

Technical BIO of Mr. David Kelly

Main Accomplishments Academic:

I graduated 1980 with BSc in Honours Physics, University of Waterloo, Ontario, Canada.

Undergraduate project:

I was the first person in North America to produce a solar cell by doping the silicon during the deposition process using an RF sputtering system. I repaired the RF sputtering station and conducted a number of experiments before attempting the construction of a solar cell and various Schottky barrier diode structures.

High School:

In 1974 while in grade 11, I programmed an IBM 1130 computer to play checkers against an opponent. The computers at this time period used computer punch cards for data entry. Most modern appliances that use a microprocessor have more computing power than this computer had. However no desk top has the classic atmosphere that a machine of this period had. The program used look ahead, 2 levels with weighting to determine the best move. [Currently, it is my opinion that digital and memory technology is now approaching the density required to create a true AI. This type of AI would use an inter-relational processing as the core of its processing, much more efficient than parallel linear processing. The inter-relational processing would be capable of providing the various ego aspects required for a true interactive AI.]

Industrial Experience, Latest First:

Invented a new capacitor fabrication technology and structure. It involves a number of technical firsts such as self-healing multi-layer ceramic capacitor and a self-healing capacitor that can use as its dielectric ceramic polymer or polymer materials with poor to no mechanical strength. Furthermore, the self-healing electrodes are compatible with high impulse currents. Another important technical development is the use of dielectric enhancement of ceramic polymer or polymer blends in such a way that the dielectric constants in many circumstances can be increased up to 13 times their unenhanced value. Yet another important development is the scavenger electrode that is able to absorb free radicals that are released over the life of the capacitor, allowing the use of less expensive polymers. Invented a new transfer printing process that can print metal layers (used to apply the electrode layer) a few nanometers thick on the capacitor dielectric or other surfaces. Metal of this thickness is partly optically transparent and the fabrication process is easily automated. The research into dielectrics for the new capacitor construction is expected eventually achieve the same energy density as current battery technology. The project involved 4,000 man hours and review and generation of about 4 feet of paper work.

Worked with Donna Lee Kelly to co-develop the “Strict But Fair” Solution For Companies. The product is the first comprehensive solution for Workplace Presenteeism that has a pending WIPO patent. It is a 100% sociological/psychological based solution

that is implemented and enforced with minimal management involvement. It resolves the sources of stress and anger within the workplace and home environment that leads to low productivity and the inability to get a proper nights rest. It is about choice and allows the worker to choose the method to use in compliance with the requirement to come to work prepared to give 100% through the whole work day.

Invented the most advanced bi-direction high voltage AC or DC to low voltage AC or DC converter. It is designed for input voltages over 30,000 volts DC with any low voltage output i.e. 10 volts. The converter has very high efficiency and many different operating modes for example a 1kW converter with no load power consumption less than 0.5 watt. This converter is well suited for use as an electronic distribution transformer or universal distribution transformer able to be connected to a wide range of DC or AC voltages.

I developed a high power modulator for a well known US military contractor. Their team of 3 engineers after 1 1/2 years could not get their modulator switch module to work without failing. I designed the replacement modulator 2,500Volt, 250 amp (design is 400 amp capable), switch time less than 50ns, with protection against any type of short circuit, conduction cooled and fit the target size required by customer. This was the first prototype that worked without problems. The project developed a new modulator driver with over-PRF, PRF-limit and over-current protection. The modulator was designed for a new airborne radar system. The project was completed with less than 6 man weeks of work compared to the 150 weeks the customer's engineers had spent without results of any form.

Conducted theoretic work into methods to increase ion density by up to 1,000 times in steam driven thermal hydrodynamic converters as an alternative for the steam turbine in the WOODGEN (see below). The process has yet to be physically constructed although it has promise for direct conversion from steam to electric power. The increased ion density would dramatically decrease the size of the converter to a more practical size.

Developed the WOODGEN wood fired co-generator, still at proto-type stage. It is basically a wood fired steam power plant that fits in the back of a pickup truck that is fully automated -just light and walk away! The steam turbine was a single stage, self-aligning, axial inflow made from precision cut sheet metal. The turbine required minimal balancing, and the first turbine prototype was tested without balancing. The brushless alternator was designed for low cost manufacture. The flash power boiler used less than 10 square feet of heating surface to generate over 200lbs of steam per hour at 150psi. The system was designed for long life maintenance free operation. The system was designed to start using a small 12 volt, 20amp hour battery and survive freeze ups.

Designed the first and one of the simplest power converters with electronic power factor correction that required only a standard switch mode regulator IC and one switch transistor. The size and cost is less than conventional approaches.

