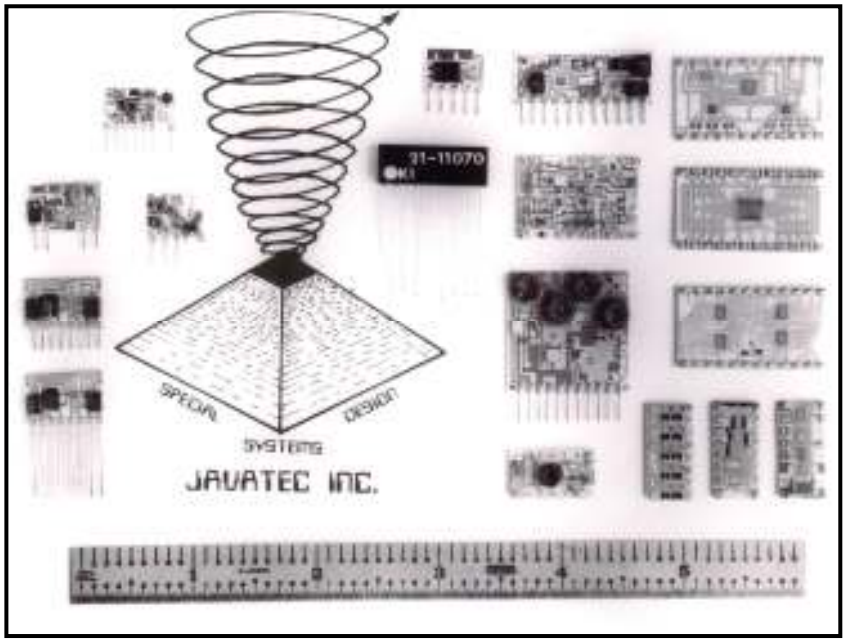
JAVATEC, INC. HISTORY – Page 1.

JAVATEC, INC. was established in early 1971 to support the highly specialized requirements for Test Systems for the newly established industry of "Chip & Wire" Thick Film Hybrid Modules. Unlike previous Thick Film Modules that used miniature packaged circuits and components that were then soldered to a Silk Screened Ceramic Substrate, this new approach employed the Eutectic Bonding of Integrated Circuits, Transistors and Diodes to a Ceramic Substrate that had gold conductor paths and various value Resistor pastes Silk Screened upon it. Each Solid State component was then "Wire Bonded" to the gold on the Ceramic Substrate.

Because these Modules were so "Custom" in the functions they performed, Test Systems had to be Conceived, Designed, Fabricated and Implemented to verify that all the functions of these Modules were performing correctly. The photo below is a very small sampling of some of the Thick Film Hybrids that required these special Testers.



Some of these Ceramic Substrates had hole patterns along the edges where pins were inserted and soldered to the Substrate. They conformed to standard 14, 16 and 24 pin configurations, (**Observe the completed units on the right hand side of the photo.**), making them somewhat easier to test because of the availability of Zero Insertion Force (ZIF) test sockets at that point in time.

However, the ability to be able to test all the parameters and functions on these numerous amounts of uniquely different Modules was a significant challenge, to which Javatec performed admirably.

Between 1971 and up until 1980 Javatec was involved with a high volume offshore production facility in Port-au-Prince, Haiti that was manufacturing components for the Telephone Industry (**DTMF Touch Tone Keypads**) and Quad Core Memory Drivers (**15,000 per week**) for the computer industry prior to the introduction of "Solid State Memory". These Test Systems that Javatec Designed & Fabricated required a high daily throughput in order to meet the production requirements of the Stateside Companies for whom these products were being produced. Again, we met the challenge of being able to produce Test Systems that were rugged, VERY reliable and extremely easy and fast for the Test Operator to use because of the **GO-NO GO** method of testing that was employed.

