

**A newsletter from  
JVL Industri Elektronik A/S**

## **Absolute multi-turn encoder in QuickStep motors**

**JVL's integrated step motors now offer improved encoder features**

Recently JVL has experienced increasing interest from customers regarding the use of the built-in absolute encoder in QuickStep motors. We have therefore made several improvements to the firmware to further utilize this function of the motors.

The most significant new functionality is to use flash-memory to implement a multi-turn absolute encoder. The system works by storing the values from the absolute-single-turn encoder in flash memory together with the actual position when the supply voltage falls below a user-defined limit. As long as the shaft has rotated less than 180 degrees in any direction while the supply voltage is interrupted, the motor will be able to find its original position when the supply voltage is re-applied.

In addition, an option has been added

to enable the motor to register its actual single-turn position at start-up.

Alternatively an external absolute multiturn encoder with SSI interface can be connected.

Error counters and timestamps are stored to facilitate service and support, and the values of various diagnostic counters are similarly stored, so for example the number of seconds the motor has operated can be saved.

Thus, wear can be monitored to improve planning for the replacement of mechanical parts. Previous error messages are stored together with timestamps, and can be recalled during service visits to enable faster error correction.

In terms of hardware, the electronics have also been improved to meet the more stringent EMC requirements for laboratory equipment.



## **Wide range of own precision planetary gears**

**JVL launches a range of planetary gears, type HTRG, suitable for most applications**

JVL Industri Elektronik has now introduced its own range of high-performance gears for direct delivery to customers in Denmark and to our representatives and customers worldwide. We can offer a wide range of gears and gear ratios for use with our own motors (MAC, MIS, MST23x, MST34x, SGMAH, etc). Model HTRG05 for example is available with gear ratios of 3, 5, 9, 12, 20 and 100:1. Model HTRG06 offers gear ratios of 5, 9, 12, 36 and 100:1. HTRG08 offers

ratios of 3, 5, 10, 12, 20, 36 and 100:1, while HTRG10 offers ratios of 20 and 100:1. The range will be extended in

response to demand for other sizes, gear ratios and motor types.



# Material friction measured using JVL equipment

## Novo Nordisk Tribotester uses MAC motor and step motor equipment from JVL

A tribotester is a general term for a unique piece of equipment that is used to perform tests and simulations of friction and wear on material surfaces. A tribotester typically must be specially developed according to the specific materials to be tested. It is not a stock item that can simply be ordered off-the-shelf. To develop a tribotester to meet their needs, Novo Nordisk Research and Development (R&D) therefore decided to enter a collaboration with two final year project students, Torben Ruby and Torben J. Herslund at the Technical University of Denmark (DTU). Today, the resulting tribotester is in use at Novo Nordisk and has become an important tool for the development and optimisation of material combinations in new injection systems for treating diabetes.

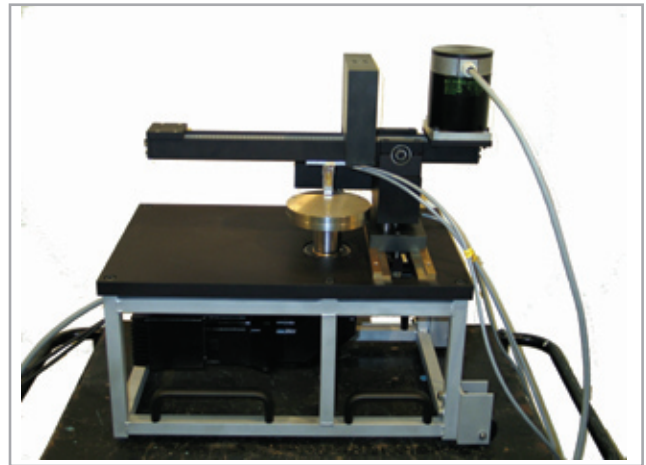
Tribology, the study of wear, friction and lubrication, plays an increasing role in the development of mechanical products. In step with increasing requirements for products to become smaller, lighter and more versatile than previous models, the contact area between moving parts has been reduced to such an extent that surface forces can exceed critical levels. This can lead to increasing numbers of defect products caused by lack of understanding of the material characteristics.

The basic principle of the Novo Nordisk tribometer is a "pin" of well-defined radius and material which is aligned perpendicular to a plane rotating "disk" of the same or different material. By applying a well-defined load, friction and thus wear occurs between the materials. The friction is measured as the inertial torque that results between the test materials.

