Introduction: Purpose of Pre-Development

This pre-development project has been initiated for the purpose of creating a severe injury avoidance system for use in table saws. The need for pre-development is due to system design that will involve high technology components and concepts. A significant amount of time will be spent brainstorming and researching technologies for solutions. Some trial & error work is expected. Further, in order to insure system reliability, an extensive amount of prototype testing will be necessary. Since this is a safety system, the team will establish tight operating tolerances and require a high level of robustness for the system. The result will be a lengthy and extremely thorough pre-development process.

Lead Execution

The lead execution for this system is the Bosch 4000 table saw. This product was selected for its ability to accept a new, high technology, system with the smallest cost impact. Also, the target market for this saw will see a positive safety benefit from such a device. Further adaptation can be made to other table saws and possibly other benchtop “cutting” type products in the future.

Reason for Development

The necessity to develop such a system is twofold. One, a “contractor-type” table saw manufactured by a competitor is expected to enter the marketplace within the next six months with an active safety system which reacts to human tissue contact with the blade. On contact, the blade can stop within 1/100 of a second minimizing injury to the user. We expect that this competitive technology will migrate to transportable saws (which are competitive to the Bosch 4000) a few months thereafter. This will not only raise the bar of performance in the transportable saw category but will create a new and significant liability concern for our corporation because of this enhanced safety performance.

The benefit to the consumer will be a significant reduction in injury severity due to blade contact. The expectation will be that the most severe injuries will be mild to moderate lacerations and that amputations will be virtually eliminated.

System Function

The anticipated system can be broken into four parts. One, a detection sub-system. Two, a discrimination/processing sub-system. Three, a triggering sub-system. And, four, a reaction sub-system.

The detection sub-system could use a number of different technologies such as capacitive sensing, density sensing, infrared sensing, and optical sensing. The idea is to paint a “virtual” picture of human tissue location in relation to the saw blade.

The discrimination/processing sub-system is the brain. Most likely, this will be a microprocessor circuit which processes the information from the detection sub-system and determines the necessary action. Further, it should perform a self diagnostic sweep of each sub-system to insure proper functionality and continuous calibration.

The triggering sub-system is the bridge from the processor to the reaction sub-system. Most likely, this will be an electronic “firing” circuit to initiate some form of mechanical sequence which is part of the reaction sub-system.
The reaction sub-system shall provide the "interference" function between the human tissue and the rotating blade. Design of this sub-system is virtually boundless in its options. Along with the detection sub-system, this is the area where we can set ourselves apart from competitive products. The reaction sub-system will be a sequence of mechanical events which can initiate through a fusible link or a pyrotechnic ignition. The key to this sub-system is that it must function in milliseconds.

**Target Cost**

The system target cost is approximately a 15-20% cost adder to the end-product. The cost can be fine-tuned once we analyze the build cost of the competitive system and identify the technologies we will use to achieve our performance objectives. This is an extremely rough estimate as we have no experience with mass production of the technologies we will be working with. Our goal is develop a competitive product for the lowest possible cost.

**Schedule**

The project informally kicked-off in April, 2002. We expect to deliver a functional prototype, a preliminary bill of materials, and estimated tooling and manufacturing costs by Quarter 3, 2003. The benchtop group will address final integration into the saw and manufacturing issues.