Developed for a DAB Transmitter application an advanced high voltage power supply technology. It used poly-phase switching 13 years before it became a commonly used technology. The power supply radiated noise was pink meaning it did not have a single tone component. The proto-type 18Kw 12kV power converter at full power with the covers removed, did not radiate enough noise to interfere with a transistor radio placed on top of the power converter section. The power supply had redundant modules with an equivalent switching frequency of 720kHz. The power supply technology is still

one of the most advanced technology, 14 years after it was designed. The stored energy in the output section was less than 8 Joules, which is extremely low for an 18 kW output.

Created one of the most advanced 900W TWT power supplies operating at a switching frequency of 100kHz. Ultra low energy storage (less than 2J) meant it was the only power supply that was capable of operating a high power mm TWT without a high voltage disconnect switch for the Anode.

I worked on a number of radar transmitters used for various Military research programs.

Developed a high speed modulator for high power pulsed EIK and EIA mm microwave tubes. The modulator was isolated to 30kV, and capable of switching 3,500 volts at PRF's to 100kHz with rise and fall times of less than 70ns. The modulator was part of a radar transmitter designed for high altitude airborne research applications. The transmitter could be synchronized to an external clock to reduce radar noise created by the power supply.

Constructed a high voltage CW EIK or EIA power supply using the LVI (Linear Variable Inductor) as the control element. The CW power supply had external control and monitoring and the ability to externally modulate the beam voltage and synchronize the main internal switching to an external frequency. The power converter was designed for operation from -50 through 60 Celsius, all high voltage sections were hermetically sealed. Outdoor operation was possible when the power supply was placed in an enclosure to protect it against precipitation.

Invented a 30kV active load for test of high voltage power supplies.

Fixed a number of power supplies where existing Engineering had been unable to find the fault. In all cases it was found that 99.9% of the design was correct and the problem was usually fixed by the addition of 2 to 3 passive components.

Rebuilt a new pulse magnetizer after it blew up a number of times. The 6 control logic boards were removed and replaced with 4 miniature control relays. The unit worked exactly as before but no longer failed, (typically failures involved the literal exploding of the 1,000 amp external current connectors from its chassis).

Developed an automated Klystron bake out and exhaust station. The processing equipment was fully automated including the controlled activation of the cathode. The station was automated using two programmable controllers.

Rebuilt and reviewed all manufacturing equipment, used by the company I was working for, used in the manufacture of TWT and Klystrons microwave power tubes, both. Over a 4 year period the reliability was dramatically increased such that the amount of maintenance staff for the electronics support was decreased by 50%.

Set up a Limited partnership for exploration for oil in South Western Ontario. We were the first company to use synthetic imaging of subsurface electric conductivity to identify potential geological traps. Designed a drilling program for three Silurian and two Devonian wells that resulted in a successful oil well producing for a number of years. The drop in oil prices by 65% made further exploration uneconomical. I was responsible for the operation of the oil well, the setting up the surface tanks and management of the partnership. I successfully conducted an Ontario Energy Board hearing to get permission for the well stimulation program.

Researched and developed a magnetic profile for a TWT that had excellent ability to align the beam so focus was not sensitive to external magnetic fields. The special

magnetic field profile prevented the possibility of focusing instabilities and resulted in a longer product life.

Fixed the grid burn out problem with the VA98 reflex klystron and increased first time process yields for reflex klystrons under my responsibility to better than 90%.

Designed a very high accuracy potential transformer with magnitude and phase error less than +/-5ppm at 47-65 Hz. Additionally, a current transformer with less than +/- 5ppm magnitude and phase error over the range of 47-65 Hz was developed. Both transformers would operate at frequencies over 1kHz.

Improved the accuracy of a thermal transfer standard to better than 5pp with resolution greater than 0.5ppm at full scale. The operating voltage was increased to 1,200Volts. A simple fix was developed for a systematic error in the thermal transfer standard, that under certain conditions could generate excessive noise.

I designed for a high precision thermal wattmeter a power supply that was capable of protecting the operating equipment from an indirect lightening strike and flash-over that can occur when testing very high voltage power transformers (>100kVac).

My main strengths is the ability to quickly move any field of technology I get involved with to of the art or the next generation. I am very gifted at identifying and fixing the bugs in an existing product quickly and inexpensively. I have acute attention to detail such that the final designs are reliable and robust. I believe in the engineering principal of KISS (Keep It Simple Stupid).

Special Note:

I have had many break in but I do not keep notes of projects that are not active. Sorry nothing of interest to find. I do all my creative design work in my head to near completion before committing them to paper.

I can be contacted through either websites www.1-LTL.com or www.stonepathpower.com

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