Introduction to Applications

For over 20 years, Animatics has been providing customers of numerous industries with the products and customer service to help them succeed. Animatics' products are at the heart of applications ranging from process tension control to parallel axis gantry, and our returning customers in old and new industries are a testament to our innovation. So many unique applications feature our products that we have recently begun compiling our own library of success stories. Is your story next?

Each SmartMotor™ can freely move between modes of operations including:

- Velocity Mode
- Torque Mode
- Relative Position Mode
- Absolute Position Mode
- Electronic Gearing
- Electronic Camming

Industries using SmartMotor™:

- Aerospace
- Agricultural
- Automotive
- Autonomous vehicles
- Biomedical
- Chemical
- Cryogenics

- Government
- Life sciences
- Marine sciences
- Material handling
- Metal working machines
- Military
- Nuclear
- Oil industry
- Packaging
- Quality assurance inspection
- Security
- Testing and metrology
- Wood working machines

And more

A few applications using SmartMotor™ technology:

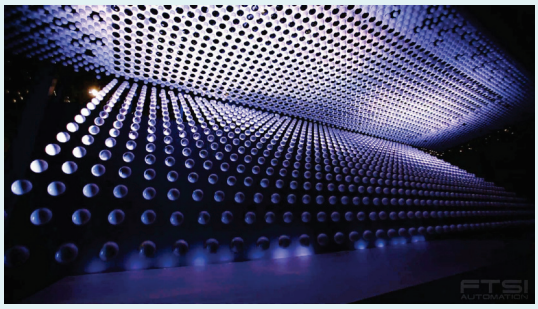
- Anode wire welding
- Automatic Web tensioning/alignment
- Auto-progression adjusting parts indexers
- Bearing inserters/presses
- Capacitor manufacturing
- Cappers
- Centrifuges
- Compression/tension testing
- Coordinate measuring machines
- Cut-to-length gage stops
- Dashboard controls button/switch testers
- Destructive testing
- Dicers
- Fillers
- Gimble mount accelerometer testing
- Glass tube cutting
- Glue dispensers
- GPS guided steering/drive control
- High speed indexing labelers
- Hydroelectric turbine nozzle control
- Infeed/outfeed stackers
- Manual handwheel over-ride
- Nut/bolt/screw drivers
- Pan & tilt bases
- Paper feeders/folders
- Parts redirectors
- Phase gearhead adjusting
- Pick & place palletizers
- Positive displacement pumps
- Shock load testing
- Step/tapered spool winders
- Tactile switch testing
- Tire tread grinding
- Topographical mapping
- Transformer coil winders
- Turbine blasé grinding
- Vision inspection
- Voice coil winders
- Wafer handlers
- Web guide
- Web tensioning
- Wire bonding
- and more

Case Studies

Animatics' case studies titled "Textbook Applications, Innovative Solutions" showcase just a few of the many success stories featuring the SmartMotor™ and other Animatics products. For more information, and to get the whole story, visit www.animatics.com.

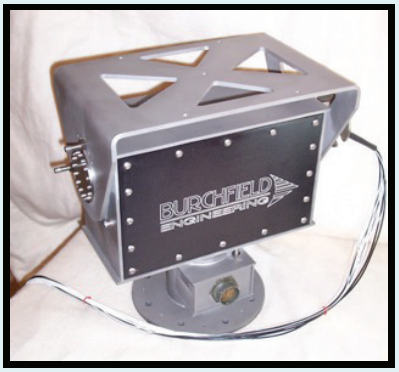
Synchronized Control of Vertical Loads

The Animatics SmartMotor was integral in the production of 1,008 flying spheres at The World Expo in Shanghai, China. Partnering with entertainment automation company Fisher Technical Services, LLC, the SmartMotor™ servos were attached to each of the 1,008 spheres and fashioned to raise and lower in quick, smooth succession over a large grid suspended above a stage. The Class 5 SmartMotor was able to provide Contouring Mode at data packet rates fast enough to allow for the fluid movement of all components of the performance. The result was a breathtaking kinetic sculpture that looked more like a computer generated animation than a life-size production.



Precision Positioning System

In an environment that hardly favors stability of a Camera, Burchfield Automation recruited the help of Animatics to fit a video Camera onto a jarring ATV travelling rough terrain. Animatics used the Phase Offset feature of their Class 5 SmartMotor™ in order to dampen the vibration of the Pan & Tilt system and allow the Camera to stay focused on the horizon as the vehicle raced through hills and troughs. The Phase Offset option creates a differential velocity between the external gyroscopic measurement of the Pan & Tilt system and the motor's internal encoder, which allows the physical measurement of the gyroscopic position sensors to tie in directly with the closed loop of the servo.



