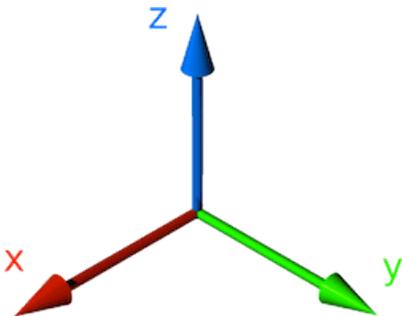


Aiman Co., Inc.
36938 Chancey Rd.
Zephyrhills, FL 33541
Est. 1985
Mechanical Surveyors
Providers of High Accuracy 3D Alignment and
Inspection Services

James Aiman
(813)-715-4600 office
(813)-997-7762 cell
aimanci@verizon.net
www.aimanalignment.com



We measure and align big things



Ships



Mining equipment



Bridges



Civil structures

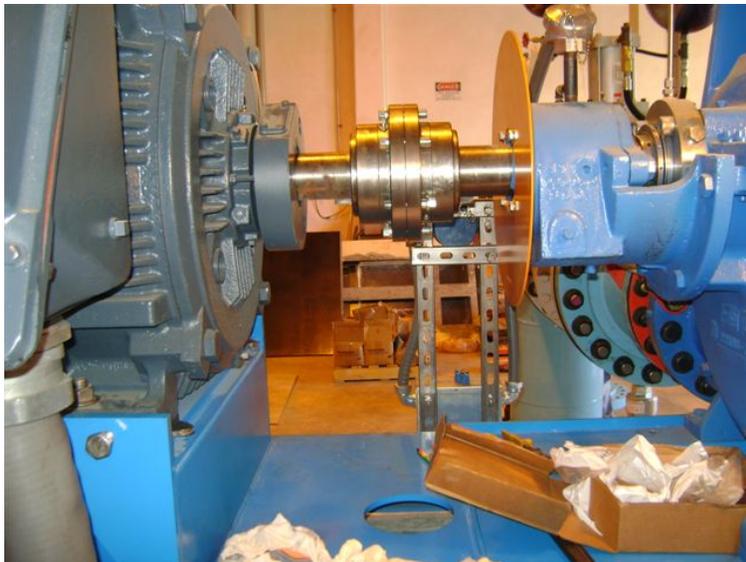
We measure and align small things



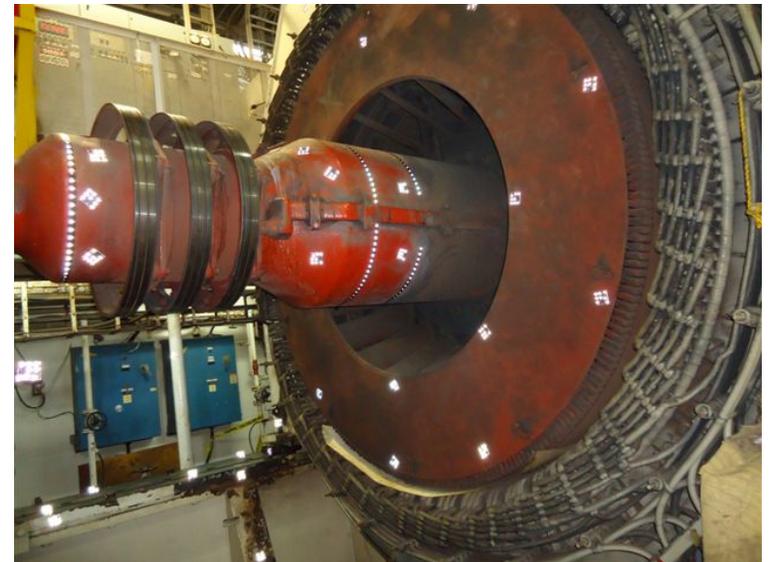
Bearings



Crank shaft



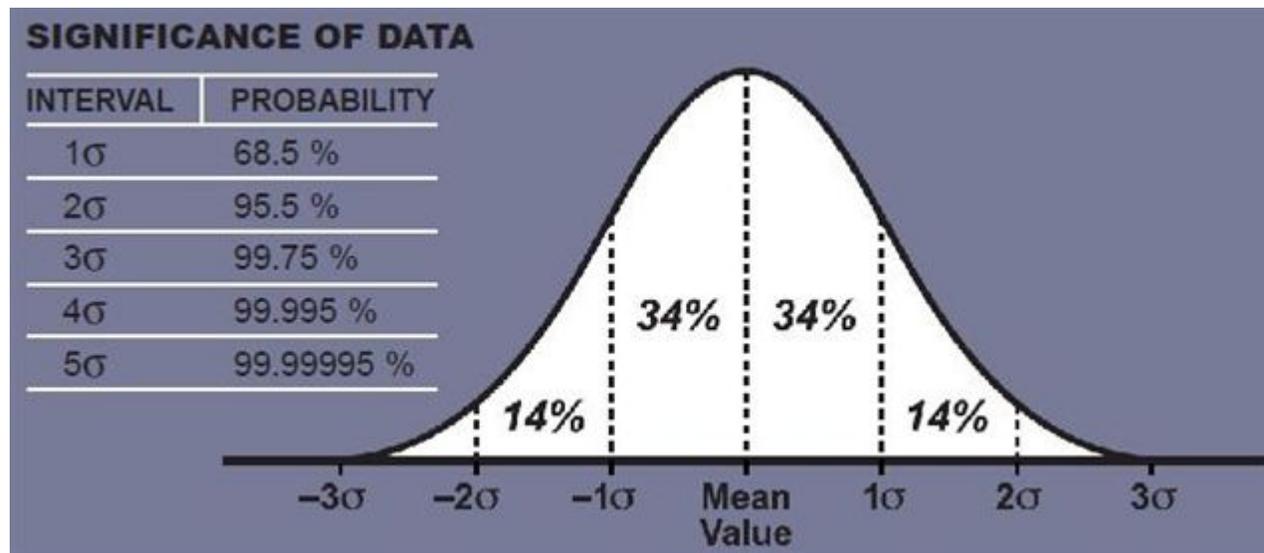
Motor to pump alignment



10,000 HP DC motor

Mechanical / Industrial Surveying

- Close range – Less than 1,200 ft
Most Cases 200 ft or less
- High accuracy – Standard unit of measure, machinist grade
 ± 0.001 inch or ± 0.00001 foot
- High precision – Repeatability, High Confidence Index
Better than 2 Sigma (+ 95.5%) standard variance



Optical alignment is based on square line work.