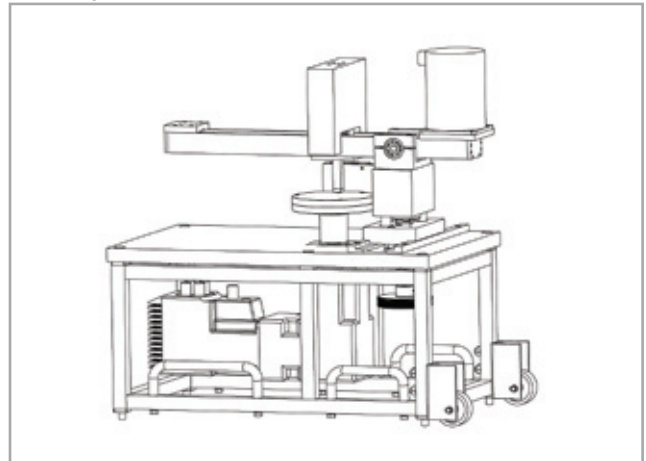
The load on the pin is provided by a weight which can be moved along an extended arm. This provides the optimum form of load and also provides the possibility to change the load during tests.

Using this basic principle of the tribotester, a force transducer was developed to measure both the normal force and the frictional force. The measurement method selected was strain gauges, which consist of a thin electrical conductor which is glued to the test material to be measured. By mounting several strain gauges and connecting them in specific patterns, force can be measured independently of other effects.

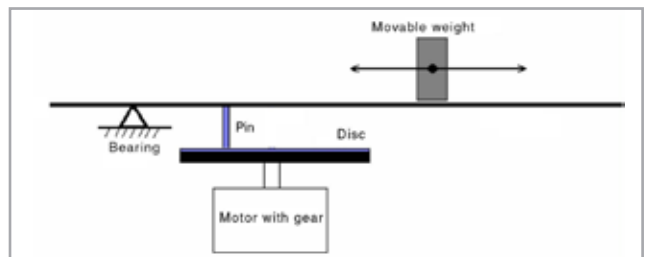
It was decided to use an AC servo motor to drive the rotating disk and a step motor to position the weight and thus adjust the load. JVL Industri Elektronik's fully integrated AC servo motor (MAC 800 motor), with its built-in controller and features, eminently fitted the tribotester design and was selected to drive the disk. The motor was connected via a



The completed tribotester



Schematic of the tribotester construction



Principle of the tribotester

5:1 planetary gear. JVL also offered any necessary support in the development of the tribotester. For positioning and control of the load, a Stögra step motor was used together with JVL Controller SMC35A.

During development of the project, JVL software MotoWare and MacTalk were used for sequencing. The completed machine is controlled from a PC using LabView via serial communication. Shortly after the academic examination, the tribotester was handed over to Novo Nordisk and the two graduate engineers were hired to commission the test rig.

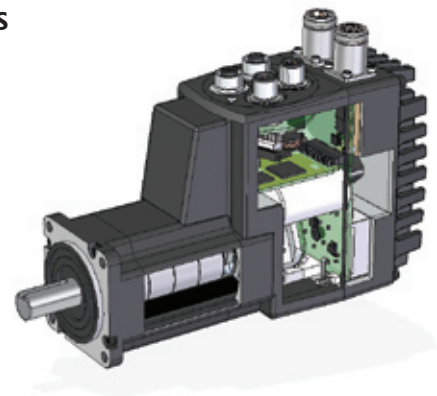
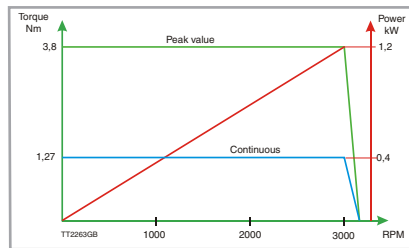
Since then, the tribotester has contributed to several development projects at Novo Nordisk and continues to do so.

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# Triple torque at all speeds

## MAC400 provides more compact machines at lower prices

A unique feature on the market for integrated servo drives is the JVL MAC400 motor's provision of both 3 x nominal torque at peak torque and full peak torque at all speeds. This means that the power of the motor can be fully utilized. Equally important is the fact that in the majority of applications a smaller motor rating can be used, since peak torque is normally only required during acceleration or braking (deceleration). And this means it is possible to achieve more compact machinery at lower prices. JVL has had these 2 characteristics as key parameters throughout the development of the



entire range of MAC Integrated Servo Motors – and triple-torque with flat torque characteristics therefore also applies to the MAC050...141 and MAC800 motors. MAC400 thus delivers 1.2kW peak, while MAC800 delivers 2.2kW peak. Given these characteristics, it is quite remarkable that JVL's R&D department achieved

this performance without the use of a cooling fan, using only cooling fins. After the extensive development work, JVL now expects to have the MAC400 UL recognized. Already now the MAC400 is UL pending.

