With the creation of Power PMAC - the “Motion Computer” Delta Tau has re-defined the traditional relationship between the general purpose computer and accessory / peripheral motion controllers. To facilitate this revolutionary change Delta Tau has developed new technologies, new architectures, and new perspectives.

- DSGATE3 ASIC
- Embedded Power PMAC
- Soft Power PMAC
- PCIe Power PMAC

**DSGATE ASIC**

Since 1985 Delta Tau has been an industry leader in the development and integration of ASIC technology. To maximize the power, throughput, and flexibility of the Power PMAC we are proud to announce the development of our next generation ASIC - DSGATE3. Built upon the feature set of its predecessors, the new ASIC provides significant new capabilities and performance enhancements including:

- Built-in resolver excitation generator
- Multiple serial encoder protocols supported: SSI/BISS, SPI, Panasonic, Kawasaki
- Multi-speed MACRO interface: MACRO @ 125 MHz, MACRO2 @ 1.25 Gbps
- Built-in sine/cosine encoder resolver 16-bit interpolator
- 12-bit hardware I/O interpolator for servo, capture, compare
- Whole-count & fractional encoder count info in a single register
- MLDT timer frequency of 600 MHz
- 32-node MACRO interface
- PWM counter frequency of 300 MHz
- 4-phase PWM output for each axis (for stoppers)

The DSGATE3 ASIC has been incorporated into a new axis interface card, the ACC-24E3. In order to take full advantage of the powerful new capabilities of the DSGATE3 the ACC-24E3 incorporates a new "mezzanine" design that provides the machine designer with maximum flexibility for both inputs (feedback) and outputs (command). The ACC-24E3 mezzanine system allows great cost and space savings by reducing the number of 3U interface modules, thus reducing the size of the UMAC rack. Even as size & cost are reduced, performance is significantly enhanced with the use of the DSGATE3. As shown in the diagram on the right the ACC-24E3 mezzanine system includes both analog and digital interfaces.

**Power PMAC PCIe Ultra-Lite**

A natural derivative of the Power PMAC as the Power PC processor has several built-in PCIe ports. High performance in a 1/2-size PCIe footprint for Ethernet motion networks like MACRO, Ethercat, RTEx, etc.

**Embedded Power PMAC**

With the Power GEO Brick you get 'the whole enchilada' in one convenient package; Real Time Linux computer, Power PMAC motion controller with DSPGATE3, or VenturComm for MS Windows™). With the Power GEO Brick you get ‘the whole enchilada’ in one convenient package; Real Time Linux computer, Power PMAC motion controller with DSPGATE3, or VenturComm for MS Windows™). The Soft Power PMAC offers one additional capability, it can be used as a simulator for application development (no controller installed).

**Soft Power PMAC**

One of the primary Power PMAC development efforts was to "port" the present PMAC code from assembly language to "C" and have it run under Real Time Linux RTOS. Having accomplished this, the next step was to simply run the same code with a RTOS or Real Time Kernel (e.g. InTime™ or VxWorks™ for MS Windows™). The Soft Power PMAC offers one additional capability, it can be used as a simulator for application development (no controller installed).
Power PMAC Demo - Laser Engraving System

Power PMAC features used in “Laser Power Marker” demo:

• Multiple Servo Rates - Galvo & servos’ controller under “one roof”;
• A controller performs a series of calculations in order to control position or velocity of any closed loop actuator. These calculations are called servos calculations and based upon the characteristics of the system, they must occur at different rates to achieve optimal performance. In order to achieve a faster response to required positions, a higher rate is required. Different components in a system may require different servo rates because of their response time characteristics.

Conventional controllers have one servo rate which is applied to all actuators regardless of their bandwidth. It is the user’s responsibility to find a servo rate at which most of the actuators have an acceptable performance. Sometimes this is difficult to achieve because of diverse system characteristics. In previous solutions from Delta Tau it was possible to get multiple servo rates in order to accommodate axes with low bandwidth (sluggish systems). So what’s new in Power PMAC? With Power PMAC, you can now apply an individual servo rate to each individual axis, which is the pre-defined servo rate at which the user wants to perform the closed loop control. This can be done in the Power PMAC configuration through the “Configuration” tab of the PMAC Installer.

As you may know the Power PMAC is in addition to being a sophisticated motion controller, a fully capable PC running a Real Time Linux OS. This means it not only supports Delta Tau’s regular script PLC and motion control language, but also supports script code written and compiled in “C”. In “Laser Power Marker” a “C” program in the Linux environment is used to read and convert the test signal from the keypad to a motion program in the Power PMAC environment. Since these programs are written in “C”, the user can take full advantage of all the flexibility and conciseness which this language has to offer. The software on the PC side can access both environments simultaneously.

The Power PMAC as a Laser Controller

The characteristics of the laser output which affects the way the part is marked is controlled by the shape and timing of the laser command signal (frequency, pulse width, and waveform). In “Laser Power Marker” demo, different types of signals are sent to the CO2 Laser unit:

• A tickle pulse is sent to the laser unit when the laser is in standby mode but immediate response is required. This tickle pulse has a lower constant frequency and very low duty cycle, just enough to keep the gas ionized and the laser ready to fire. The PWM signal is used to command and control the actual output of the laser when marking is needed. The duty cycle of the signal relates to the intensity of laser’s output power.
• All of these signals are generated by Power PMAC and passed through an off-board NAND gate circuit.

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The modular 3U format UMPC provides a rugged foundation upon which to build your Power PMAC system. The wide selection of plug-in UMPC accessories allows you to configure your Power PMAC to meet the specific application requirements. The modular 3U format UMPC provides a rugged foundation upon which to build your Power PMAC system. The wide selection of plug-in UMPC accessories allows you to configure your Power PMAC to meet the specific application requirements.

Motor types supported:

• Brushless (ACGCO)
• DC Brush
• Hydraulic
• Induction
• Piezo
• Stepper (open/closed)

Position Feedback:

• Quadrature encoders
• Sinusoidal encoders
• Resolvers
• Sincos format encoders
• LVDT’s, RVDT’s

I/O:

• Axis Flags: In Home, Limit +/-, Fault, User
• Input: Out Amp Enable, Pro Compare
• Digital: Inputs - 24 to 48 channels (per card), TTL to 2.4V range
• Digital: Outputs - 24 to 48 channels (per card), TTL to 2.4V range, 25mA to 600mA
• Analog: 12-bit, 16 channels (per card), 1 bit 4 channels (per card)

Power PMAC - Motion & I/O Control:

The Power PMAC combines Delta Tau’s legendary motion and I/O control processing engine, the rugged and flexible EMPC (Universal Motion and Automation Controller) modular control system, and a Power PC processor (32/64 bit architecture, 64 bit hardware floating point processing) - resulting in a Motion Computer with unparalleled performance capabilities.

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