

News from JVL

A newsletter from JVL Industri Elektronik A/S

Number 4

Climatic tests and computer-controlled testing

JVL ensures quality using systematic test procedures

To ensure our customers receive products that operate reliably for many years, we have now improved our test facilities with the addition of a computer-controlled test-rig and a climatic test unit.

Our computer-controlled tests cover all PCBs and assembled units. First each PCB is tested individually and then, after climatic tests, the fully assembled Controller is tested. All relevant current and voltage levels, input and output levels, and functions are tested. Motor functions and correct positioning with a motor connected are also verified.

Before final assembly, selected PCBs and all high-complexity PCBs



are stress-tested in the climatic test unit for 24 hours. These procedures ensure faults such as bad solder joints and defect components are detected.

The fully-assembled Controller then undergoes a quick test of functions and thereafter is subject to



a final stress-test in which the temperature varies between -10 and +50° C for 48 hours.

Finally, the Controller is tested once more under computer control to check all functions, thus ensuring that we meet the demands for high quality set at the design phase.

Customised valve controllers

Specially-developed JVL step motor controllers for Swedish firm

JVL Industri Elektronik A/S has recently completed development of a step motor controller which has been specially designed for a completely new design and patented type of regulation valve. The new servo valve, for regulation of fluids and gasses in process plant equipment, has been developed by the Swedish engineer and inventor Gustav Rennerfelt. The servo valve is manufactured at *Roslagsverkstäden* in Hallstavik just outside Norrtälje, where 8 million *kroner* have been invested in new production facilities, already creating 10 new jobs.

The new servo valve has been named System Oden. In addition to the step motor controller and step motor, the system uses a unique, very compact, stable gear with a high gear ratio to control the opening of the valve. A hermetically sealed valve has also been developed and patented. The maximum torque rating is 220 Nm and the weight is

only 8 kg. In comparison a corresponding pneumatically-controlled unit weighs 16 kg and an electrically controlled unit 25-40 kg. In addition, the new servo valve is far less expensive to operate and has far fewer moving parts, thus ensuring great operational reliability and long life. Two other models providing torques of 50 and 500 Nm are under development.

The step motor controller is a very compact unit which can be mounted directly above the motor in the valve housing.

4-layer PCB technology and the latest generation of Power MosFets have been used in the driver stage. This ensures minimal heat dissipation and cooling fins are unnecessary. The motor position is controlled by an input signal of 4-20mA. A corresponding output enables the valve's position to be read. Set up of the velocity, acceleration, rotational torque and hysteresis is made via a compact RS232 interface using



Windows-based software developed by JVL. The driver supplies 6.8A per phase at a nominal voltage of 24V. Since the controller is required to operate over a wide ambient temperature range from -25 to +60°C, special care has been taken in the selection of components.

In Scandinavian countries these unique new servo valves are available from Tillquist Process AB.

Computer-controlled camera-robot uses JVL Step- and servo motor controllers

SFX, Motion Control Animation achieved using a specially constructed Danish camera-robot

For many years, the Danish company CMC has built up extensive know-how and expertise from Allan O. Lückow's numerous trips to the USA and UK in connection with the recording of animated films using specially constructed motor-controlled camera set-ups.

The principle of this film technique, which is widely used for puppet work and advertising films, involves using a computer to control the position of the camera in relation to the subject and taking individual shots in each position. In this way, the impression that the film has been recorded in real time is created. The camera is mounted on a robot and motors are used to control all movement. The motors themselves are controlled by drivers via a computer running special software.

In addition to moving the camera between each frame shot, the computer is used to control lighting, and objects on Model Movers can be animated, controlled by motors and drivers via the same computer.

Throughout the years, JVL Industri Elektronik A/S has contributed to the development of such camera-robots at CMC with our expertise in the field of motor control and by supplying step motors, gears and drivers.

CMC's latest camera-robot is controlled by a total of 10 step motors with associated JVL Drivers. A large AC servo motor with associated Yaskawa driver (also supplied by JVL) ensures the robot's forward and reverse movement on rails.

The 10 step motors control:

- 1) Dolly forward/back
- 2) Camera-arm rotation
- 3) Camera-arm Up - Down
- 4) Camera Pan, Roll: vertically, rotation, horizontally
- 5) Zoom and "Fixed Nodal Point" focusing
- 6) Camera motor
- 7) Various "Model movers" which move objects

The drivers are controlled by a powerful PC using step and directional signals. The software used is RTMC 48 (Real Time Motion Control) from Kuper Controls, which can

control up to 48 motors in addition to on/off functions. The entire time sequencing of such film recording can for example be controlled by an SMPTE time-code which ensures complete synchronisation of audio, picture and video signals.