An example of Burchfield Automation's Pan & Tilt system that is used in various industries

CNC Surfboard Shaper

Compact, rugged and low maintenance. That is what OEM Dynamics' (division of Animatics) HLD60-H3 linear actuator is, and that is the kind of machine Precision Shapes Northwest created using it. Typical surfboard shaping machines are large, incredibly heavy and much too expensive. With the HLD60-H3 and Animatics JenCNC™ software, they combined both a CAD/Cam and motion control software package into a unique graphical user interface to control multiple SmartMotor servos on the linear motion systems in true 3-D coordinated motion. The machine went to market in record time and the results were in the profits.

See the video of this Application on www.animatics.com

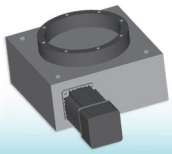
ANIMATICS® on YouTube

See more @ www.animatics.com

Example Applications

Concepts and Capabilities of the Animatics Product Range:

Programmable Rotary Index Table



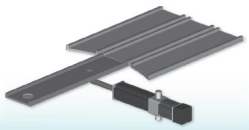
Modulo Position Mode

- Biomedical
- Oil Industry
- Semiconductor
- Chemical Coatings
- Cryogenics

Centrifugal applications, destructive and g-force testing, paint mixing and manufacturing, oil separation & mfg., anode wire welding, etc.

By adding a SmartMotor to any servo-rated worm gear box or flange output gear reducer, the system becomes a fully programmable rotary index table and can be programmed to any practical number of indexes and dwell times. Given the I/O and control capabilities, the dwells can be based on end-of-process contrary to fixed mechanical CAM, speeding up overall production cycle times.

3-Position Parts Diverter



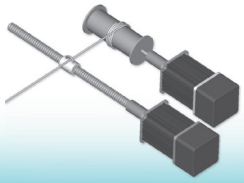
Position Mode
BCD Input
Absolute Position Mode

- Packaging
- Material Handling
- Food and Beverage
- Agricultural
- Chemical
- Medical

Product separation for mid production, package diverting, grouping and ungrouping, product inpsection and diverting

A simple upgrade to a SmartMotor from a two or three position pnuematic aircyclinder allows multi-point programmable poisitoning while maintaining I/O trigger control from any PLC.

Traverse & Take-up Spool Winders



Velocity Mode & Electronic Gearing Summed Together

- Textile or other engineered fibers
- Transformer Mfg.
- Audio Electronics
- Tank Mfg.
- Motor Mfg.

Spooling/winding yarn, thread, carbon fiber, or other converted material, voice coil winders, musical instrument cord, wire and string production

Using programmable software travel limits, electronic gearing, and special firmware drive control, winders can work with unlimited variations of spool width, wind angle and end-point dwell as well as step, stack and tapered winding applications. SmartMotor's low inertia and high speed accelleration enable extremely precise winding.

Multi-Axis Pick & Place

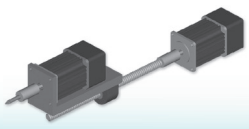
Position Mode
Absolute Position Mode

- Automotive
- Semiconductor
- Packaging
- Material Handling
- Biomedical
- Food and Beverage

Product packaging, wafer processing, hazardous material handling, liquid filling applications, capping applications, palletizing machines

Up to 120 individually addressed motors can be placed on a communications bus allowing for easy coordination of multiple axis applciations.

Drill & Tap/Nut Runner



Follow Mode with Velocity Mode and Monitoring Position Error

- Automotive
- General Fabrication
- Machining
- Aerospace

Dashboard control button/switch testing, eyeglass mfg., any operation requiring drilling, tapping or screw feed.

Set a rotating SmartMotor as the Master and have the linear axis electronically gear off of it to provide high speed drilling and tapping and screw feed control with limited torque. Adding proper torque detection, the unit can detect when the screw or tap has become dull or worn. As a nut/screw runner, it can detect cross thread, broken or stripped thread, or missing or jammed parts.

Input/Output Stacker

Position Mode
Absolute Position Mode
Relative Position Mode

- Semiconductor
- Food and Beverage
- Consumer Electronics
- Consumer Goods

Compact disk mfg., wafer processing, pizza or tortilla stacking, flatware and dishware production, etc.

Start stacking and continue in incremental stack shifts while maintaining part counts. Having localized I/O within the integrated controls, all parts handling can be dealt with by the stack motor itself.

