Haydon kerk Motion Solutions PITTMAN

Success Story

Diagnostic Lab Instruments

An Interview with
James Izzard,
Mechanical Engineer,
Life Sciences & Medical
Diagnostics Equipment at TTP

Fast response, adaptability, and collaboration between TTP and HKP allow for quick development in the Diagnostic Lab Instrument field using the new IDEA Motor

INDUSTRY - APPLICATION
Medical - Diagnostic Lab Instrument

APPLICATION DETAILS
TTP is a design consultancy engaged in product research and development in several markets, including industrial, commercial, aerospace, communications, medical, and life sciences. TTP begins as early as scientific discovery and typically produces beta units to begin the production transfer to a selected manufacturer. TTP had begun development of a new diagnostic instrument and were challenged to present concepts on an accelerated time schedule.

CHALLENGE
The instrument requirements included the following:

- Spin a drum of samples according to a defined velocity and acceleration profile
- Rotationally index the drum 12 degrees during the load, unload, and read cycles
- Reliable, quiet, and small enough to fit on a lab table

WHY HAYDON KERK PITTMAN

- Performance and value compared to a new drive development
- Fast technical response to customer needs for proof of concept
- Quick turnaround on prototype parts
- Customized components for any application
- Motor and drive package designed to work as a single system
- Wide range of motion products from a single supplier

SOLUTION
TTP was contracted for development of a table-top medical instrument that required precise velocity and indexing profiles. HKP approached TTP with a new Pittman product, the IDEA® Motor, a 42 mm, BLDC motor with an integrated servo drive that appeared to meet all the current requirements. After receiving and testing a sample unit and software, TTP was encouraged with the servo capabilities of the compact package.

"We like working with HKP because of the level of support and customization we receive. We have in-depth conversations with HKP especially when we have a particular requirement and we need to know whether it's feasible, and get some great feedback."

As the development progressed, TTP provided a solid model of the drum that the IDEA Motor would spin in the instrument, as well as the desired velocity and acceleration profiles. Within a few days, HKP 3D-printed the drum, fabricated a coupling, and programmed the motion profiles into the drive. With the pieces assembled, HKP then recorded a video of the system tracking according to the specified motion sequence. The video and prototype were sent to TTP for testing. The indexing functionality was tested earlier and deemed sufficient. The IDEA Motor provided high flexibility and allowed TTP to test several concepts by making small changes to software and by utilizing the on-board inputs and outputs.

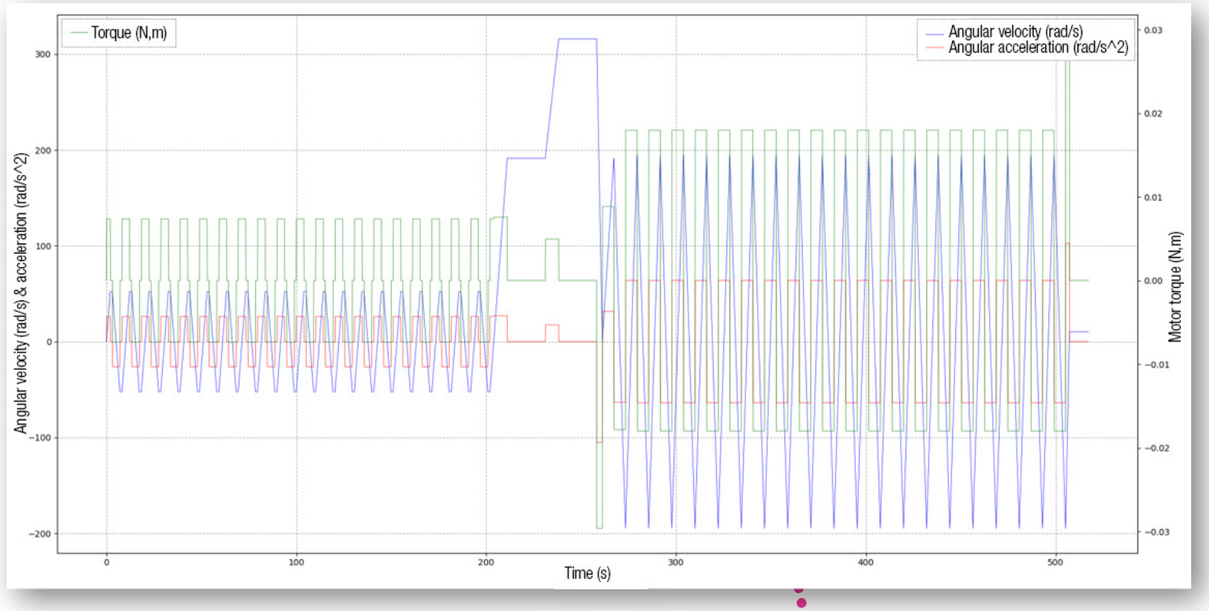
TTP was delighted with the performance and assembled a proof-of-concept for their end customer within weeks instead of months. The proof of concept worked well, but the IDEA Motor was too tall.