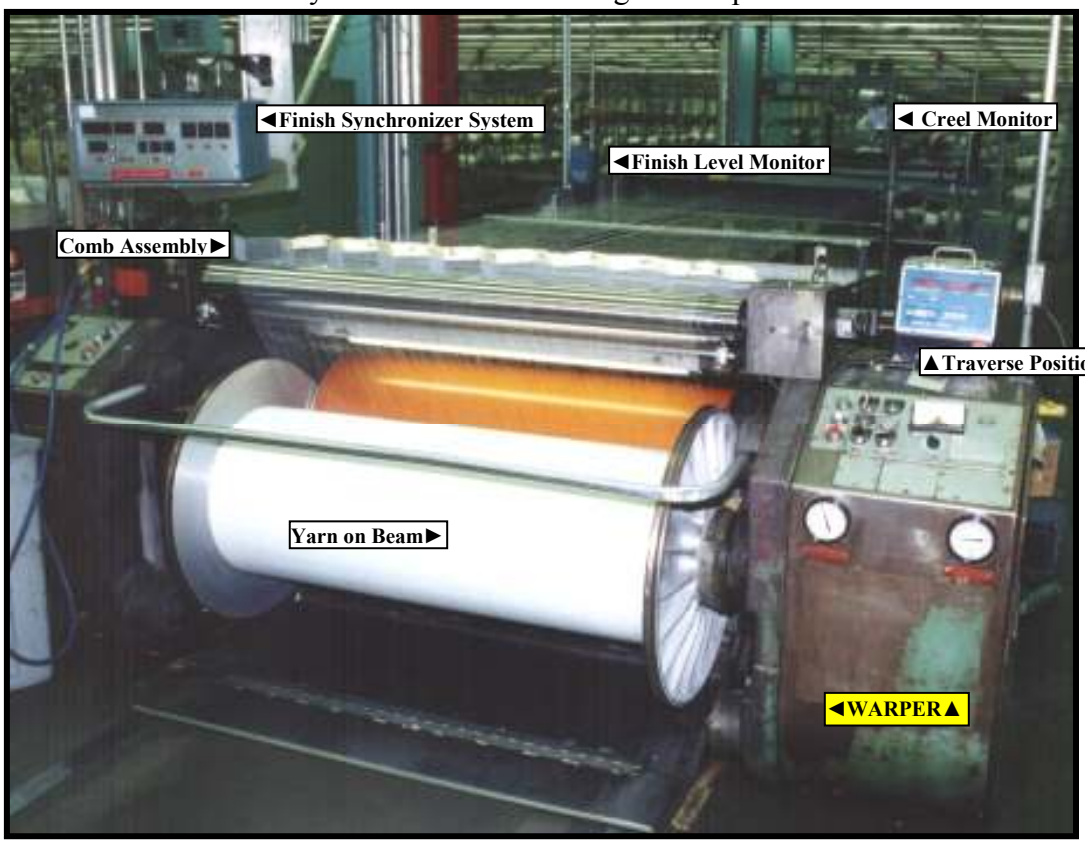
Semi-Automated Tester for DTMF Keypads►

JAVATEC, INC. HISTORY –Page 2.

In 1980, Javatec became involved with a large Polyester Yarn manufacturer in NC that required a system to be designed that would allow them to apply a special "Finish" to the yarn as it was being "beamed". The challenge was that they required it to be synchronized throughout the full speed range (**0 to 1,000 yards per minute**) of the machine (**Warper**) that was winding many thread lines of yarn on a large spool (**Beam**). See photo below.

