocks are to be placed on all vehicles being worked on in the shop.

7. Cars are to be assessed by instructor before entering the shop and prior to release to owner. Scope of assessment will be determined by the work performed. We recommend the use of inspection stage checklist be placed on rear view mirror.

8. Safety Issues

a) Board of Education to implement a formal and standard set of safety procedures and dispense to each school.

b) Safety procedures and course outlines to be sent home and returned signed by both parent and student before commencing work in course.

c) Safety procedures to be tested on at beginning of course.

d) Recommend an allotted amount of time to be designated each month to review safety procedures with students.

9. Random safety audits be conducted periodically throughout school year. We suggest that students be involved in a separate in-school inspection.

10. Safety policies and hazard alerts contained in the Occupational Health and Safety Binder are to be reviewed and signed off by shop teachers.

11. A mandatory safety workshop held every two years to update teacher qualifications.

APPLYING WHAT WE HAVE LEARNED

– *Court Case Examples*

Often times hard lessons are learned when Courts rule on injury claims, and Tech Shop injuries are no exception. Occasionally, good practices are rewarded with favorable judgments. Regardless of which way a Court rules, valuable lessons can be learned from these rulings that can be incorporated into a school board's policies and procedures. If followed, fewer injuries should occur. If injuries still occur, having followed policies and procedures that were based on Court rulings can assist in the defense of the claim.

Court Ruling #1 - Jury Rulings Provide Direction on School Board's Duties

In two separate but similar cases involving student injuries while using a push stick to push a piece of wood through a jointer/planer, both Juries provided clear indications of the reasons for arriving at their decisions. Interestingly enough, although similar cases in terms of the equipment and the injury, one jury found the student's inattentiveness to be the major cause of the injury (although still holding the teacher and the school board partly negligent), whereas the second jury found the school board to be 94% negligent, in spite of the student's own admission of not following proper procedure.

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Court Case Examples
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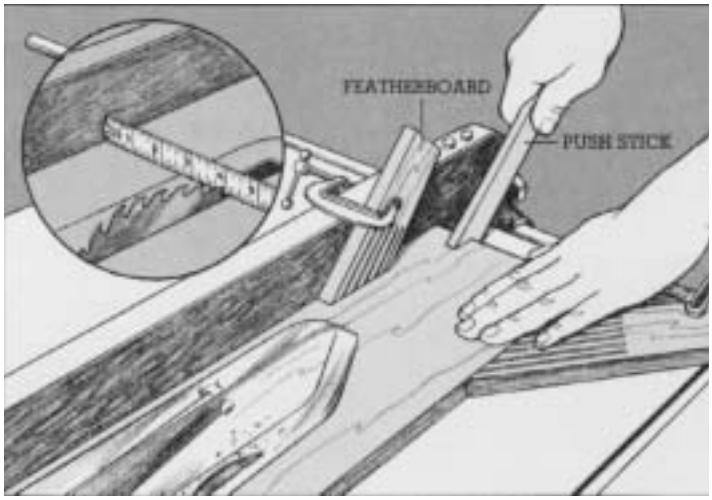
The reasons for judgment were:

The teacher was negligent because (he):

- *Accepted the condition of the equipment, shop lay-out and safety process with no questions asked;*
- *As an employee, the teacher is regarded as an extension of the school board;*

The school board was negligent because:

- *There were insufficient safety reference materials available;*
- *Lesson hand-out materials were poor quality;*
- *No evident changes in workshop safety practice after accident occurred;*
- *School Staff were not given responsibility for making "Safety First";*
- *Push sticks must be approved as a school board device, the same as any machine;*
- *School board needs to approve each shop lay-out;*
- *School board is responsible for hiring qualified instructors;*
- *School board is responsible to ensure equipment is maintained properly;*
- *School board should ensure there is a safety process in place – including testing students on safety rules;*
- *Student projects must be approved by the school board;*



Court Ruling # 2 - Importance of Safety Training Documentation

In this case, a fifteen-year-old student suffered severe injuries to her dominant hand when, during woodworking class, her hand came into contact with the turning blade of a table saw. The student had approximately 40 previous classes in the woodworking shop using various pieces of machinery, including the table saw, which she admitted she had used several times before the accident.

The student sued the teacher and the school board. The student alleged that the teacher had not provided adequate instruction in the use of the table saw, had not adequately trained her in safe procedures, and in general, the teacher was not competent. It was also alleged that the equipment was unsafe, the school board hired an incompetent teacher and the school board failed to supervise the teaching activities.

