Draw Tower Gratings (DTGs) are produced during the drawing process of the fiber itself, before the primary coating is applied. This is a cost effective production process for high quality Fiber Bragg Gratings. This offers unique characteristics such as extremely high proof strength, insensitivity to bending, spliceless array configurations and uniform coating coverage. FBG parameters and coating material can be selected based on customer needs.

Fiber Bragg Gratings for Real World Applications

Have you seen the light?
HBM has...

“Once we had made the decision to develop a range of fiber optic strain gauge products, we invited leading manufacturers of Fiber Bragg Gratings to supply us with samples of their product so we could test them in line with our proposed applications. At the end of the testing process only one product retained its mechanical integrity and specification and this is why HBM has selected FBGS as its partner to develop its optical strain sensor products”

Dr Karl-Heinz Haase
Product and Application Manager,
HBM Optical Sensor Technology & Asset Monitoring
**FIBER BRAGG GRATING PRINCIPLE**

Fiber Bragg Gratings are made by laterally exposing the core of a single-mode fiber to a periodic pattern of intense ultraviolet light. The exposure produces a permanent increase in the refractive index of the fiber’s core, creating a fixed index modulation according to the exposure pattern. This fixed index modulation is called a grating, which reflects one particular wavelength, referred to as the Bragg wavelength.

Draw Tower Gratings (DTG®s) are produced using a process that combines the drawing of the optical fiber with the writing of the grating.

The figure below shows the set-up of this production process. The process starts with the heating of a glass preform, which subsequently initiates the pulling and formation of the fiber.

Further in the production process, the fiber crosses the optical axis of a laser beam in order to write the FBG. The Bragg wavelength of the FBG is controlled using a tunable interferometer that projects a periodic UV-light interference pattern onto the fiber. Using a pulse selector and taking into account the draw speed, FBGs can be accurately positioned in the fiber.

When the grating has been written the fiber is coated by entering a coating reservoir, followed by a curing step of the coating.

Finally the location of the DTG® is marked automatically and the fiber is reeled onto a drum.

As such the commonly used stripping and recoating process of standard FBGs is not necessary and the pristine fiber strength is maintained during the DTG® manufacturing process.

**FEATURES OF DRAW TOWER GRATINGS**

Draw Tower Gratings offer some unique advantages over traditional FBGs:

1. Extremely high breaking strength (>5% strain)
2. Spliceless sensor array configurations
3. Uniform coating coverage
4. Cost effective through automated production process

Depending on the application, fiber type and coating can be selected to ensure:

- Extreme operating temperature range (cryogenic to +200°C)
- High adhesion properties between glass and coating to allow direct bonding of DTG fiber
- Low bending losses to allow flexible fiber installation
TECHNOLOGY

APPLICATIONS

Temperature Sensing
As the reflected Bragg wavelength of the DTG® is determined by the temperature, many DTG®s (sensors) can be written in a single fiber line for monitoring distributed temperature profiles. Special coatings are available that can support cryogenic as well as high temperature applications.

Strain Sensing
DTG®s show a stable and reliable wavelength response as a function of the applied strain. DTG®s can be attached directly to the test object or integrated within composite materials. Due to the high mechanical strength, DTG® strain sensors show an excellent long term stability in applications where high strain levels (>10000 µm/m) are combined with severe fatigue conditions.

Fiber Tagging
When servicing data transmission cables, the ability to distinguish data conduits from one another is often required. Densely spaced DTG® arrays can be used to label optical communication lines in a permanent and unambiguous way. Each unique DTG® array configuration represents a binary number that can be read using standard measurement devices.

INDUSTRIES

Draw Tower Gratings are used today in many industries for critical sensing applications. Many FBGS customers develop or employ sensing solutions in which the DTG® is the core element.
FBGS is a Belgium/Germany-based developer and manufacturer of high-strength Fiber Bragg Gratings (FBG) using draw tower technology. The company was founded in 2005 as a spin-off from the Institute of Photonic Technology (IPHT) in Jena (Germany).

Based on a unique process, FBGS is capable of writing grating arrays during the drawing process of the fiber. This automated process results in very high-quality, cost-effective Fiber Bragg Gratings with unique characteristics which are suitable as an OEM component for both standard and bespoke applications. As pioneers in this industry we are committed to providing our customers with innovative and ground-breaking products for monitoring of temperature, strain and fiber tagging.

STRATEGIC VISION

To become, through our unique Draw Tower Technology, our R&D capabilities and application know-how, the absolute World-Wide market leader in high quality, cost-effective Fiber Bragg Gratings.

CONTACT US

To download product information and read about customer applications please go to www.fbgs.com

Please contact us to discuss your application or to obtain a free sample of DTG® fiber.

BELGIUM - Head Office
FBGS International NV
Bell Telephonelaan 2H
B-2440 Geel
Belgium
Email: info@fbgs.com
Tel: +32 14 58 11 91
Fax: +32 14 59 15 14

GERMANY - Manufacturing
FBGS Technologies GmbH
Winzenlaer Straße 2
D-07745 Jena
Germany
Email: info@fbgs.com
Tel: +49 3641 508 514
Fax: +49 3641 508 551