

# ZA Castings Improve Surveyor Transits

When you sell precision instruments you get pretty particular about the quality of castings that go into them. That's exactly the case with Warren-Knight Company, Philadelphia, PA which manufactures surveying instruments as well as navigational aids and special instruments for optical sighting and angular measuring. Warren-Knight scrutinizes their castings during each stage of production; in fact, some inspections are even done with a magnifying glass. Ralph Oberholtzer, Vice President of Engineering explains, "Our customers expect a quality product and we can't afford to give them less. Superior finish, internal integrity, sharp machined details and wear performance all play a part in our casting requirements". Two years ago Warren-Knight learned of Eastern Alloys', Inc. new ZA zinc gravity casting alloys and in the interim has specified more than a dozen ZA zinc components for their instruments.

Warren-Knight designs their own instruments and specialty measuring devices. Although they purchase castings and optics, virtually all other secondary machining, finishing and assembling is done in-house. Their machine shop is spotless with special machines doing each manufacturing operation. Their facilities include a paint line which uses the latest aircraft quality paints for their instruments. Even though their part requirements are not high volume (several hundred per year is typical), they continuously evaluate new materials and processes looking for ways to improve their products and lower their manufacturing costs. That's smart business in today's competitive world. "ZA alloys give us a low-cost alloy system to work with which integrates nicely with our present manufacturing methods. We gain higher strengths, lighter weight and better product performance with zinc castings. Another advantage is that we are not limited to sand casting. We're using graphite permanent mold castings on some of our parts and are considering other casting methods", says Mr. Oberholtzer.

But Warren-Knight was cautious about zinc at first. A breakthrough occurred when ZA zinc solved a chronic wear problem experienced with an aluminum tripod head casting. The casting, which is secured to a surveyor's tripod, has an external thread onto which surveying instruments are mounted. With aluminum the external thread on the tripod casting simply galled and wore down after repeated mountings. Switching to ZA-12 zinc solved the wear problem because of zinc's high hardness and excellent wear resistance. Alternate solutions to make the head castings out of bronze or hard anodized coating of the aluminum parts were not economically feasible.

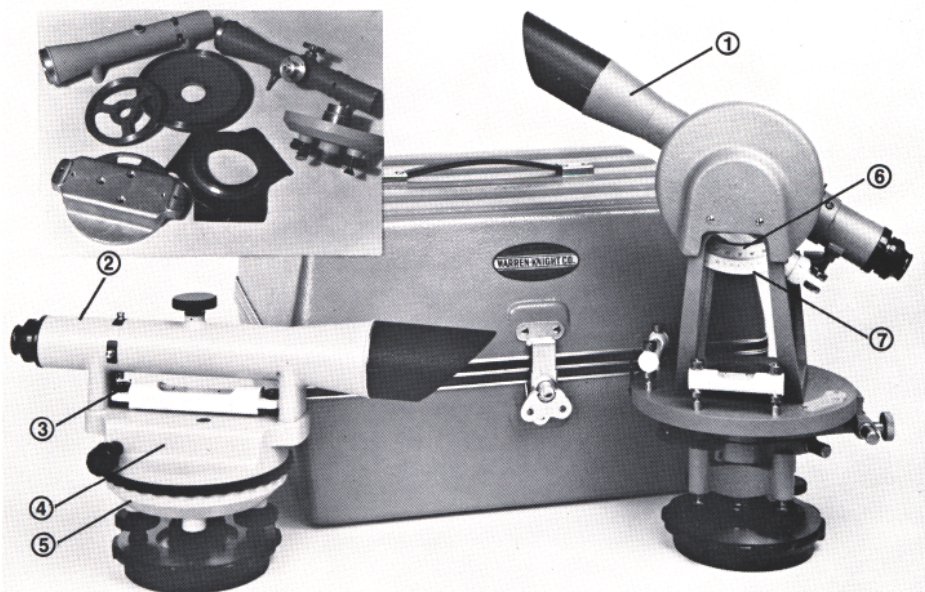
"We selected ZA-27 sand casting for our telescopes because we wanted light weight and maximum strength for long-life durability", says Mr. Oberholtzer. Strength of ZA-27 is in the 60,000 psi range and the alloy is 43% lighter than bronze. A good cost saving

was appreciated compared to the sheet brass assembly which was the traditional manufacturing method for the telescopes. Precision machining of ZA-27 was no problem even for critical internal diameters which are honed to close tolerances. Warren-Knight was able to incorporate a tilting axle on one of their telescopes as part of the sand casting because of zinc's good bearing qualities.

Tilting surveyor transits incorporate vertical and horizontal circles which are given a brush finish and engraved with indications of degrees for angular measurement. For these parts Warren-Knight chose precision ZA-12 graphite permanent mold castings to ensure a tight, defect-free structure. ZA-12 engraved extremely well and provided sharp edged lines and lettering, which when painted black, contrasted with the brushed finish. Aluminum was used in the past, but engraving soft aluminum resulted in tears and unattractive ragged edges. Also, under-the-skin porosity was often experienced with aluminum. Other Warren-Knight structural zinc parts shown in the photo include the leveling head and level bar/plate made as ZA-12 sand castings. In both cases, the smooth as-cast surface finish was perfectly satisfactory for painting without the need for grinding and polishing.

"Right now we have other ZA castings on the drawing board as we bring on our new product lines. We're pleased with zinc because the alloys provide a combination of technical benefits and superior economics. But it's the quality of ZA castings and their ease of machining and finishing that impress us most. In the near future one of our newer instruments could be made entirely of ZA castings", says Ralph Oberholtzer. Things have progressed so well that Warren-Knight is thinking of producing some of their castings in-house. ZA zinc is the only alloy system that is being considered because of zinc's clean, low temperature melting characteristics.

ZA castings have made life a little easier at Warren-Knight by helping them control their costs and improving their cast product quality. Maybe ZA alloys can help you. Eastern Alloys would appreciate the opportunity of showing you the many cost-saving benefits of ZA alloys for your sand castings, permanent mold castings, graphite permanent mold castings and die casting requirements. Our technical service team is available, just by asking, for consultation with you and/or your customers about ZA zinc or for on-the-spot casting assistance. Just call or write Derek Cocks.



*Builders level (on left) and a contractor's transit (on right) are two of three new surveyor instruments made by Warren-Knight Company, Philadelphia, PA which use ZA zinc castings. These include: (1 & 2) ZA-27 sand cast telescope castings; (3) ZA-12 sand cast bubble leveler housing; (4) sand cast ZA-12 lever bar and plate; (5) ZA-12 sand cast center leveling head; (6 & 7) engraved ZA-12 graphite permanent mold vertical and horizontal circles.*

*(Inset photo) Examples of more than a dozen ZA castings specified for transits and other miscellaneous measuring instrument components made by Warren-Knight Company.*



Reprinted from "Alloyer" the Eastern Alloys newsletter

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