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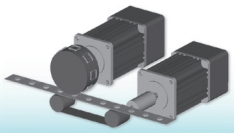
Example Applications

Print & Die Cut Alignment



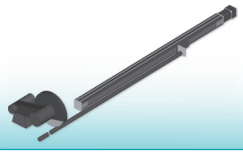
Follow Mode with Phase Offset Electronic Gearing

- Metal Working
- Consumer Goods
- Packaging
- Government
- Any industry that labels their products

Puzzle piece production, product label die cutting & blister pack sealing, printing, scrapbooking piece production, leather die cutting for consumer products, jewelry stamping, metal embossing, stencil making, stamp and adhesive precision layer cutting, etc.

With electronic gearing, you can accomplish phase offset moves to properly align die cut processes with printed registration marks. The same technique can ensure over-mold and multi-layer print alignment and pocketed blister pack parts placement.

Programmable Cut-to-Length Stop or Back Stop Gage



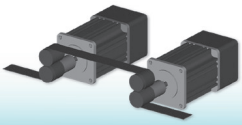
Index with Position Mode

- Biomedical
- Industrial Mfg.
- Chemical
- Construction

Glass tube cutting, precision pipe cutting, trim finishing, framing, window mfg., etc.

With the ability to program up to 1,000 subroutines and 32K of extra storage space, the system can be programmed for hundreds of back stop positions and sequences. You only need a simple HMI; no PLC or PC is required.

Process Tension Control (with one or multiple nip rollers)



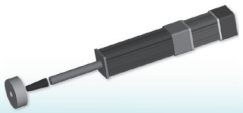
Follow Mode with Phase Offset

- Packaging
- Consumer Goods
- Paper
- Material Handling
- Consumer Electronics

Package labeling, lateral position control, paper processing, film and foil processing, converted materials mfg.

Using phase offset moves while electronically gearing Master to Slave, you can easily control tension between two sets of nip rollers. Tension is regulated by pre-test measurement or live analog, serial or digital feedback even with varying speeds and up or downstream loads.

Programmable Force Press to Fit



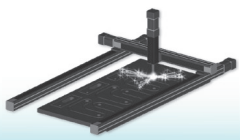
Position Mode with Derivative Error Control

- Medical
- Wine and Spirits
- Military
- Consumer Products
- Computer
- Cell Phone Mfg.
- Automotive Production

Resistive welding, power tool production, computer hardware mfg., bottle corking, medical device mfg., toy production, consumer electronics production, any general capping applications.

A SmartMotor allows for closely regulated positioning and position error control. This results in highly repeatable torque limited machine cycles. The result is a very good solution for pressing parts together or any other force-limited application where both cycle time and proper force must be tightly regulated.

Parallel Axis Gantry



Position Mode with Contouring Mode

- Automotive
- Wood Working
- Government
- Aerospace
- Military
- Marine Sciences
- Metal Working

Glue dispensing, coordinate measurement, topographical mapping, CNC wood or metal cutting, many other CNC operations.

Proper fault handling will prevent gantry racking in the event that either Master or Slave faults out during a move. Homing is done only once during power-up and the Master and Slave sync up all times after maintaining perfect alignment. Works perfectly with Animatics' CNC software.

High Speed Parts Counter & Verification

Velocity Mode or Follow Mode with High Speed Counter Input

- Medical
- Government
- Chemical
- Military
- Materials Handling
- Quality Inspection
- Consumer Goods Mfg.

Pharmaceutical container filling, quality control, RFID tag mfg., battery mfg., office chair wheel processing, cabinetry knob counting, currency and coin production, ammunition mfg., any high-speed part inspection process.

The external encoder input can be used to read quadrature incremental encoders, step and direction input or just as a counter where input pulses can be counted at a rate of up to 2 Megahertz. As a result, the motor can feed parts and part count even at high speed and with little distance between each part.

Total Benefits of Integrated Motion Control

The Conventional Servo System in Machine Design Projects

Development Time

- Several weeks designing physical control cabinets
- Time spent interfacing with multiple vendors
- Several weeks programming PLCs
- Weeks designing/installing cabling
- Several days interfacing motors
- Time interfacing I/O points

Total: 4-6 months

Design & Procurement Costs

- Control cabinet, rails, mounts
- PLCs
- Control modules
- Electronic amplifiers
- A-D I/O converters
- Motors
- Encoders
- Cabling

Total: $$

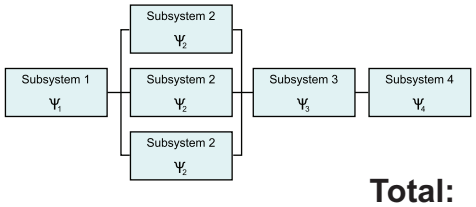
Maintenance/Support (Downtime Losses)

Troubleshooting:

- Programming non-localization & non-uniformity
- Multiple vendors
- Excessive cabling
- Need for multiple engineers/technicians
- Numerous potential failure points

Reliability Factors:

- MTBF is function of machine component count
- Non-standardization of components causes communication errors
- Having numerous systems and subsystems reduce reliability



Total:

The Simplicity of the Animatics SmartMotor™ in Machine Design Projects

Development Time

- Full control electronics integrated in motor
- One stop shopping with excellent lead-times
- PC based programming environment. Program is developed & stored in any motor's internal memory
- Plug and play off-the-shelf cables compatible with all SmartMotors, and existing legacy components
- 7 on board A-D I/O, option for 10 additional (24V) on board

FAST!