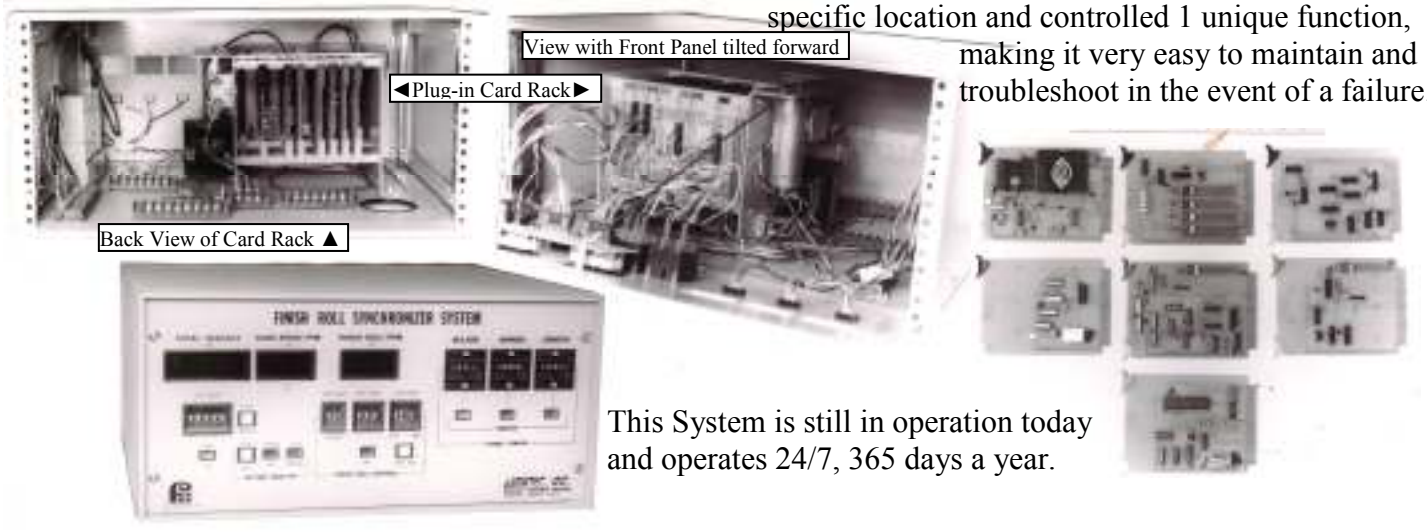
Javatec now entered into the field of "Turn-Key" Monitoring & Control Systems. We not only Designed and Fabricated this System, but we installed it, wrote a very comprehensive Operation & Maintenance Manual and instructed and trained their Operators and Maintenance Technicians on how to use and maintain this System.

This initial System proved to be **so** beneficial to their operation; we were given a contract to install this Synchronized Finish Roll System on their remaining 37 Warpers in 1981.



▼INSIDE THE FINISH ROLL SCHRONIZER SYSTEM▼

Shown to the right below are the original 7-Control cards designed for this system. Each card plugged into a specific location and controlled 1 unique function, making it very easy to maintain and troubleshoot in the event of a failure.



This System is still in operation today and operates 24/7, 365 days a year.

JAVATEC, INC. HISTORY – Page 3.

It would appear that the mid 80's were our busiest years, as were asked to look into the problems that were having trying to keep a mechanical "Cam" system in adjustment during the manufacturing of a Beam of Yarn. I was very difficult to adjust it this initially, as it usually required a Shift Mechanic when they had to make changes to this parameter. Once it was adjusted, it had a tendency to work its way loose after making just one or 2 Beams and they continued to experience significant "Down Time" and losing precious production output.

Taking into account all the parameters of all of the various Beams that were produced, Javatec devised a very unique Programmable Digital Positioning System that employed the same Digital Stepper Motor that was used on the Finish Roll Synchronizer System. The "Traverse Positioning System" took the place of the old (badly worn) mechanical cam system and had programmable features that had not been seen until this point in time for controlling the "Comb" assembly that laid the Thread Lines of Yarn evenly on the Beam

The Traverse Positioning System (TPS) accomplished this feat by accurately spinning the Nut of a precision Ball Screw assembly with the Stepper Motor. The end of the Ball Screw was machined to precision diameter and length and would extend on the outside of the enclosure. See Photo below.

All of the Control Electronics, Stepper Motor, Mechanical Drive Components and Power Supplies were contained in a 10x10x10 Enclosure as shown above and the "Heart of the system was a Microprocessor.

