

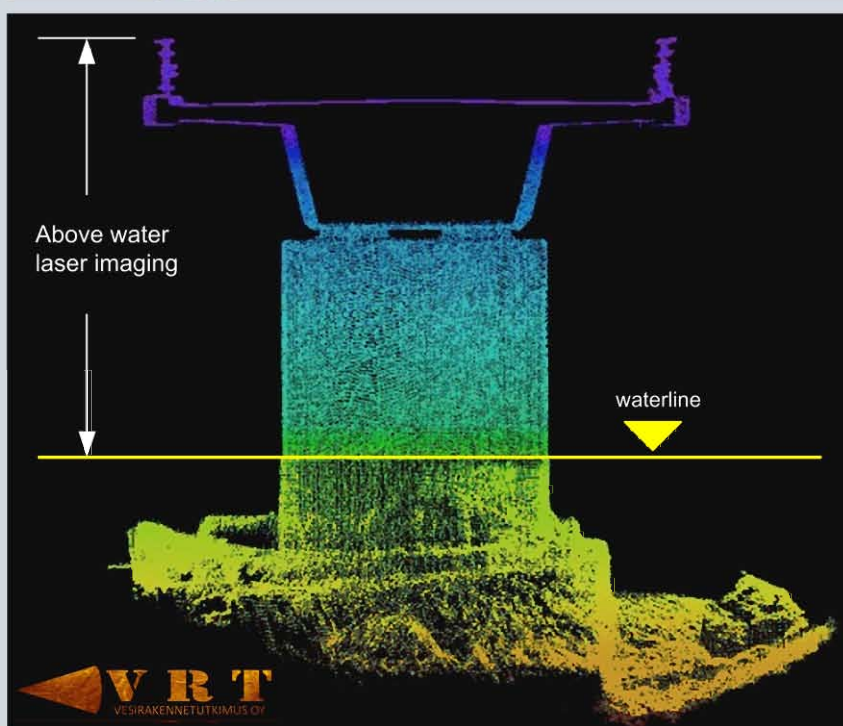
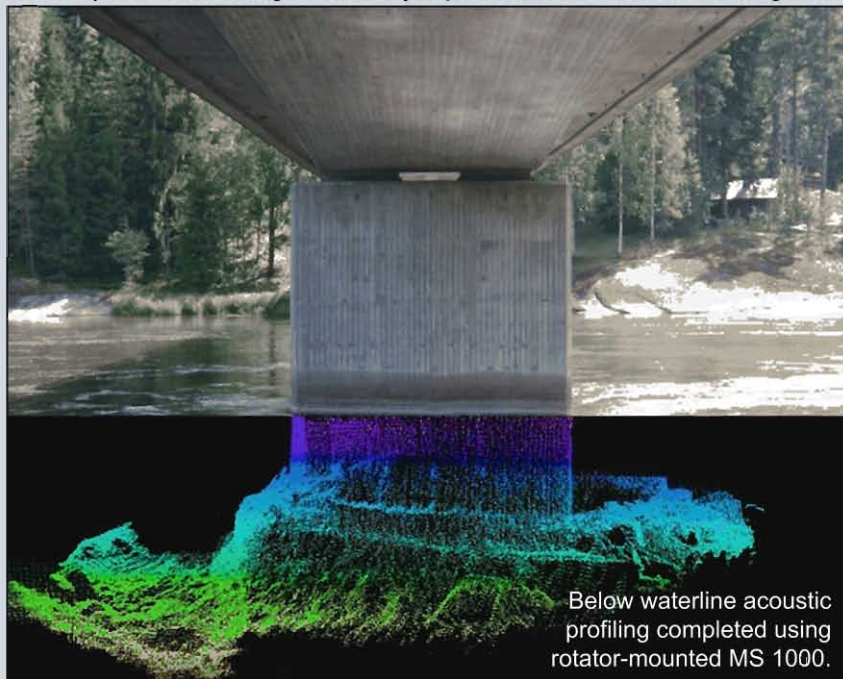


3D Inspection of Bridge Sub-structural Elements

"In the United States there are approximately 590,000 road and highway bridges. Of these, the Federal Highway Administration (FHWA) has identified 17,000 of these as "scour critical," and another 86,000 as "scour susceptible." On April 5, 1987, after three decades of service, the Schoharie Creek Bridge failed due to scour in what was determined to be a 50 year flood event. Ten people lost their lives in this disaster.

There is one fact that is not disputed: "Scour is the primary cause of bridge failure in the United States."¹

¹Courtesy *Echoes and Images, The Encyclopedia of Side-Scan and Scanning Sonar*



Images courtesy VRT Finland OY

MS 1000 3D Scanning Sonar System Overview:

Scanning sonar fitted with a conical, narrow-beam profiling transducer can be used for many tasks unsuitable for a conventional echo sounder. Examples include dock, bridge, tunnel and shaft inspections, internal pipeline and tank surveys, and sounding data collected under docks and berthed vessels. The keys to success lie in deploying the sonar head so it remains stable, that its position is referenced in the X,Y,Z axes, and its azimuth is known.

Mounting the sonar on a pan rotator provides the second axis drive to enable 3D profiling.