Total: 1.5 months or less

Design & Procurement Costs

- SmartMotor™
- Power Supplies
- Cabling
- Development/programming software FREE

Lowest Total Cost!

Total: $

Maintenance/Support

- All debugging of I/O done at SmartMotor; it reads the analog value of every I/O point regardless of how it is configured
- The SmartMotor software program can check for short circuits, failed outputs, read bus voltage, and check temperature
- Machine builder can specify the appropriate SmartMotor configuration and develop a special part number for future use
- Motion control programs can be standardized and stored in every SmartMotor. A network of SmartMotors can be controlled to use only specific parts of programs
- A spare SmartMotor can be kept on hand and substituted in the case of failure, minimizing downtime. **ZERO DOWNTIME ACHIEVABLE**
- SmartMotors have an extremely long MTBF, and exceptionally low rate of failure

Total: (Zero Downtime Achievable)

Animatics Corporation • All integrated motor products made by Animatics are covered by patent number 5,912,541
tel: 408.748.8721 • fax: 408.748.8725 • www.animatics.com

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Total Benefits of Integrated Motion Control

The Conventional Servo System in Machine Design Projects

Flexibility and Expansion

- Large cabinets with complex wiring diagrams are difficult to expand or modify
- Multiple vendors cause inconsistencies in future machine modifications
- Machine expansion is difficult with larger cabinet-based systems; thereby hindering growth

Total:

Sustainability

- More components demand more energy from the entire machine

Total:

The Simplicity of the Animatics SmartMotor™ in Machine Design Projects

Flexibility and Expansion

- Wiring is a cinch with plug and play components
- One stop solution with full technical support, programming tutorials, training sessions and more
- Animatics' Automation Solution Providers are available around the world and whenever you decide to expand your business

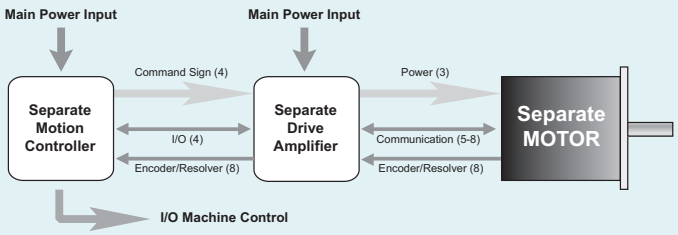
Total: **Extreme Flexibility!**

Sustainability

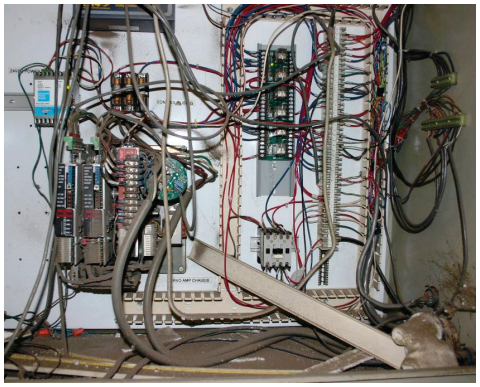
- Smaller initial footprint leaves more space available for other machines or future machine development.
- Less power consumption
- SmartMotor's compact packaging reduces waste energy and material during production

Total: SMART!

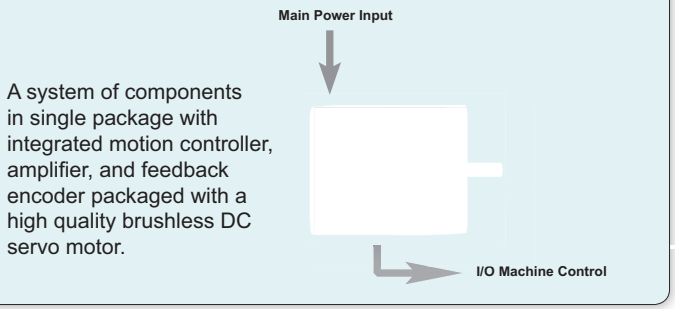
Conventional Approach



Control cabinet of complex cables, rails and mounts wastes valuable time, energy and money



SmartMotor™ Approach



Simple connection map for the SmartMotor