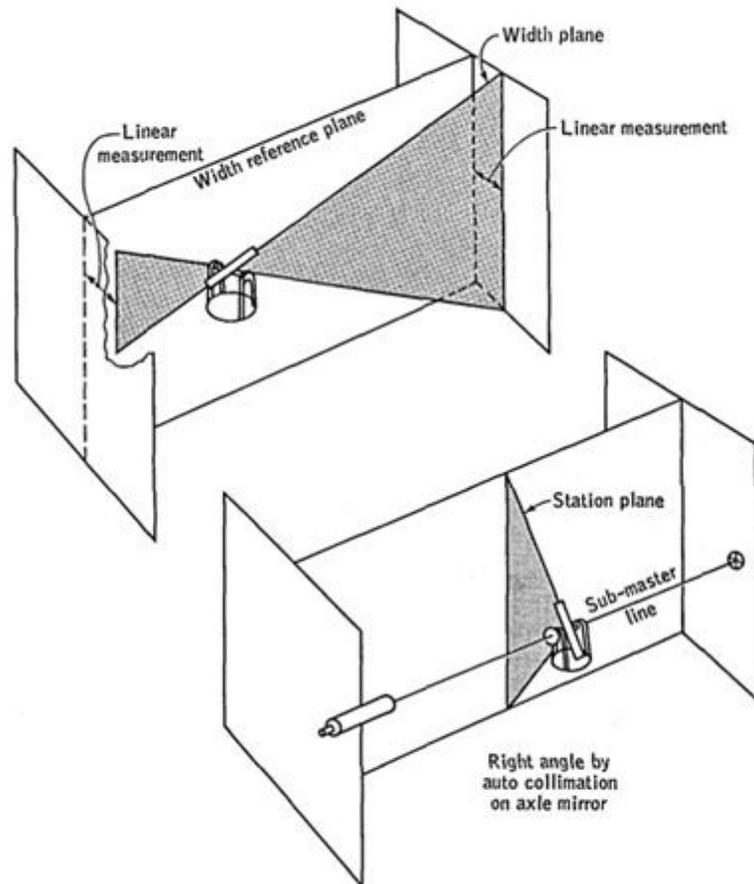


Fig. 14-4. A width plane and a station plane.

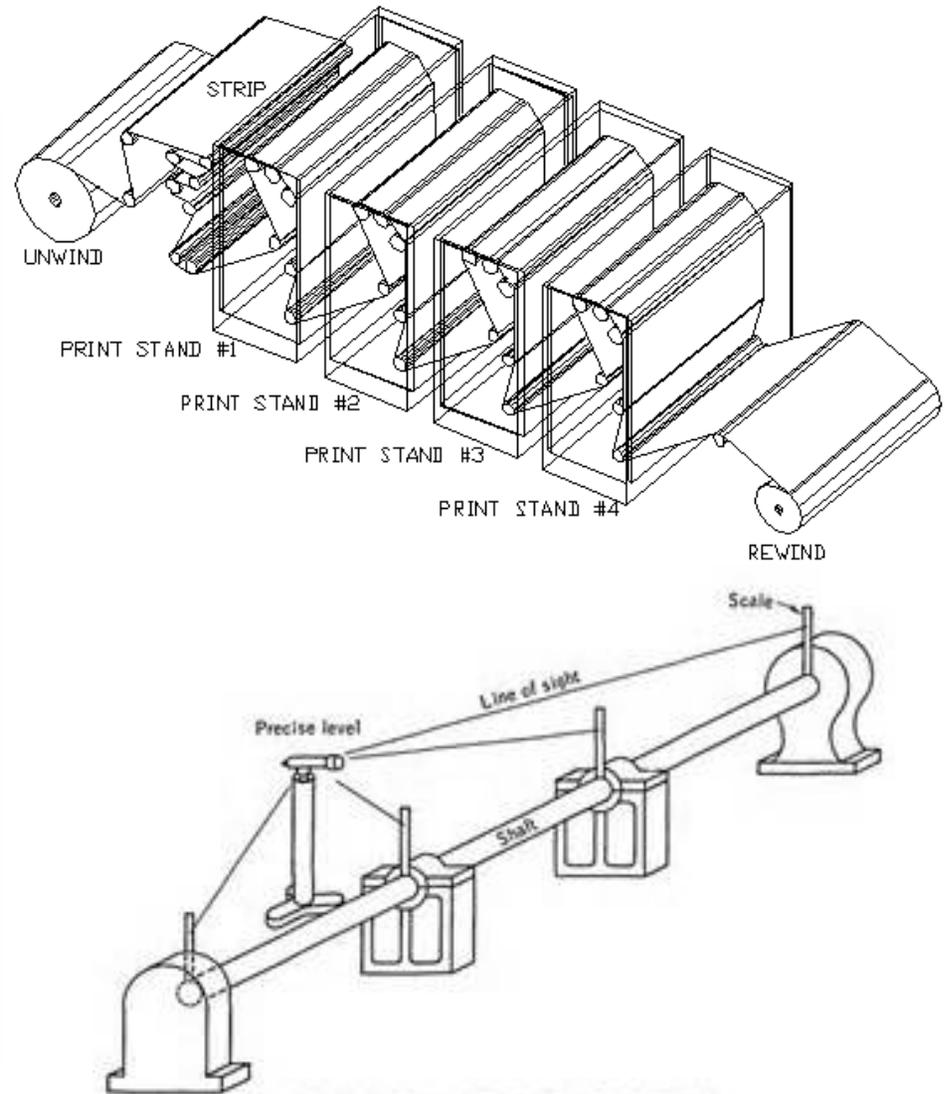


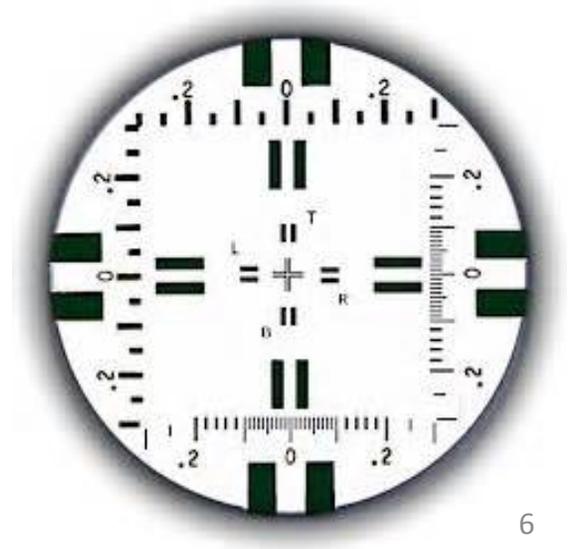
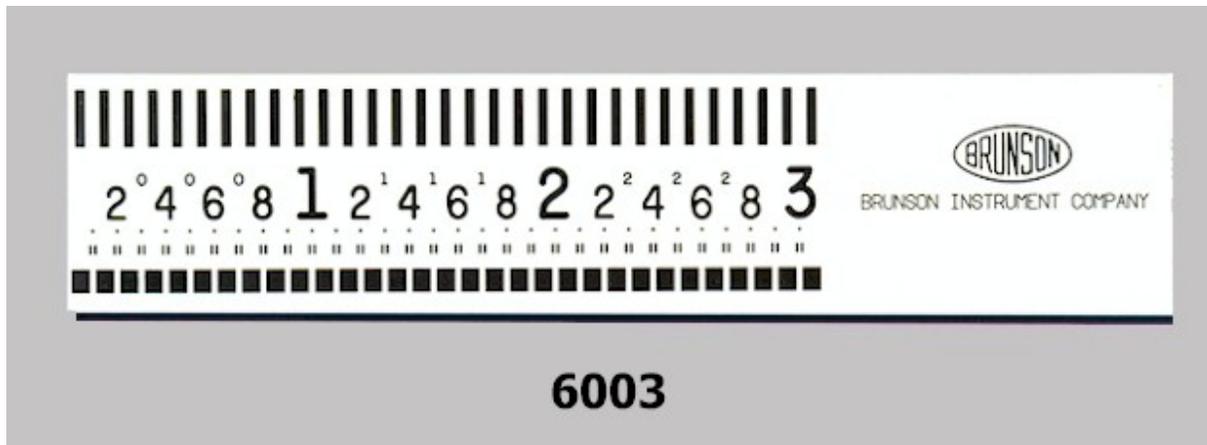
Fig. 1-17. First step in aligning a shaft: leveling.

