

# TIMING

**TD2**  
engineering  
& surveying

## LiDAR - Light Detection and Ranging

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### THE TIME WAS RIGHT

TD2 has purchased new drone-mounted LiDAR to keep us competitive in the construction marketplace. Under consideration for a long time, we were waiting for the remote sensor technology to evolve and fit what we do in terms of price, size, weight, speed, reliability, and accuracy.

LiDAR stands for Light Detection and Ranging — a remote sensing method for measuring distances. The DJI Matrice 300 with RTK (drone and base station), L1 (LiDAR), and P1 (camera) adds flexibility, coverage, and accuracy to our drone service offerings.

This LiDAR-equipped drone will expand the project sites we can fly with high ground cover, (picture Nebraska's wild prairies or the Loess Hills), and speed up how quickly we can get them done compared to conventional methods. This equipment can also be used on existing sites with structures or anywhere.

This marks our 3rd generation of drone technology, joining our fixed-wing Sirius Pro and the Falcon 8+ octocopter. Since winter 2018, with our first drone, TD2 has learned by doing, consistently improving our processes and information-packed deliverables.

This will provide our clients the high-density and high-accuracy data in different 2D and 3D model forms that can be taken straight into AutoCAD, Esri ArcGIS, or other rendering and editing software (CloudCompare, ReCap, and Truview are examples).

LiDAR equipment entails a laser, a scanner, and a specialized GPS receiver. And LiDAR can be used over land and water to generate high-precision maps of both terrains. Blue light is used to scan land areas. In contrast, green light scans the bottom of the ocean and riverbeds. For our projects and purposes, TD2 will use topographic LiDAR, which typically uses a near-infrared laser.

Do you have a vision for a challenging site? Call Chris Dorner.

### HOW IS LIDAR DATA COLLECTED?

*When an airborne laser is pointed at a targeted area on the ground, the beam of light is reflected by the surface it encounters. A sensor records this reflected light to measure a range. When laser ranges are combined with position and orientation data generated from integrated gps and inertial measurement unit systems, scan angles, and calibration data, the result is a dense, detail-rich group of elevation points, called a "point cloud."*

*Each point in the point cloud has three-dimensional spatial coordinates (latitude, longitude, and height) that correspond to a particular point on the earth's surface from which a laser pulse was reflected. The point clouds are used to generate other geospatial products, such as digital elevation models, canopy models, building models, and contours.*

NOAA. What is lidar? National Ocean Service website, <https://oceanservice.noaa.gov/facts/lidar>.



Dave and Emily unpack and get acquainted with the new LiDAR equipment.

### DAVE NEEF FLYS

This may surprise many clients as Dave did not spread it around, but Dave Neef, RLS, retired this May. Precise to the end, he retired exactly 40 years from his hire date on 5/16/83.

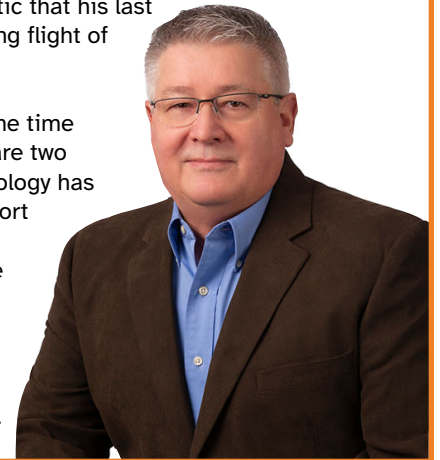
Dave has been a constant in TD2's Survey department. Always precise, always willing to take on a challenge. We are the beneficiaries of his meticulous attention to detail and continue to follow the processes and procedures he put into place.

Dave started his surveying career in Colorado, not knowing what a surveyor did, but he loved the outdoors. Wanting to return to the Omaha area, Dave dropped off his resume at the office, and Bill Dorner called and hired him over the phone. That was in 1983, and he started working as a rodman or the lowest guy on the survey ladder. Over time, Dave learned from the experienced surveyors around him, became a Crew Chief, and was encouraged to get his license. He moved inside as a Project Manager in 1992 to direct TD2's technical personnel in the preparation of

Elevation Certificates and Letters of Map Change in addition to ALTA/ACSM Land Title Surveys, Subdivision Plats, Route Surveys, Topographic Surveys, and Construction Staking projects.

In 2020, he also took on managing TD2's drone services. A huge change and a challenge; he got his FAA license, learned the new technology, and set the department up for success. It seems poetic that his last day was the first training flight of the LiDAR drone.

Things happen when the time is right; these stories are two examples. LiDAR technology has developed to our comfort level, and Dave's life has moved into a more relaxed pace. We wish Dave the best in his retirement, and we will miss him as a colleague and a friend.



### Thompson, Dressen & Dorner, Inc.

Chris Dorner, RLS  
Land Survey Lead  
cdorner@td2co.com

TD2mail@td2co.com  
402/330-8860



Omaha:  
10836 Old Mill Road  
Omaha, NE 68154  
O:402/330-8860 F:402/330-5866

Sioux Falls:  
5000 S. Minnesota Ave., Unit 312  
Sioux Falls, SD 57108  
O:605/951-0886

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