Control console with computer and step motor drivers

The camera itself is a somewhat exclusive Mitchell Fries camera, an older Mitchell camera that has been found to be particularly well-suited for Motion Control Animation and has been modified for this special application by Fries Engineering in Hollywood, USA.

In addition to executing a pre-programmed motion and lighting sequence, the computer can also register a manually performed motion sequence. This is achieved by equipping all the relevant step motors with an encoder that trans-



The camera robot in a studio between sequences for the 1997 LEGO campaign

mits accurate positioning data to the computer when the camera is moved manually. Once the sequence has been registered, it can be repeated accurately for subsequent filming.

Allan O. Lückow emphasizes that step motors are currently superior to servo motors for this type of filming owing to their great repetition accuracy in the time domain. The position of the camera must be extremely accurate at precisely the instant the shot is taken, even though this is done at various speeds. In addition, it is of course important that the camera doesn't shake during filming and much effort has been used to remove undesirable resonances to ensure that the construction is adequately stiff but mechanically damped. The use of ministep drivers employing a large number of steps per revolution has also helped to avoid resonance problems.

Toothed-belt, gear and chain drive transmissions are used depending on the individual functions, and very high-quality bearings are used.



Servo motor used for movement of the robot on rails

This application of step motors and controllers supplied by JVL is yet another good illustration of the many varied applications where great demands are made on accuracy. Allan O. Lückow points out that he chose JVL as a supplier partly because of the excellent technical support he could obtain throughout the entire development phase.

JVL at PCIM '97 & the Herning Industrial Fair

JVL participated at the international exhibition for "Power Electronics, Drives, Motion & Control and at the Herning Industrial Fair from the 16th to 20th September

From the 10th to 12th June, JVL Industri Elektronik A/S took part in the international exhibition that was held in conjunction with the "PCIM '97" Congress in Nuremberg. This annual congress is organised by PCIM Europe (Power Conversion International Magazine), one of the most renowned publications in the field. The publisher now also issues another magazine - AMD&C (Automation, Motion, Drives & Control) - which is targeted specifically at research and development engineers and machinery manufacturers throughout Europe and includes articles on automation and motion control.

More than 134 lectures were presented at the Congress by experts from a total of 22 countries. At the open exhibition held in conjunction with the Congress, a very comprehensive selection of equipment was presented by 152 exhibitors from all over Europe.

Engineer Mads Siggaard represented JVL. Our stand offered a wide selection of JVL Step, AC-Servo, and DC-Servo motor controllers. Mads reported great interest in our products and received several enquiries from companies interested in representing JVL in various countries. We made many excellent contacts and will continue efforts to market JVL products abroad.

At the Herning Industrial Fair on the Danish mainland of Jutland, we experienced, as usual, a great deal of interest at our stand, where we were pleased both to see established customers and meet new contacts making their first acquaintance with our motion control products. Our model racetrack, where visitors could try their skill out competing with a controller-driven racing car and win a JVL polo-shirt, also contributed to activity at the stand.



JVL at the PCIM show



JVL at the Herning Fair

JVL represented in Germany

Renowned company representing JVL products throughout Germany

JVL Industri Elektronik A/S has now reached an agreement with the company *Servo Halbeck* in Offenhausen near Nuremberg to represent JVL motor controllers in Germany. The company manufactures its own advanced PC-based and stand-alone AC and DC servo controllers and additionally represents many renowned international manufacturers of motor controllers. *Servo Halbeck*, which was founded in 1984, has a great deal of experience within this field and found JVL's range of step motor controllers an interesting supplement to their other equipment. To provide sales and service support in the north of Germany, the company has established a branch in Geldern, near Krefeld.

servo Halbeck

JVL represented in Great Britain & Ireland

Bournemouth company represents JVL products throughout Great Britain and Ireland

JVL Industri Elektronik A/S has now entered an agreement with the English company *Motion Control Products* of Bournemouth to represent our motor controllers in Great Britain and Ireland. Motion Control Products is partly owned by the large English concern Parvalux, which for more than 50 years has been a leader in small gear motors.

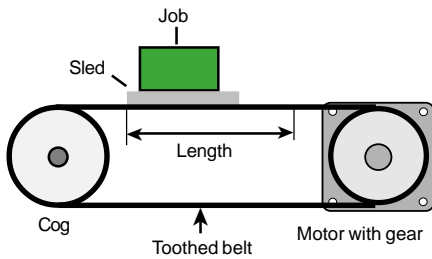
Motion Control Products sells a wide range of products in the fields of motor control and automation and has extensive know-how and experience in these areas.