Optical tooling came on to the mechanical scene about 1940 and is still widely used today.

- K&E .1 sec micro alignment telescopes



- Optical scales and targets





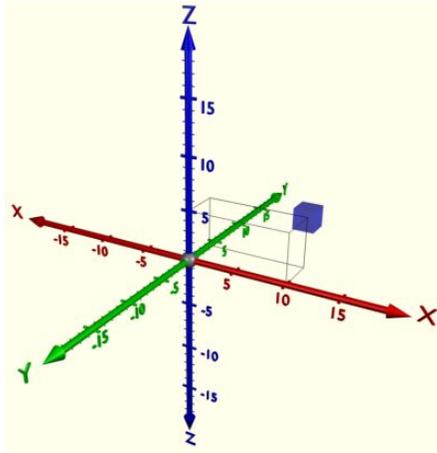
K&E tilting levels
with micrometer

Wild T2 1 sec theodolite
with micrometer

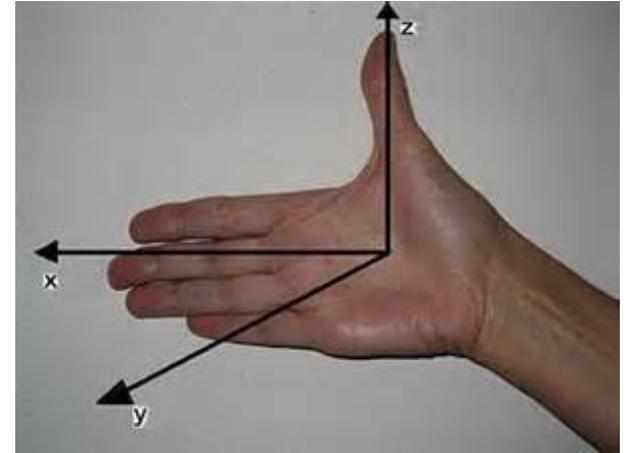


Brunson .5 sec jig transits
with micrometer

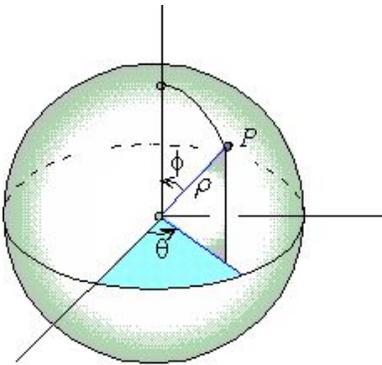
Describing a point's location



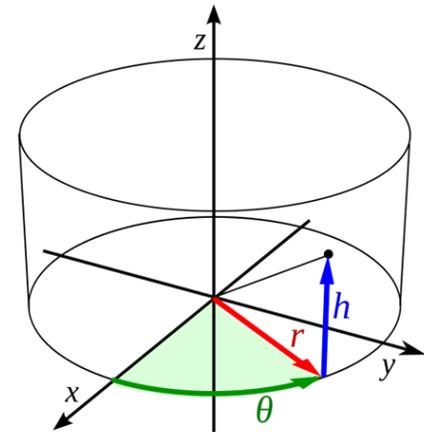
Cartesian coordinate
90° intersection



Right hand rule



Spherical coordinate
Horizontal angle
Vertical angle
Radius



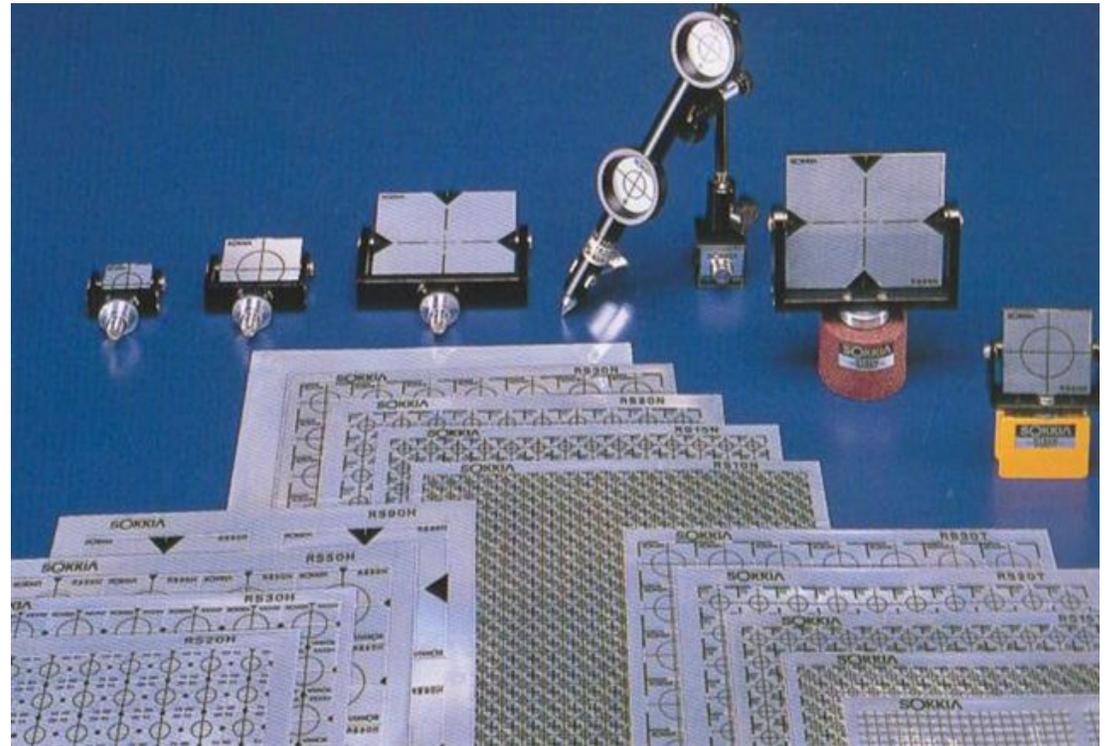
Cylindrical coordinate
Horizontal angle
Elevation
Radius

Sokkia .5 sec Total Station



6' – 1,200'

