Phonon Ultrasonic Bonder

ECE 290 – Fall 2005

Project Statement

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Statement of Need:

Engineers have been selected to improve the precision of an ultrasonic bonder. Currently Phonon uses bonding machines that are decades old to connect circuits by bonding metal strips. Although the machines are working as well as the day they were built, the procedure of bonding in use requires a standard type of routine calibration. Phonon uses a Mech EL 907 wire bonder to bond strips of metal to chips that are adhered by silicon base glue to a kovar case. Because silicon absorbs pressure, the current procedure of applying pressure to the bond site causes the silicon to temporarily deform and cause an uneven and inconsistent bond. The parameters of the waveguide and foot are also quite sensitive and critical to the outcome of each bond. The engineer's objective is to provide Phonon with a low cost diagnostic procedure to optimize wire bonding by the machine. If time permits, we will adapt our method to multiple types of waveguide foot patterns and metals.

Preliminary Requirements:

The diagnostic procedure must utilize a method of sensing environmental signals. The data will be acquired by a type of acquisition board and then relayed to the computer for interpretation. The computer interface should produce a visual representation of the interpreted data. The calibration system must help the operators in setting up the bonder.

Basic Limitations:

The procedure is limited to the use of and modification of the Mech EL 907 wire bonding station. The modification unit must be portable to individually calibrate multiple wire bonding machines. The data acquisition board must have sufficient input resolution to collect multiple signals of different forms. The tools used for calibration should not interfere with the functions and use of the bonding machine once they are removed. Phonon must approve of all expenditures and will provide all materials and necessary support. Written software must be in a modern programming language.

Other Data:

The wire bonding machine uses 60kHz to bond metals.

Questions:

Does the ferroelectric ceramic sensing transducer have data/signal feedback?
What is the required pressure needed to make a wire bond on the chip?
Does our code have to be submitted to Phonon or just the application?
Can the data acquisition board be upgraded for greater resolution or more inputs without modification of the code?
To what accuracy do our measurements need to be?