# SSI interface in QuickStep motors

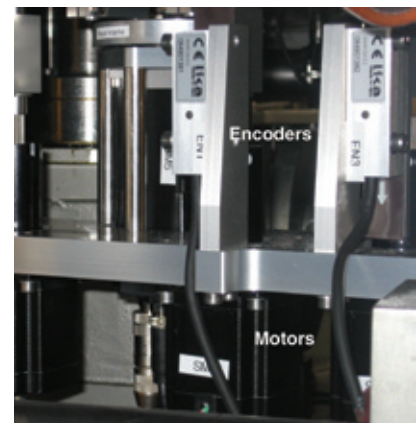
## Connection of absolute encoders with SSI-interface

The firmware of JVL's QuickStep motors has been extended with yet another function: an SSI encoder interface. It is thus possible to integrate absolute encoder functions in QuickStep and SMC75. Typically, absolute-encoders are used when there is a need to continue operation immediately after power is re-applied to a machine or system – without first having to perform a zero-search reset. Another major reason for using absolute encoders is to correct motor position in relation to the actual

physical absolute position measured by the SSI encoder.

JVL has recently assisted with the completion of a large system that uses a number of SMC75 controllers with LIKA SSI encoders. The SSI functionality has thus already proven its applicability in real life.

We would also like to draw attention to the possibility for supplying QuickStep motors with a built-in rotating semi-multiturn absolute encoder for less demanding tasks.



System with SMC75 controllers and LIKA SSI encoders

# JVL representatives

In October last year, we held a major meeting for representatives at JVL headquarters in Birkerød, Denmark. Participants attended from the majority of our European representatives, our representative in Mexico, and JVL's subsidiaries in the UK and Germany.

The purpose of the meeting, which was held 29-30<sup>th</sup> October, was to inform our distributors of new products, including the new MAC400 integrated servo motor, and the many new functions in JVL software. In addition, a wide range of motion

control topics were addressed during the meeting. The meeting also provided the opportunity for practical, hands-on sessions, e.g. using wireless control.



This meeting provided the opportunity for a rich exchange of experience, and at JVL we gained a very good overview of our distributors' wishes and proposals for existing and new

products, and tailoring equipment to customers' specific needs. It was the sixth time we've held such a meeting and we regard it as an important factor in supplying the best possible service to our customers throughout the world.

## JVL now represented in India

In Autumn 2009, Inteltek Automation became JVL's distributor for the whole of India.

Inteltek Automation JV is headquartered in Pune approximately 160 km from Mumbai, which is the financial capital of India. Pune is also known as the India's Detroit, where major car manufacturers such as GM, Tata, Fiat, Bajaj, Mercedes, and Mahindra are already established, and Chrysler and Volkswagen are planning to establish factories. Inteltek Automation JV is one of a group of companies under the Intelmac group, with more than 20

years of experience in motion control technology. Inteltek has a total of 9 offices at strategic locations throughout India, including Mumbai, Delhi, Bangalore and Chennai. This ensures proximity to the customers so that their technical and economic needs can be accommodated.

Inteltek has 17 employees in its sales organisation and 16 in the application and service of motion control systems. We would like to welcome Inteltek to our now long list of distributors, and are certain that they will deliver high performance for JVL in this very large and important market.

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## New Swiss distributor

In Autumn 2008, Omni Ray AG took over dealership of JVL products in Switzerland. Omni Ray AG has been one of the leading distributors and service organisations in industrial automation in Switzerland for more than 55 years. A homogenous range of high-quality products and a long-standing and global presence are natural characteristics of Omni Ray AG. Omni Ray AG is a recommended partner for communication, control and process automation components. We would like to welcome Omni Ray to our network of distributors, and look forward to an effective and prosperous collaboration.

**Omni Ray**  
Power of Automation



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## New office in Germany

JVL has established a new office in Stuttgart in Germany. The office will handle all enquiries and orders related to JVL's products throughout Germany. Mr. Jan Tausend has been appointed Sales Director and is ready to help with any enquiries about motion control. Jan has many years of experience in automation within a broad spectrum of industries. Most recently he has focussed on Servo-, Motion-, and Drive application areas. We welcome Jan and look forward to an excellent collaboration.



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## New employees

**Helle Bitsch**, 28, joined JVL in November 2008. Helle is appointed as a sales supporter for the sales department and is responsible for CRM and marketing.



In addition Helle also has a role as purchaser. She qualified in retail trade and worked with Danish retailer Matas for 8 years, where she was responsible for campaigns and purchase. Helle has studied business administration at the Copenhagen Business School.

**Betina Stoltz Duhn**, 28, joined JVL's accounting department in December 2008. For the past 3 years, Betina has worked as bookkeeper for several small companies. Betina's areas of responsibility lie primarily in accounts receivable, stock keeping and creditor payment.



We would like to welcome both Helle and Betina to JVL.



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