Horizontal angle



Retro-Reflective Targets

Vertical angle

Radius

Sokkia .5 sec Total Station

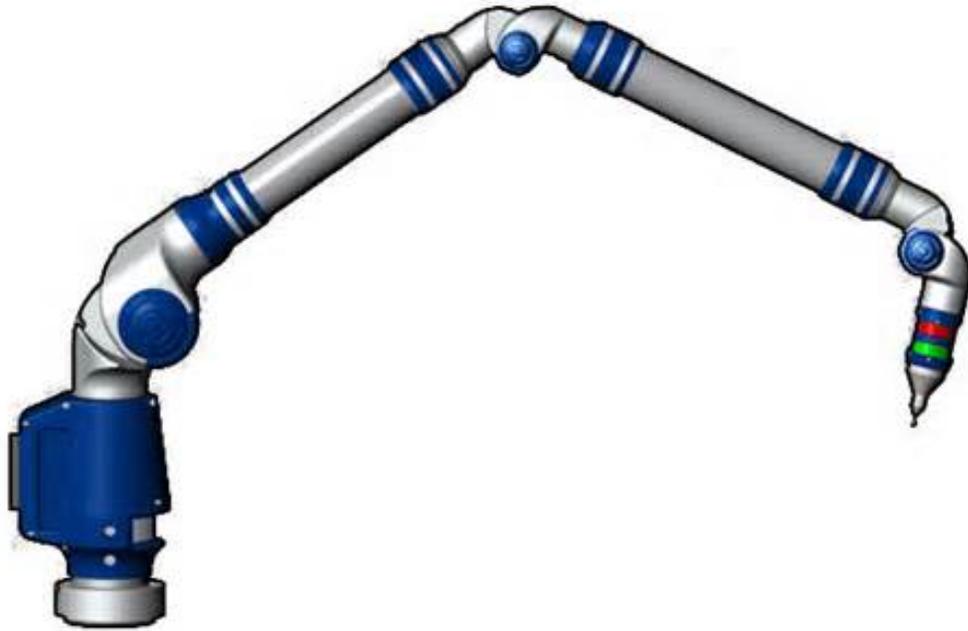


700 lb instrument stand



Bridge crane rails

CMM Arm 3D Mapping and Alignment



Faro CMM Arm

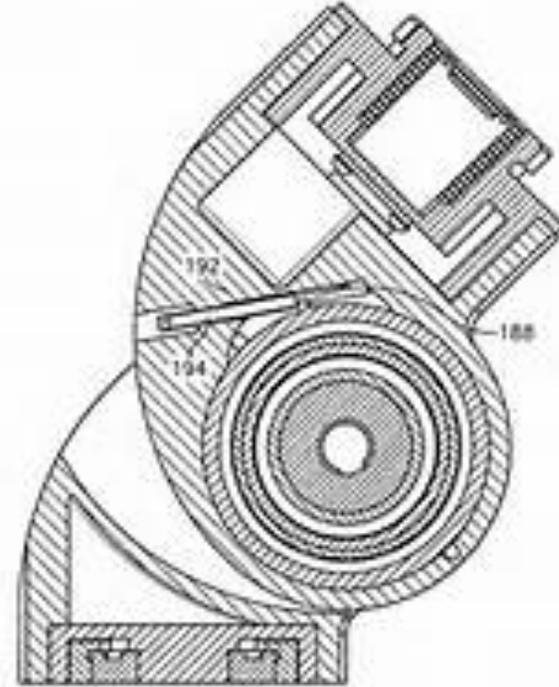


FIG. 28

Encoder at the joint

Collects data from rotary encoders at joints

CMM Arm 3D Mapping and Alignment



Machined part to be inspected with CMM Arm



Mapping flange holes

CMM Arm 3D Mapping and Alignment

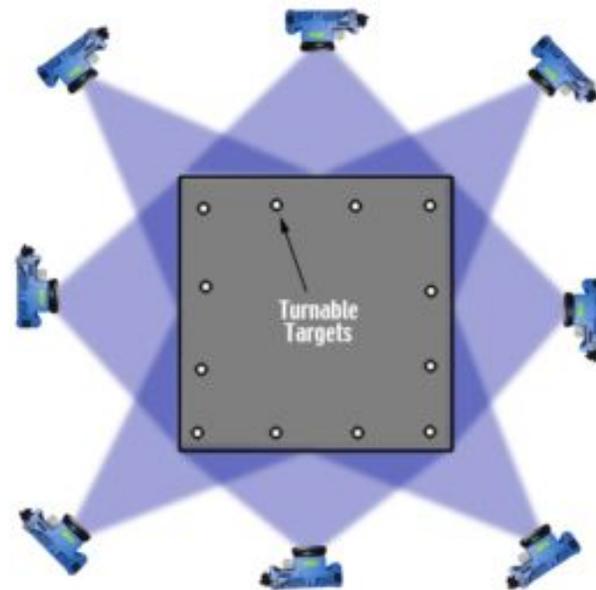
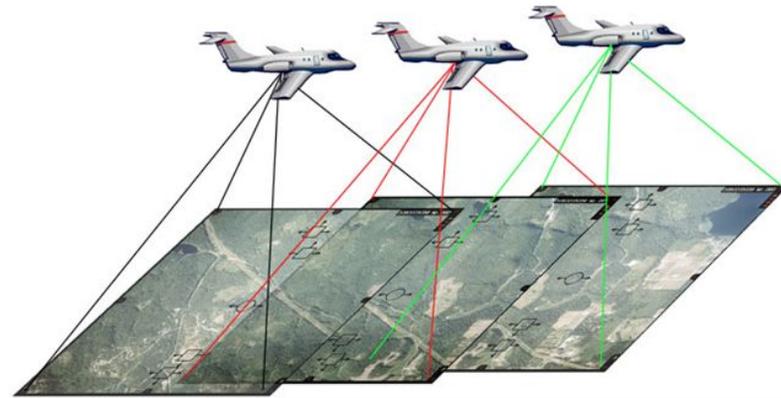
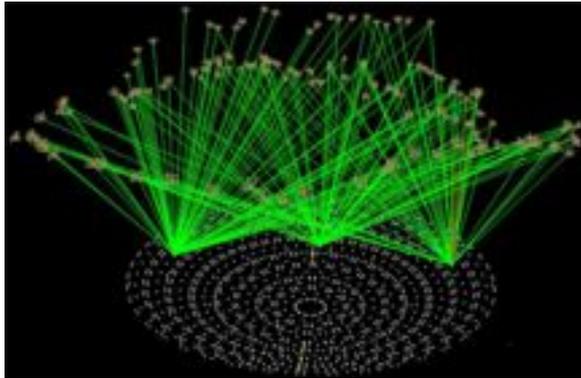