The Output Shaft had a total travel length of 3.500 inches and the Traverse Stroke, adjusted by the PRESET, was a maximum of 1.500 inches within this 3.500 length. This value could be changed rapidly during Setup to a specific value of 3 decimal places **(0.000)** when the Warper was stopped by pressing the Membrane Switches on the control panel, allowing the Operator "Precise" control of the Left & Right Traverse of the Comb assembly. This value could be changed (up or down) in 0.001 increments "On the Fly" for precise control.

This Traverse System improved the quality of the end product **SO** significantly, that again we were awarded a contract to install these units on every one of their machines, plus several spares.

JAVATEC, INC. HISTORY – Page 4.

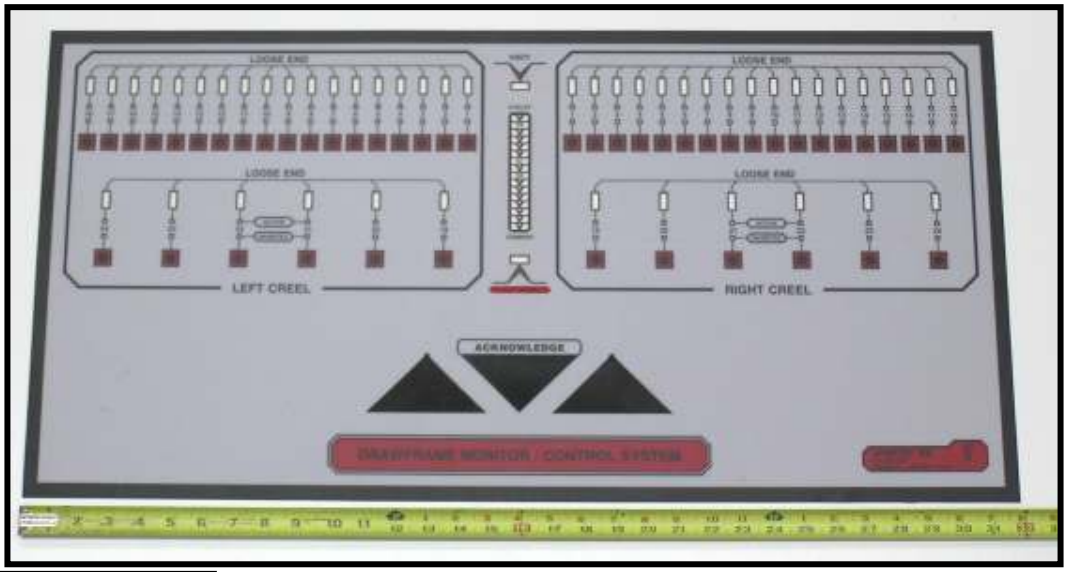
When IBM© introduced the **P**ersonal **C**omputer in 1981, Javatec soon after, realized an opportunity to expand our domain by incorporating these **PC**'s into our Monitoring and Control Systems. However, manufacturers of Input/Output control cards that would plug directly into the **PC** where not yet available to any significance and didn't begin to appear on the market until a few years later.

In 1985 Javatec seized this opportunity and designed a large Yarn Monitoring System that would use a **PC** to communicate between 14 groups of 7-Microprocessors that were monitoring a "Drawframe" operation. This was a very elaborate System that would individually generate Shift Reports, Creel Reports, Utilization of individual Drawframes (28 total) and overall performance for the entire Drawframe area via the IBM© **PC**. The individual Microprocessor portion that was monitoring each individual Drawframe, would detect broken Tow Bands via an Infrared Motion Detector designed and manufactured by Javatec. It would also detect Tight Edges via a Laser Diode sub-system that was again designed and fabricated by Javatec. This System had the capability of detecting 48 Tow Bands simultaneously as the individual Tow Bands were being pulled through our custom designed Eyelet Board, where the Infrared Motion Detectors resided.

Due to the immense size of this project as compared to <u>any</u> previous projects, we still managed to have the first bay of 2 Drawframes operational within 10 months of the receipt of the Purchase Order. There was a **<u>significant</u>** amount of custom programming involved for all the Microprocessors (98), the **PC** and the communications between them via RS-485.