They were very pleased to add JVL's complete range of Step, AC, and DC Servo motor controllers to their product programme.

MOTION
CONTROL PRODUCTS

DimWare, configuration software ensures rapid, reliable determination of motor size

JVL can now offer even faster and more reliable determination of the optimum motor size, with or without gearing, for the 3 most commonly used types of drive



With DimWare we can now determine motor size, with or without gearing, for 3 commonly used types of drive: Toothed belt, Spindle and Disc. Calculations are performed almost while you wait and you are ensured that the selection of motor and gearing is optimum for the task in hand.

In the simple example shown here, the motor torque is transmitted via a gear to a toothed-belt driven sled.

Typical parameter values are as follows:

Gearing: approx. 1:10

Mass of sled + job: 70 kg

Duration of movement: 1.5 sec.

Acceleration=Deceleration time set to 0.1 sec.

Length: 300 mm

These values are keyed into DimWare together with data on the cog, etc. The gear can be directly selected from Technoingranaggi's programme. In this case a BGT-0800-2 gear was selected.

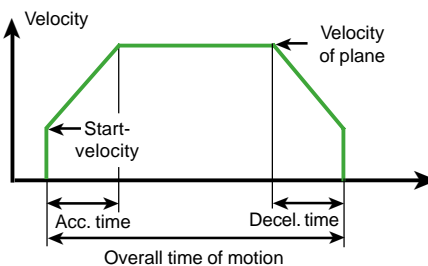
After selecting CALCULATE, a motor is selected that can provide the calculated torque at the given operating frequency. If the operating frequency is outside the desired range, one or more of the selected times or gearing must be changed. The software includes inertial torque data for a wide range of standard motors of various manufacture. In

Metak		Moment	
Massen af glas	80. kg	Moment fra masse	9.400 Nm
Plasets hældning	0. Grader	Moment fra lastrem og inert	9.011 Nm
Friction	10. N	Moment fra motor	9.019 Nm
Tandhjuls-materiale	Stål	Sikkekoefficient	2.
Tandhjul-diameter	100. mm	Totalt nødvendigt moment	9.450 Nm
Tandhjul-tykkelse	25. mm	Totalt moment	9.980 Nm
Actual tandhjul	2. stk.	Drivgeltes forløb	
Massen af lastrem	0.5 kg	Forkørsac	204.036.4 Hz
Tandrens vinkel grad	100. °	Motor-acceleration	1012047.9 Hz/s
Anden røndeinde læsti	0. lgecm ²	Acceleration-pulser	49548 Pulser
Drivgelte		Acceleration-længde	97.5212 mm
Hastighed af plan	503.285 mm/s	Total omløbning	921.51882 Pulser/s
Sættetid for bevægelse	1.5 s	Motor omk. hastighed	2228.6 rpm
Længde	300. mm	Effekt (uden sikkerhedsfaktor)	
Accelerations-tid	0.1 s	Effekt ved konstant hastighed	0.461 W
Start hastighed	100. Hz	Accelerations-effekt	158.215 W
Motor og Gear		Decelerations-effekt	107.834 W
Public. omk.	0150. Pulser/cm	Inerti konstant til motoraksel	5.150 lgecm ²
Inerti af motor	SGM-04	0.191 lgecm ²	
Inerti af gear	BGT-520000-2	2.0982 lgecm ²	
Gearing	2 tris (i = 9 - 26)		
Gear/rens vinkelgrad	90. °		

this example, a Yaskawa motor SGM-04 was selected.

A second calculation is performed and the values are again checked to be within the required ranges.

The DimWare software is incredibly fast to use and gives almost instantaneous response on the effect of any change. Customers who carry out many calculations of this kind will benefit greatly from the use of DimWare.



New Sales Engineer



On the 1st of May, Mads Sigaard joined JVL as a sales engineer. Mads Sigaard holds an M.Sc. in engineering and for the past 5 years has worked with motor controllers at the company Allan-Bradley (Rockwell). Mads' areas of responsibility at JVL will include all forms of external sales, including courses and training, customer projects, configuration and commissioning of systems, etc., both on the domestic market in Denmark and abroad. We firmly believe our customers will benefit greatly from Mads Sigaard's broad range of experience.

Representative



...when motors must be controlled

e-mail: jvl@jvl.dk.
Internet: http://www.jvl.dk

JVL Industri Elektronik A/S • Blokken 42 • DK-3460 Birkerød • Denmark • Tel. +45 4582 4440 • Fax. +45 4582 5550