Measuring bore for out of round



Measuring seal face for flatness

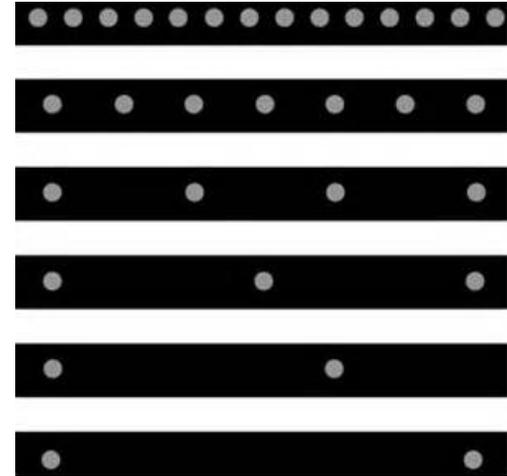
Close Range Photogrammetry & 3D Mapping



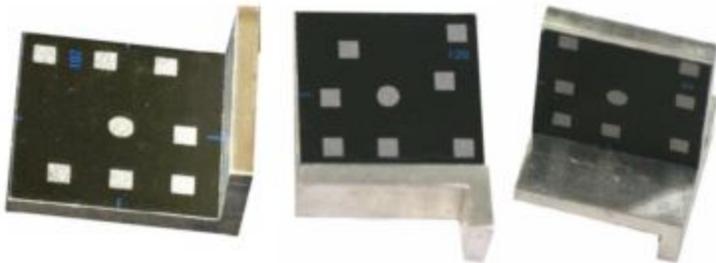
Close Range Photogrammetry & 3D Mapping



Photogrammetry camera



Dot targets



Coded targets

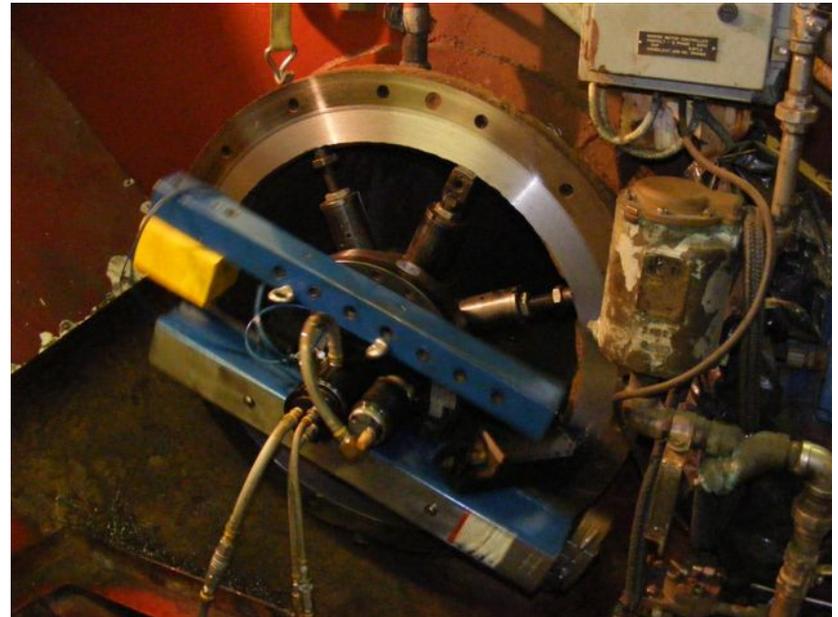


Scale bars

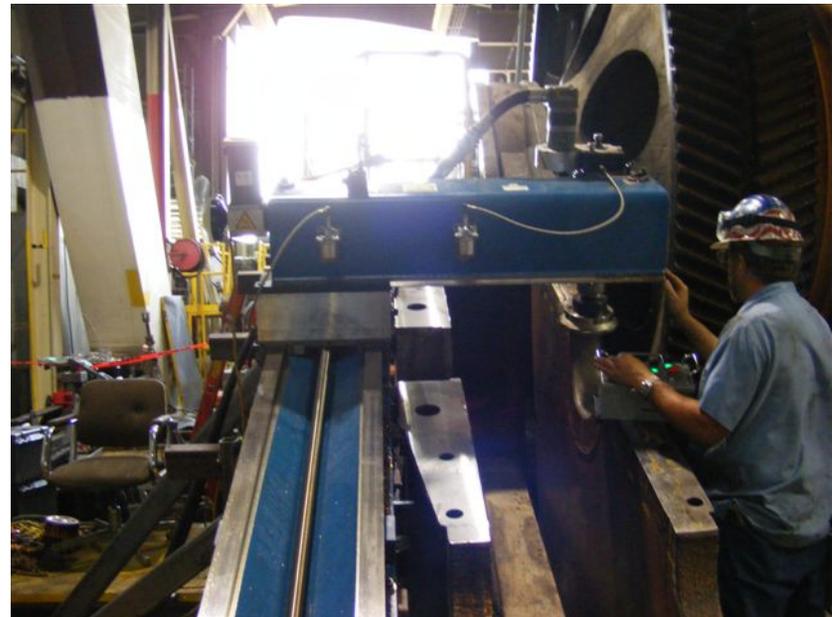
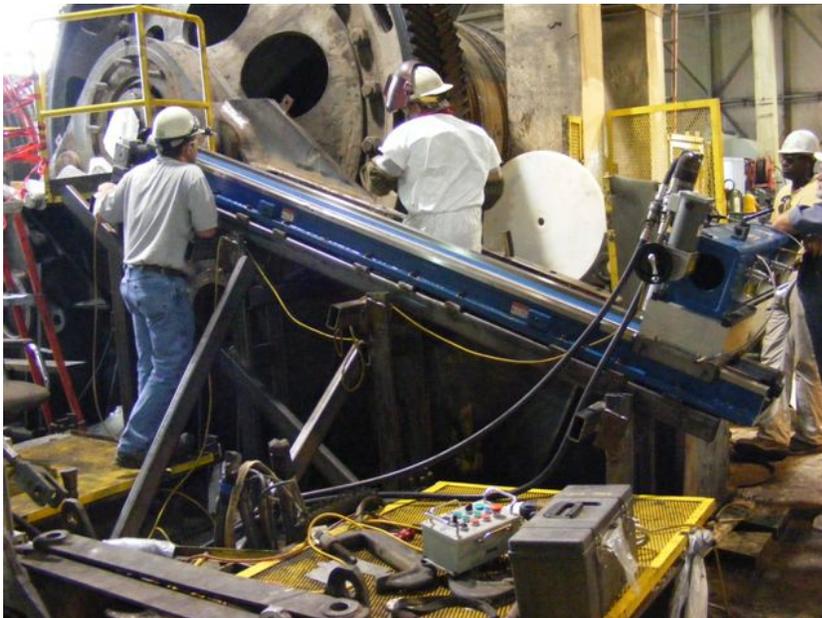
Close Range Photogrammetry & 3D Mapping



Line Bore Field Machining



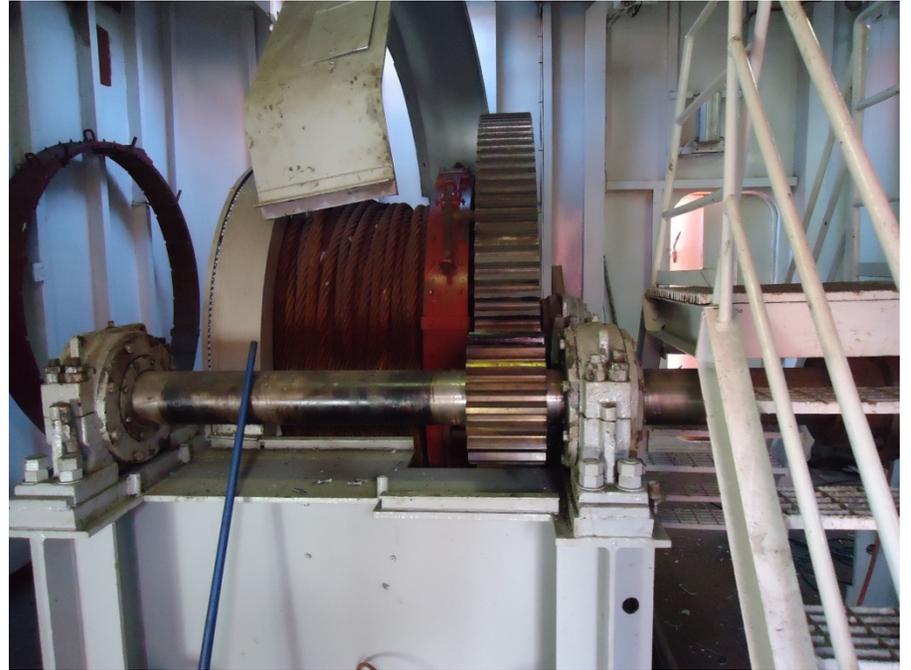
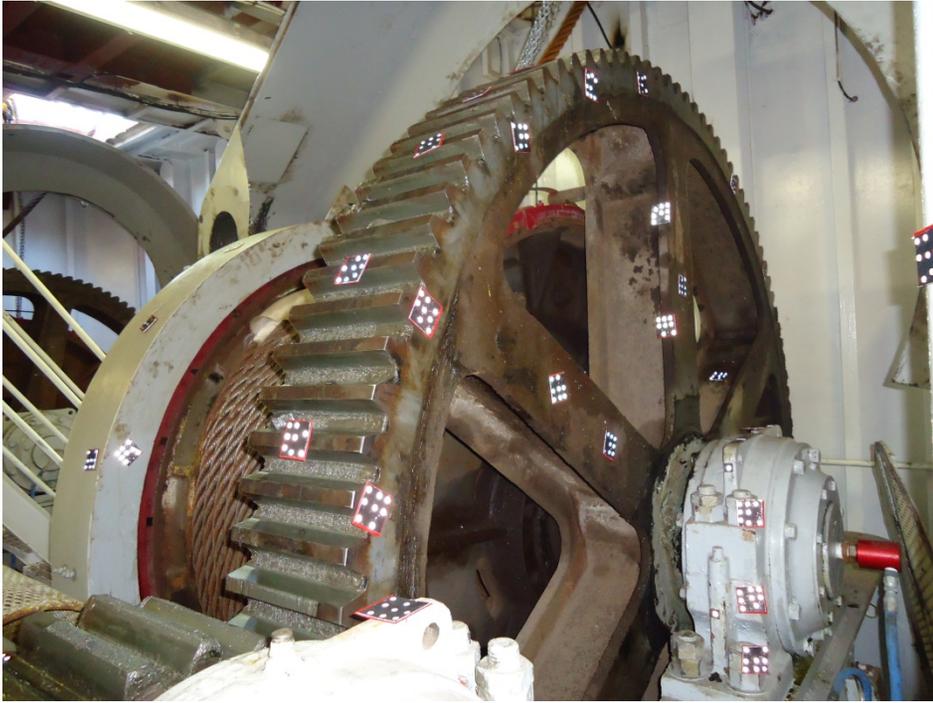
Slab Field Machining