This was the largest System Javatec had ever designed and installed and the documentation that accompanied it was substantial, to say the least. All 28 Drawframes were operational within a 17-month period from the onset.

Control and Feedback & Fault Indication of 48 Tow Band positions



16 x 32-inch Membrane Switch Panel

◄Remote-Operator Input Panel
24 - STOP REASON Codes
10 x 16-inch Membrane Switch Panel, controlled by a Microprocessor

InfraRed Motion Amplifier / Detector (IRMAD) ►
28 active Drawframes x 48 Sensors = 1344 Sensors in continuous operation., with an extremely LOW failure rate, most of which was due to dirty contacts on the mating connector.

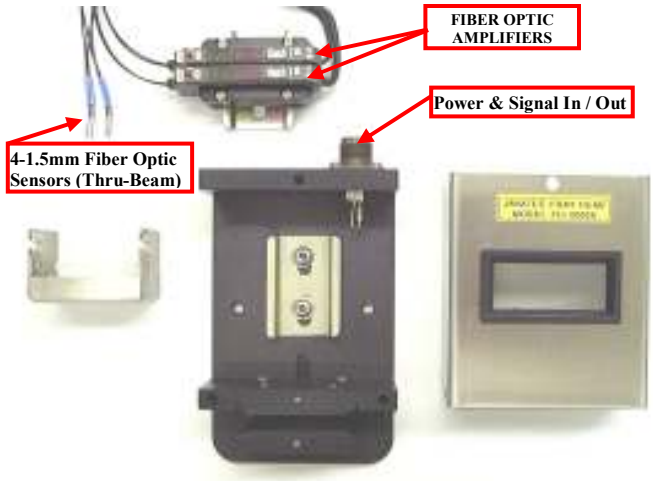
JAVATEC, INC. HISTORY – Page 5.

As more and more "3rd party" sources became available with more sophisticated cards that would interface directly with the **PC's**, Javatec began to "embed" the **PC** within the structure of the Test System and use a "Mouse" or a "Touch Screen" Monitor exclusively to input all data into the **PC**.

The first example of this was in 1987 when we designed and built a large mechanical system called a Fray Tester that would pull yarn from a bobbin and accurately measure a 500-foot sample and detect any broken filaments (**called Frays**) within that length. The operator would use the mouse to select the "Lot Number" of the yarn from a list on the Monitor. That specific Lot Number would generate "Limits" and if these limits were exceeded, the PC would communicate to the Control Area where the yarn was being made and they would make the required adjustment, based on which Limit was exceeded. This was a "State-of-the-Art" System at the time of its implementation and saved this Yarn Manufacturer hundreds of thousands of dollars annually in "down graded" Yarn, generating an almost immediate payback. They are still in operation and will be until all of their current Yarn Spinning Machines are implemented with new high speed "On-Line" Fray Detectors.

In 2000, Javatec redesigned the Fray Detector Head assembly in the Fray Tester that was originally conceived and manufactured in 1987 from an Analog device, using Photo Diodes and a significant amount of external circuitry to a State-of-the-Art Digital device using Fiber Optics.

TOP EXPLODED VIEW – FRAY HEAD



Keyence Corporation of Japan manufactures these Amplifiers and Fiber Optic Cables. Javatec designed a special housing to mount the 2 Amplifiers shown at the left and the 1.5mm Fiber Optic Sensors that plugged into each Amplifier and sensed the broken filament ±2.0mm from the centerline of the yarn path as it was passing thru the field of view of each Sensor. One broken filament that was 1.0 denier in size would cause the value that is shown in **RED** to drop approximately 50 counts, causing the "threshold" value shown in **GREEN** to output a pulse when this occurred. Typically before and any testing occurred, the Test Operator would read the value in **RED** and adjust the Threshold value in **GREEN** to be 20-25 less.

