final report

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Bladestop Stage 2

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Summary of Project Bladestop

Over the past month BladeStop has progressed significantly to a workshop tested state. It has undergone mechanical re-manufacture, partial circuit re-design and extensive testing.

Mechanical
The mechanical re-manufacture involved the installation of two 4kN gas struts to increase the force and speed of the clamping mechanism. A hydraulic pump was required to cock the mechanism and extra strengthening plates and gussets put in place. Significant time was invested into obtaining the correct geometry, sizing, material thickness and strength for the levers to ensure reliable tripping. The increased pressure of the gas struts introduced wearing between the contact surfaces of the levers which degraded the reliability of the mechanism to remain latched during operation and to unlatch when fired. The main lever's body is made from a hardened stavax. To protect the contact surface from wearing a special insert is made from a hardened tool steel. After much design analysis, experimentation and testing, BladeStop has mechanically operated repeatedly for over 150 trips. In addition to this, the automatic re-cocking of the mechanism was another design issue overcome with the use of a larger die spring and engaging surfaces. The slip of the blade through the clamping jaws has been reduced to ensure minimal damage to the operator's finger. Other mechanical modifications made to the saw involved the manufacture of the rear cover, mounting of a VSD and sensor, operator arm guard, pump safety bypass, waterproofing of the system, clamping block guard and general strengthening of the saw frame.

We are looking to improve the current trigger system. While the mechanism has been shown to work for 150 trips, in practicality the trigger would need to be replaced every few months due to wearing. This increases the cost and maintenance of the machine and is undesirable. During development of the trigger arrangement it was found that the system would fail (either by failing to latch when cocking or failing to unlatch when fired) if not precisely calibrated. As a result, MAR has sought the design expertise of a precision trigger manufacturer based in the US. Initial communication with the supplier has revealed confidence in being able to achieve 3000 trips before failure. Preliminary estimates would see manufacture and delivery of a prototype trigger mechanism in two-three weeks, and another two-three weeks required to modify, install and test the system. This projects a site ready band saw at the start of November (see milestone summary below).

Electrical
The electrics largely remained the same. The main changes were made to the switching circuit due to the increase in voltage on the coil. The coil's voltage was increased from 48v to 96v, and required more powerful switching MOSFETs. The change required some re-design and the addition of another power supply in the bottom electrics box. Additionally, the onboard self-checking of the high voltage across the coil needs to be adjusted to suit. Electrically the system has also been made more robust with extra connectors and tougher mounting to protect against vibration or shock when the mechanism is triggered. A software update is being developed to ensure the saw is tested once each day before it is used in operation.

Due to the changes in the mechanism design, another proximity sensor shall be added to ensure that the operator cannot run the saw without having the mechanism fully cocked. The location of the board in the top box shall also be moved below the saw table to protect the electronics from the shock caused by the clamping blocks.

Testing
Extensive testing has been conducted on BladeStop. Over 30 sausage tests were conducted to ensure minimal damage to the finger. The blade comes to a halt within 11ms from the detection of the operator's touch. At a reasonable pace, the sausage received a cut 5mm deep or less, see figure 1 below. In slower movements, cuts as shallow as 1-2mm were achieved.

As previously stated, the saw was fully run in operation and tripped over 150 times to ensure mechanical and electrical repeatability.

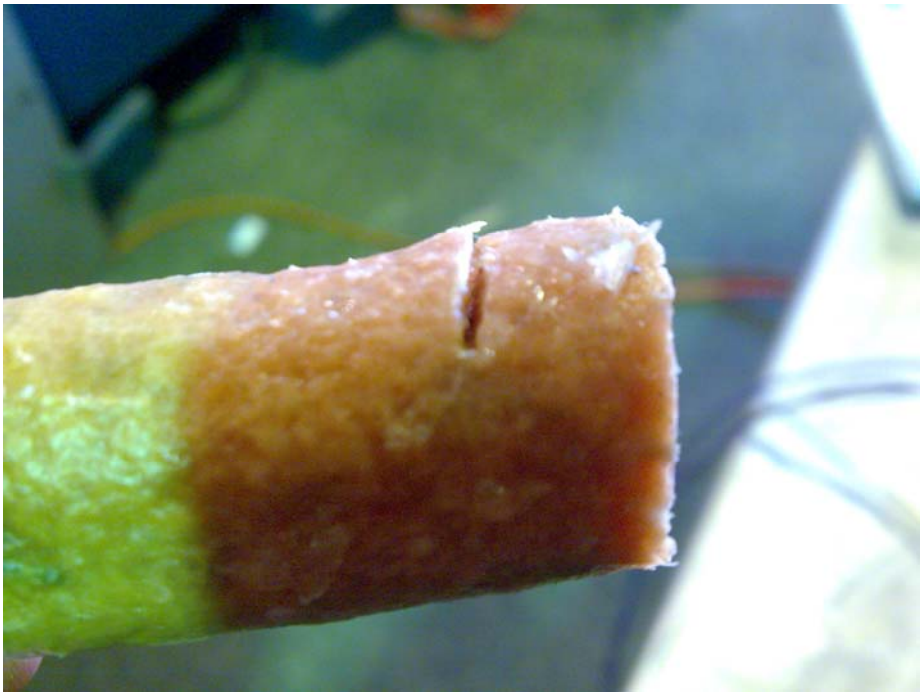

Figure 1. Sausage test result, 4mm deep cut

Project Progression Summary

No.	Description	Scheduled Start Date	Scheduled End Date	Status
	Progress Stage – Mechanical Trigger			
	Design and manufacture of trigger mechanism	15/09/08	03/10/08	Underway
	Delivery of mechanism	03/10/08	10/10/08	
	Progress Stage – Complete Software			
	Develop daily trip test	19/09/08	22/09/08	Underway
	Progress Stage – Electrical			
	HV fault and coil missing checks	19/09/08	22/09/08	Underway
	Software daily test and prox sensor update	19/09/08	22/09/08	Underway
	Wire up proximity sensor	23/09/08	23/09/08	
	Move PCB to below saw table	24/09/08	26/09/08	
	Progress Stage – Integrate Trigger Mechanism			
	Integrate and fit mechanism to saw	13/1008	17/10/08	
	Progress Stage – System Testing			
	Reliability Testing	20/10/08	10/11/08	
	Trip Speed Testing	20/10/08	10/11/08	
	Sausage Tests	20/10/08	10/11/08	
	Progress Stage – Onsite Install			
	Band saw Install	17/11/08	21/11/08	

MAR PROJECT TEAM

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ATTACHMENTS

Attachment Number	Description

QUESTIONS / FEEDBACK

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CUSTOMER FEEDBACK

Name	Comment / Feed Back