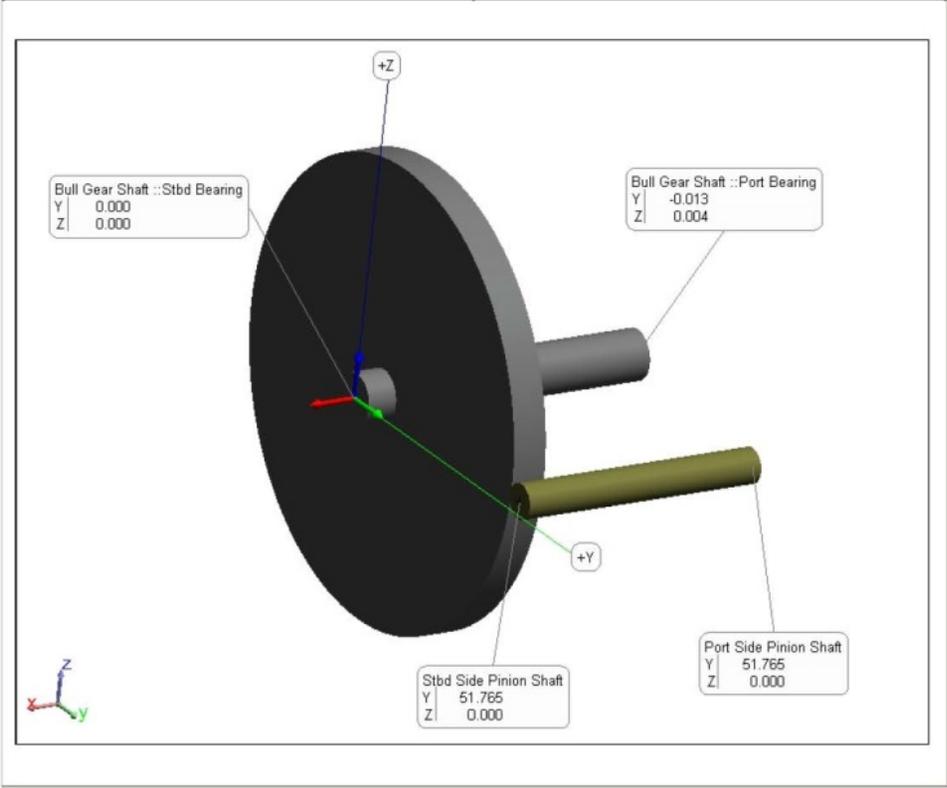


Gear Alignment





Port Side Bull Gear Bearing is High .004" and to Aft .013"	Reference, Stbd Side Bull Gear Bearing and Pinion Shaft
--	---







Installing Targets



Boom Layed Down For Repairs



Mosaic Unit 21

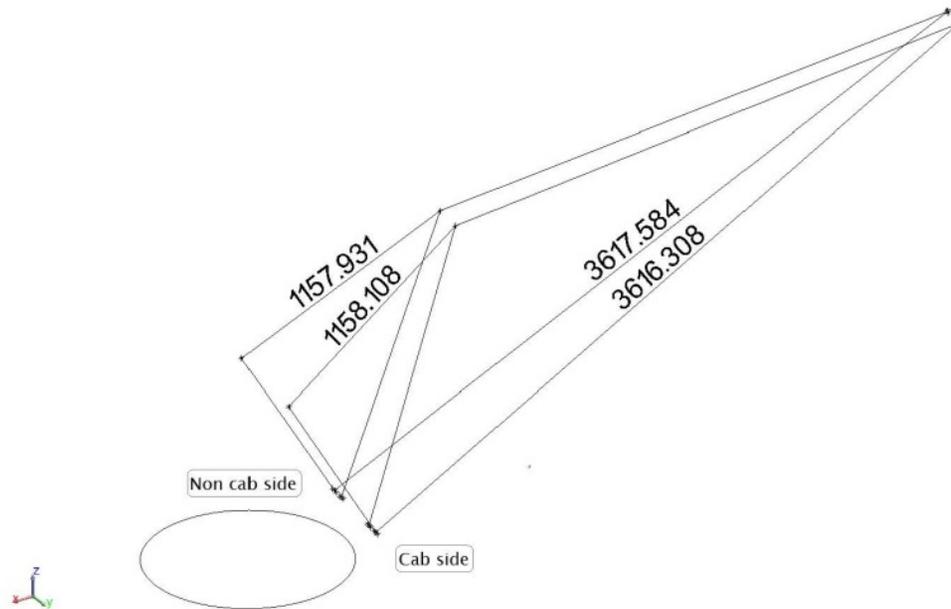
Boom, Mast, A-Frame. Survey

Caterpillar Global Mining LLC
929 US Hwy 17 N
Ft. Meade, Fl. 33841
863-285-7979

Aiman Co.Inc.
36938 Chancey Rd.
Zephyrhills, Fla. 33541
813 715 4600

As Found on Friday Sept 20th 2013

The survey was conducted between the hours of 1 am. and 6 am.