By changing to this new Fray Head Design, we increased the accuracy and reliability of this system by an order of magnitude, as we now had a Fray Head that could be calibrated with precision. These new Fray Heads have operated flawlessly in NC, Turkey and Mexico since they replaced the old Analog Fray Heads in early 2001.

JAVATEC, INC. HISTORY – Page 6.

In 1988 we developed a precision Programmable Yarn Twister that would twist the yarn a given number of "turns per inch" to within ±0.1 TPI. This allowed specific "Break Load" tests to be performed on those Yarn samples with great accuracy and repeatability.

The Programmable Yarn Twister had a maximum of 999.9 turns and was accurate and repeatable to ±0.1 turn. On the left side of the unit there is a 4-Digit Thumbwheel Switch that sets the stop value for the Twister.

Example: If the sample length of the yarn is 22 inches and 2.5 turns per inch is required to be inserted, this 4-Digit Switch would be set to **055.0**.

During the onset of 1990, Javatec developed some high accuracy, Laboratory Systems that would measure Yarn Shrinkage to 0.005% and display it to the nearest 0.01%. This system would apply a predetermined Load, measured by a precision Load Cell. When that exact load was reached, the unit would stop and measure a high resolution Digital Encoder that was attached to a high accuracy Ball Screw Assembly and the **PC** would convert this Encoder value to percent shrinkage. This unit uses a "Touch Screen" for all of the Operator inputs and would automatically print a report when the test samples were complete. All data was then stored on the hard disk in the **PC** for future retrieval.

The photo below on the left shows these 2 Yarn Shrinkage Test Systems aligned 90 degrees to each other to conserve floor space and allow the Test Operators easy access between these 2 Systems and the Hot Air Shrinkage Ovens that were approximately 15 feet to the right. The picture on the right shows the IBM Host computer that communicates to the 2 Yarn shrinkage Computers and the company's Internal Network that is interfaced into their Quality Data Management System.

During this same period of time, Javatec designed and fabricated Precision Hot Air Shrinkage Ovens that would maintain temperatures to within ±0.1ºC of the Set Point temperatures, ranging from 105.0 to 204.0ºC. This Oven was Designed and Fabricated as a direct result of the Yarn Shrinkage Test data varying so greatly during its first 6 months of operation. After many tests using "Monitor" Bobbins of yarn we finally determined the cause to be the old style Hot Air Shrinkage Oven that was being used. Once we implemented this new Javatec H.A.S. Oven, **ALL** of the previous problems became non-existent, significantly improving the quality of the yarn being produced. The Inside Chamber is 20x20x20 and it has a maximum Set Point of 250ºC

JAVATEC, INC. HISTORY – Page 7.

The above System was designed to simultaneously test 4 Printed Circuit Boards, each containing a very low (0 to ±1 Inch of water) Differential Pressure Transducer. This System would generate and monitor pressures that would range from 0.0000 to 0.9999 inch of water. There was a computer controlled PID loop that would read the Supply Pressure and then control a Stepper Motor (Micro-steps) that would adjust a precision mechanical Needle Valve to obtain the desired Test Pressure.

These particular Circuit Boards were part of an overall HVAC system used to automatically control large buildings' heating & cooling systems.

This Test System increased the testing "thru-put" of these Circuit Boards by a factor of 10 over that of the previous Manual Test System with much greater accuracy and a full printout of Test Parameters for each Circuit Board. This System also made repair of these Circuit Boards easier, as it isolated problem areas.

JAVATEC, INC. HISTORY – Page 8.

In March 2005, Javatec delivered a PC based Tester designed to test 2 different Circuit Boards in conjunction with each other. One Board was a Control Logic device and the other was a Modem (small Board on the Left).

The versatility of this Tester is in the "Plug-in" Test Module. For different Boards, a different Module would be required in addition to a different Test Program.

A special Card has been installed in the PC that provides 16 channels of 16-Bit Analog Data Input, 2 Channels of Analog Data Output, 24 standard Digital I/O and 8 High Current I/O. For other features, additional cards can be installed in the PC.