

Application note 104: monochromator with high count encoder

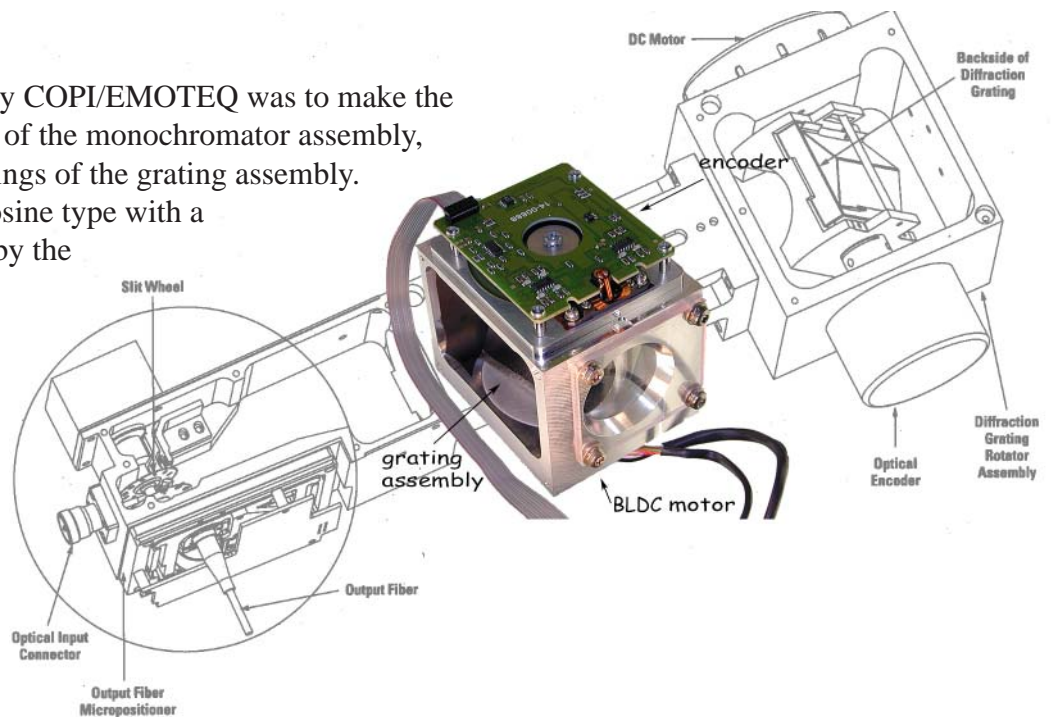
This note describes the solution provided by Allied Motion to resolve an encoder/bearing/alignment problem in a direct-drive monochromator used in a 400 through 1500 nm spectrum analyzer.

Allied Motion was invited by the customer to assist in resolving the following problems:

- a third party “housed” encoder showed consistent bearing failure due to a “three bearing” design
- the resolution and signal stability over temperature of this encoder turned out to be inadequate
- accurate axial alignment of the encoder with the grating assembly was exceedingly difficult and a source of positioning errors.
- the two bearings of the encoder had to be aligned perfectly with a third bearing anchoring the grating and motor. Misalignment would cause ‘wrenching’ and lead to bearing failure.

The solution provided by COPI/EMOTEQ was to make the encoder an integral part of the monochromator assembly, using only the two bearings of the grating assembly.

The encoder is a sine/cosine type with a resolution limited only by the capacity to resolve the signals with an interpolator. The 9,000 base sine/cosine cycles from the encoder were resolved into 36,000,000 digital A/B cycles (144 million “measuring steps”).



It was now relatively easy to align the encoder disk within two arcseconds of the center of rotation of the grating assembly. An ultra-low cogging EMOTEQ brushless DC motor supplied the direct drive of the grating, yielding a wavelength resolution of five picometers over the full temperature range (-30°C through 65°C).

For information and assistance, please contact:

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