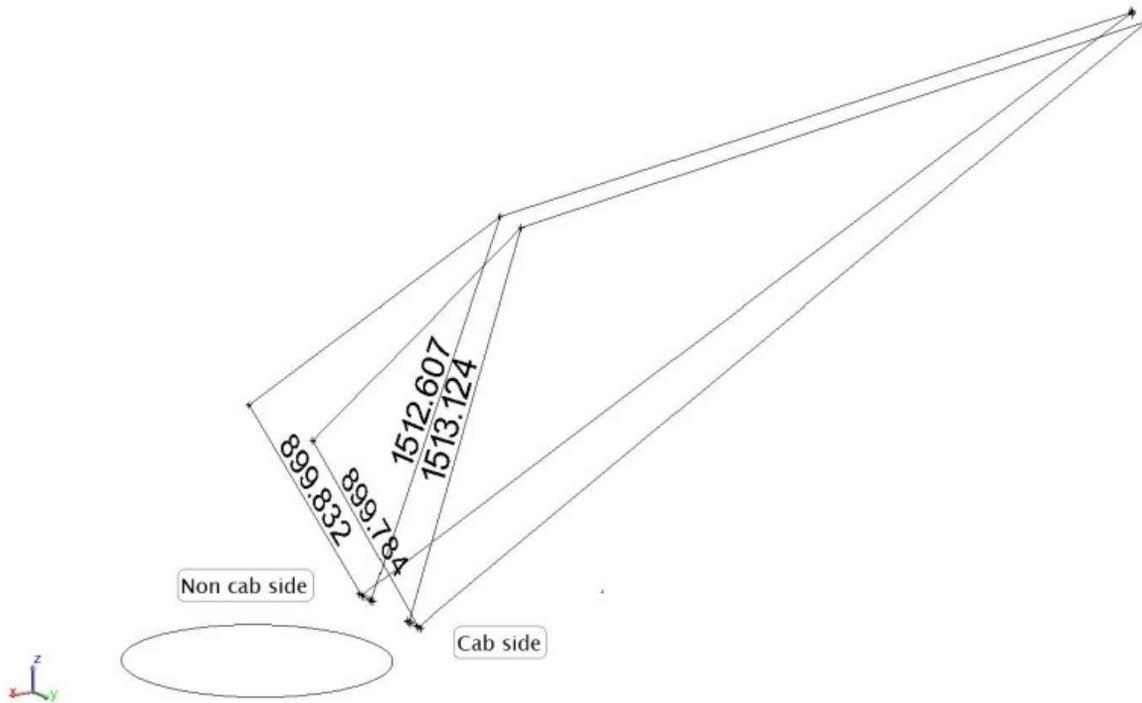
Tip of A-Frame Pins to Tip of Mast Pins
Boom Feet Pins to Boom Tip Pins

Tol. +/- 0.125"

Mosaic Unit 21 9/20/13

UNITS: Inches

Page 1 / 5



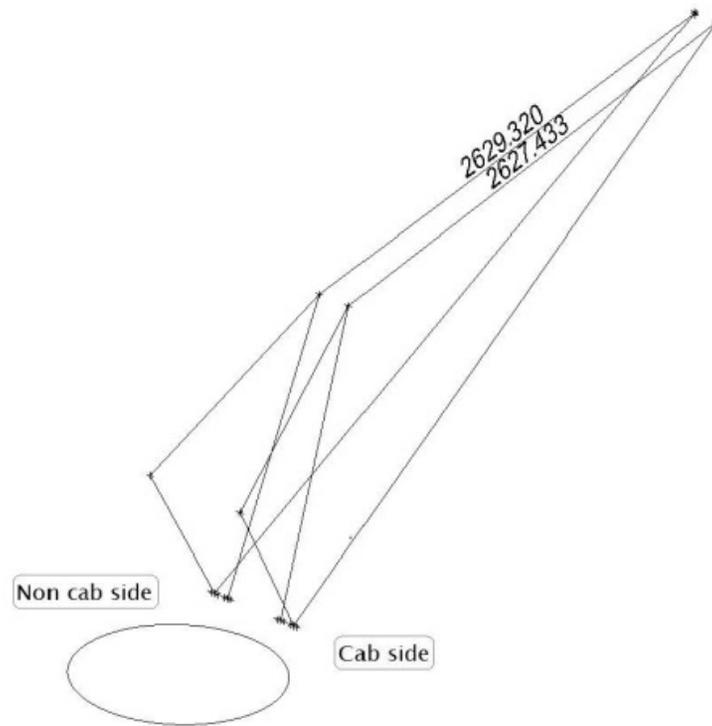
Tip of A-Frame Pins to Boom Feet Pins
 Tip of Mast Pins to Mast Foot Pins

Tol. +/- 0.125"

Mosaic Unit 21 9/20/13

UNITS: Inches

Page 2 / 5



Tip of Mast Pins to Tip of Boom Pins

Tol. +/- 0.125"

Mosaic Unit 21 9/20/13

UNITS: Inches

Page 3 / 5

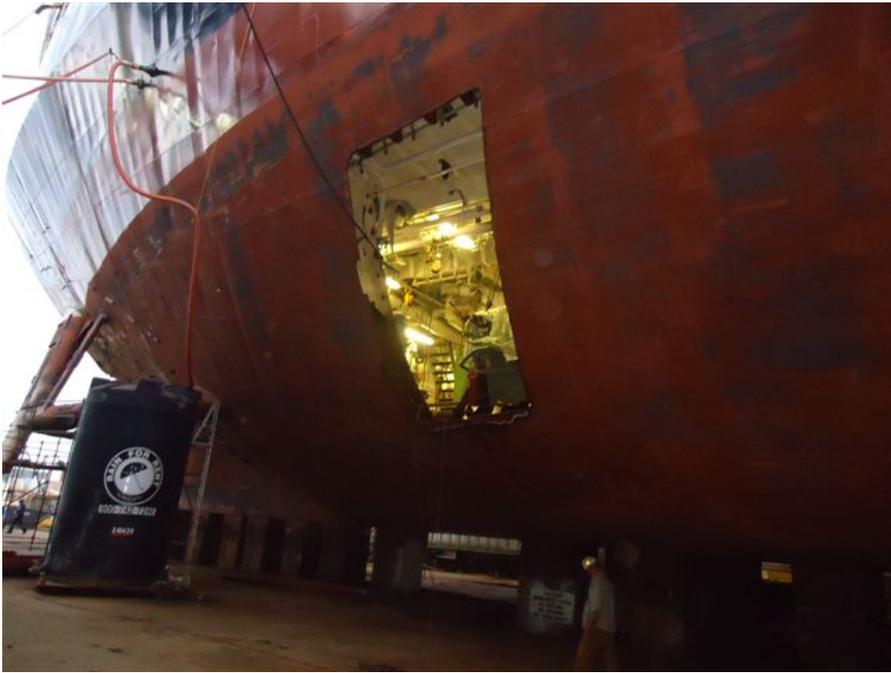
USACE Dredge Wheeler Repower Project at Signal Ship, Mobile, AL 2012-2013