After a five day trial the jury returned a verdict completely dismissing the actions against both the teacher and the school board.

The evidence showed that the teacher not only emphasized safety on a regular and daily basis, but that he:

- ✔ *Continually supervised the students as they worked with the machinery;*
- ✔ *Kept records of the instructions given to individual students;*
- ✔ *Had students acknowledge by signing forms that they had been trained in the use of various pieces of equipment;*
- ✔ *Never left the classroom while class was in session;*
- ✔ *He ensured the competence of the students in the use of the machinery;*
- ✔ *He promoted safety as the single most important objective in the classroom.*

The school board was successfully defended because the teacher had exercised Due Diligence in following a policy that recognized the risks and the importance of safety, had a procedure in place to ensure the safety steps were followed and had documentation to prove that the system was in use.

SAMPLE SHOP SAFETY AGREEMENT

As a student in this shop, there are a few safety rules you must observe. Rules will be kept to a minimum, but those we do keep are for a definite reason. Knowing the reason for each rule should make it a lot easier to remember and observe that rule.

1. *Students must never enter the shop unless the teacher is present.*
2. *Power equipment must never be operated unless a teacher is in the shop.*
3. *Do not run in the shop.*
4. *"Horseplay" will not be tolerated in the shop.*
5. *Use care and common sense when using any sharp tool – always keep hands and fingers behind the tool's cutting edge.*
6. *Protective equipment, such as (goggles, etc.) MUST be worn when using any power tools, or machines.*
7. *Long hair, loose clothing and jewelry must be restrained or removed.*
8. *Never use any machine until you personally have been given instruction by the teacher about the use of that machine.*
9. *Report any damaged/defective tools or machines to the teacher.*
10. *If you cut or scratch yourself, report it to the teacher and receive treatment.*
11. *Keep benches and floors clean, replace tools as soon as you are finished and place scrap in proper bins.*
12. *When finished with oil or paint soaked rags, dispose of in special safety bins.*
13. *In the event of a school fire drill, or an actual fire in the shop, WALK out quickly and silently.*
14. *Welding goggles and leather aprons must be worn during any welding or forging process.*
15. *Only one operator per machine is permitted.*
16. *Use compressed air with caution – wear eye protection, direct air away from eyes, skin and any opening in the body. Beware of flying particles.*

I, _____ have read this Shop Safety Agreement. I understand and will obey these rules.

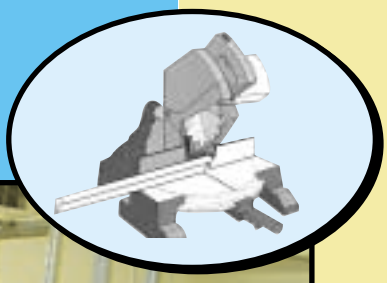
Signature:_____ Date:_____

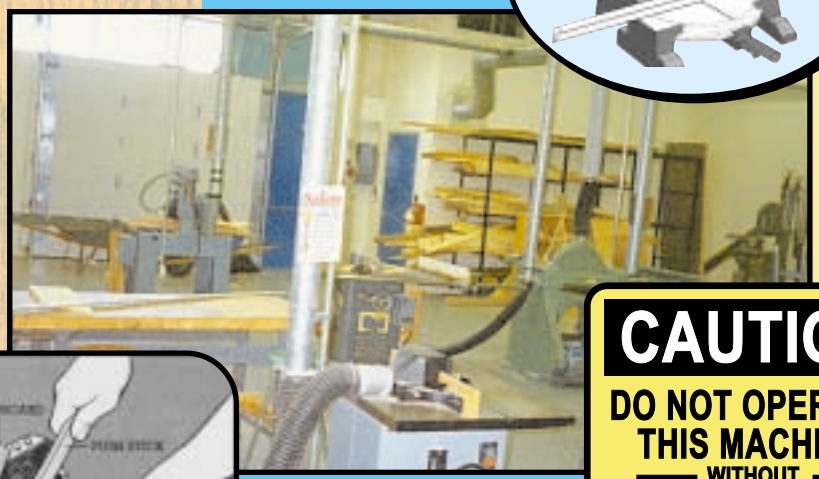
Be on guard against

SHOP INJURIES

Protective Equipment

Machine Guards





Safety Practices

Ontario
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The O.S.B.I.E. Oracle is a publication of:
The Ontario School Boards' Insurance Exchange
91 Westmount Road. Guelph, Ontario N1H 5J2
http://www.osbie.on.ca Editor: David Beal (E.& O.E.)

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