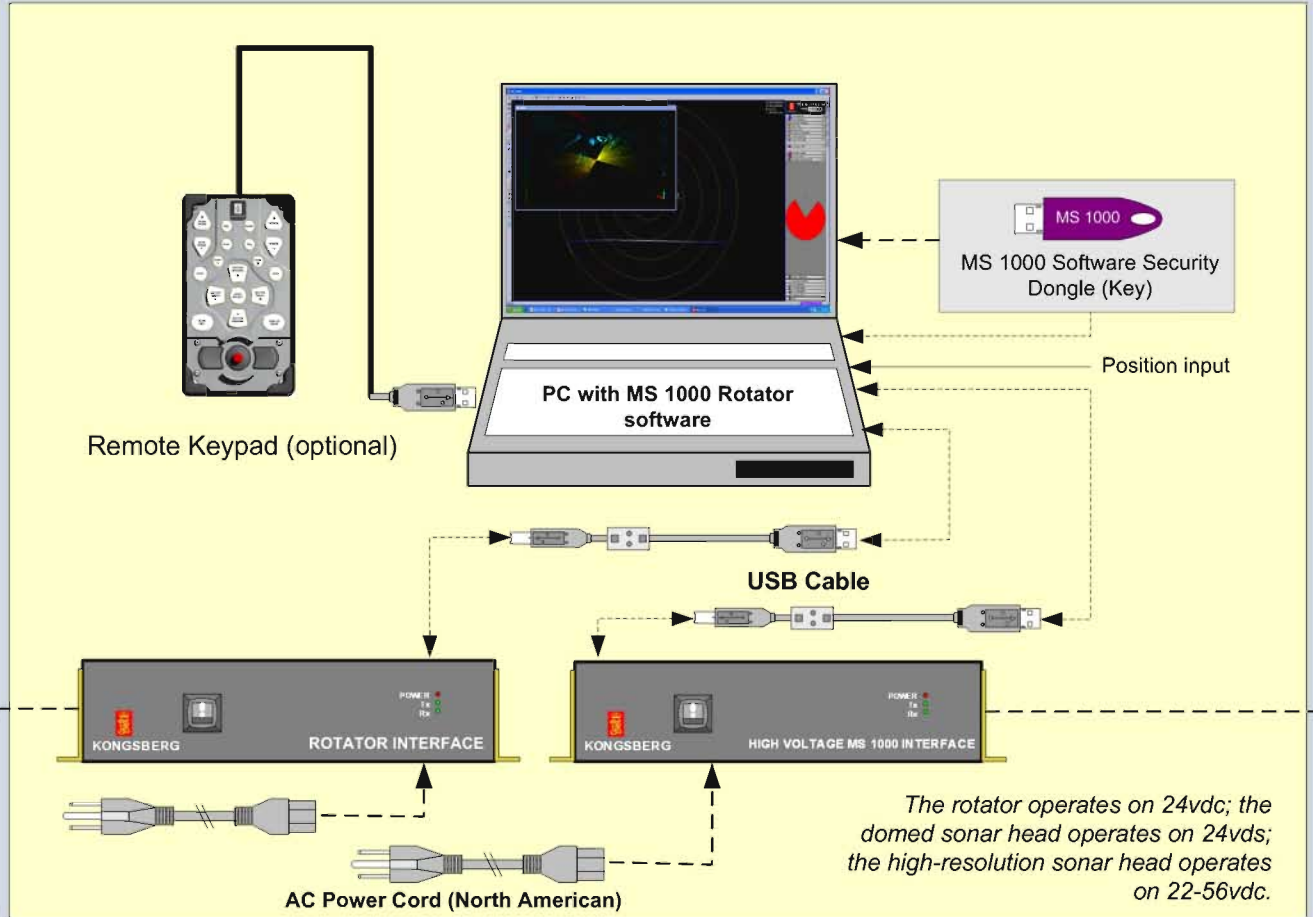
The MS 1000 3D profiling system is typically tripod or boom deployed. Within the MS 1000 program, the operator selects the sonar scan coverage, desired step size for the scanning sonar transducer and the arc of coverage and the degree (or parts of a degree) step change in azimuth (angle) of the rotator.

Once the operator configures the MS 1000 software, the scan process is automatic. At the end of each sonar scan the MS 1000 sends a serial command to the rotator which turns the sonar head in azimuth; this is followed by a command that begins the next sonar scan. This continues until the pan rotator arc of coverage is completed. Profile coverage from a single location produces a star-like pattern.

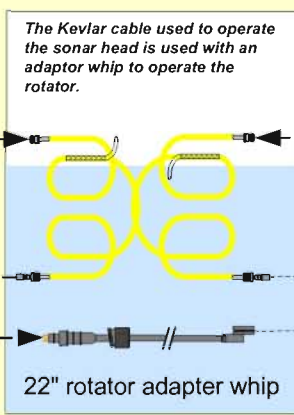
The profile data is *relatively positioned* to the sonar transducer and rotator. To combine multiple data profiles from different locations the position of the rotator/head transducer, its precise position, starting azimuth and its elevation must be known. A pitch and roll sensor, collocated to the rotator/sonar head, must also be used and its data string input to the MS 1000 record.



3D MS 1000 Profiler System Configuration



MS 1000 Scanning Sonar and Rotator Arrangement



Kevlar Operation's Cable:
Clean the connector and lightly coat inside with non-conductive o-ring grease.