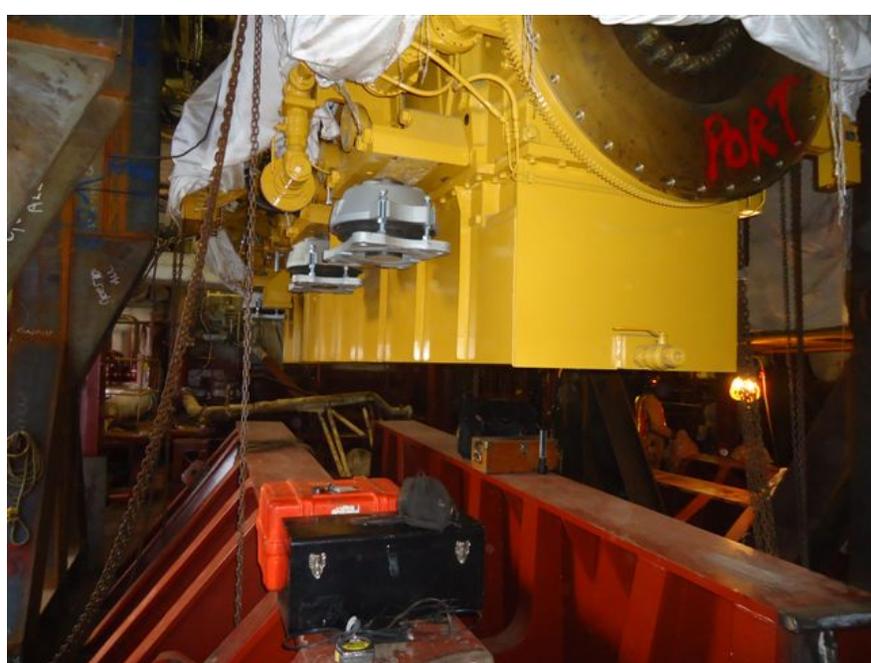
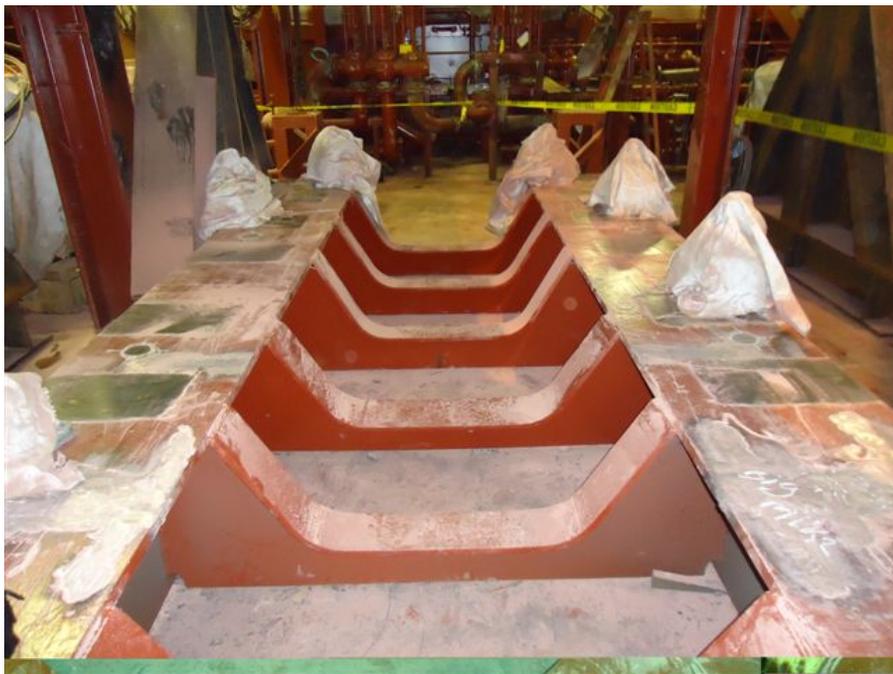


ACOE Dredge Wheeler coming out of dry dock.









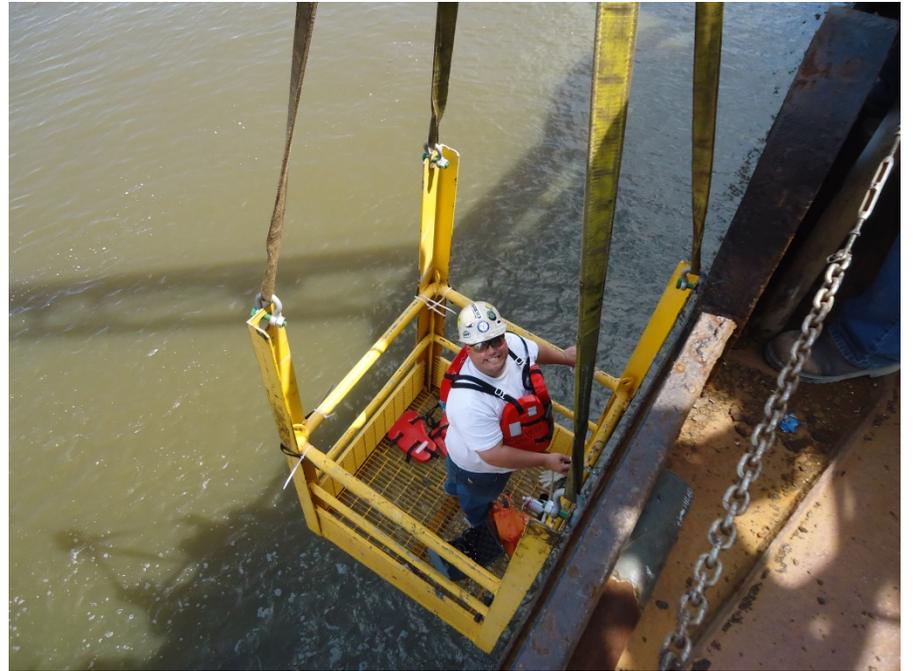
Dry-dock Complete



Carnival Cruise Ship Triumph vs. USACE Dredge Wheeler

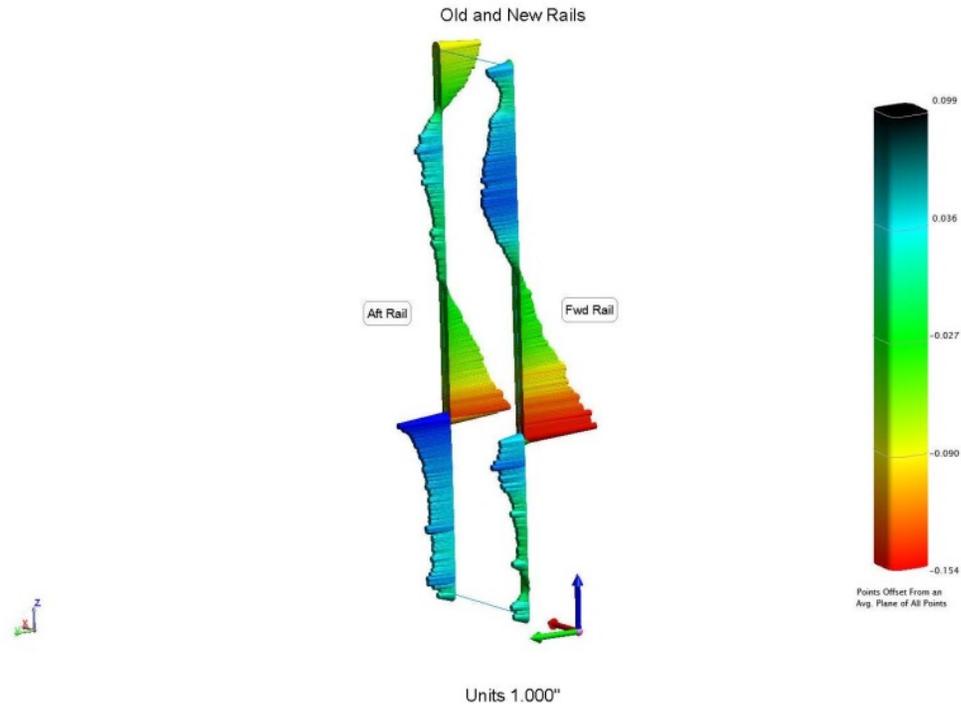






Post Collision With Carnival Triumph Stbd Side Trunnion Rail Flattnes Survey

Red spikes indicate the rail surface is closer to the hull (inboard)
 Blue spikes indicate the rail surface is farther from the hull (outboard)



Units 1.000"

All Vectors Summary: Vector Group	
As Found: Old and New Steel Points Offset From an Avg. Plane of All Points	
Statistic	dY
Min	-0.154
Max	0.099
Average	0.000
StdDev from Avg	0.053
StdDev from Zero	0.053
RMS	0.053
Count	563

Moore Haven Lock Gate Repair Project



East Gates



Line Bore