Favoring the servo capabilities of the IDEA drive, TTP inquired whether the drive electronics could be adapted to be a pluggable module to install into a motherboard. HKP again quickly prototyped the drive electronics module from the IDEA Motor and presented the module solution to TTP. The accommodation to the board design was extremely valuable as TTP had confidence that the drive would perform as expected. The drive was not being de-featured, just reconfigured.

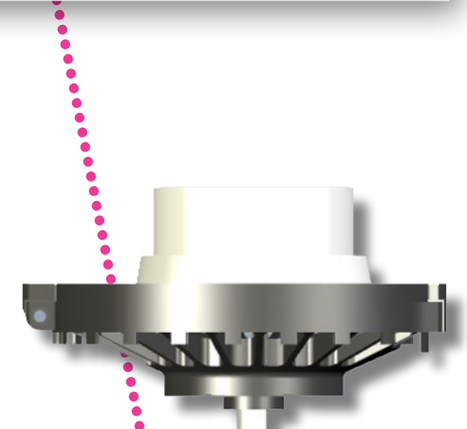
To better fit the motor into the instrument and improve the positional accuracy, further height reduction and better encoder resolution was needed. TTP specified a shorter motor shaft length and selected an encoder with a higher resolution. These changes are considered standard customizations and are very much part of the HKP culture. To validate the thermal models, TTP ordered a motor with thermocouples added to the winding and to the motor case. Again, HKP reacted quickly and delivered the necessary test unit.

RESULTS
The IDEA Motor enabled TTP to accelerate their delivery of the proof of concept and rapidly enter the development phase. Collectively, TTP and HKP worked to define the connector requirements of the module and motor and prototypes were delivered. Satisfied with results to date, TTP's customer has ordered the drive module and customized motors for their beta build. Fast response, adaptability, and a preference for customization led HKP to a valued partnership. HKP continues building its credibility with TTP as a trusted motion control provider.

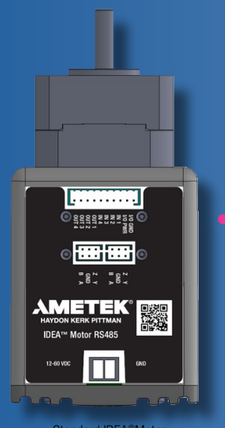
"Having a drive that could accommodate several different behavioral paradigms meant that we could try different ways of running the instrument. We made a prototype that holds the disk position with the drive and measures the disk position with encoders and flags. Using this drive provides the flexibility to test many sensible approaches. To iterate fast enough, we needed close communications between our engineering teams."
– James Izzard, Mechanical Engineer at TTP



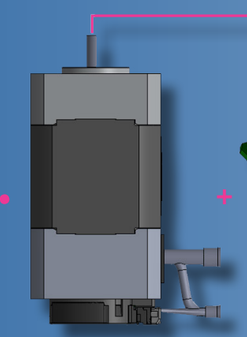
Motion Profile: Velocity, acceleration, and torque over ten minutes time.

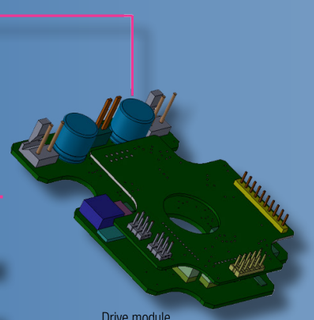

Prototype with drum

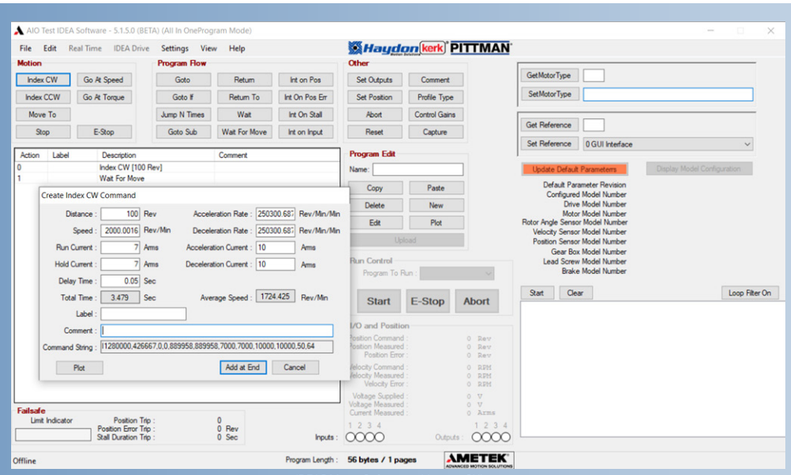
The Evolution



Standard IDEA® Motor


IDEA® Motor with custom shaft length and Hi resolution encoder


Drive module



IDEA® Motor Software with easy GUI

- COMPACT
- PRECISE VELOCITY
- COMPLETE SOLUTION
- FAST TURNAROUND
- ACCOMODATING SOFTWARE

The Technology Partnership

TTP is an independent technology company where scientists and engineers collaborate to invent, design and develop new products and technologies.

www.ttp.com

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