MAVERICK
INSPECTION LTD.

Research & Development

Industrial Drainage Video Inspection Floating Platform

Custom Solution Development Case Study Compiled by Warren Tessari

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www.maverickinspection.com

About Maverick's Research & Development Department

Research & Development began for Maverick in 1994: sourcing, customizing, developing and creating inspection tools because there was no other choice. In the beginning, we had a limited selection of options and we often had to create our own ways of accomplishing completely new inspection missions. In addition, we searched out innovators from around the world and introduced their technology and methods to our clients in Western Canada.

Since then, we have increased our selection of off-the-shelf solutions for video inspection, subsurface investigations, utility location, and other services. We have, however, also increased our capability for creating and modifying inspection systems to match specific job requirements. At our R&D facility, we have the means of designing, manufacturing and testing custom systems.

The Challenge

Industrial drainage systems such as oily water sewers are a unique inspection challenge. Although Maverick has a wide range of piping inspection systems, water level and flow make many robotic crawler inspections impractical.

Ryan Brosda, Maverick's Remote Video Inspection Department Manager, researched available raft options, however he was not satisfied with their quality or features. They were either limited to a large size of pipe, difficult to deploy, not sufficiently rugged for industrial applications, and/or couldn't be modified or added onto for additional instrumentation such as sonar.

Ryan came up with a specific list of features he was looking for in a floating video inspection platform:

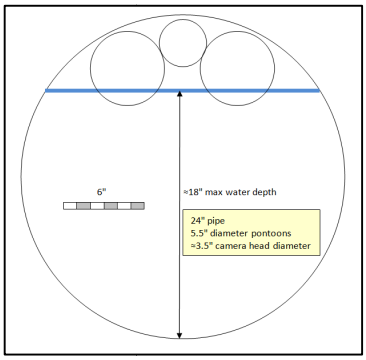
- stability with a larger explosion-proof pan & tilt camera head
- ability to flow with the current or be pulled through by rope
- industrial in quality and durability
- easy to insert and remove through manholes and catch basins
- minimal draft for low water levels
- ability to fit into a range up pipe sizes down to 16"

Maverick has a wide selection of pipe cameras, crawlers and robotic camera systems.

However, an industrial raft platform was missing from our remote video arsenal.

- safe for use in coated pipes without risk of liner damage
- modular and adaptable for different applications
- uses only easy to source materials for field repairs
- capable of carrying additional instrumentation such as sonar
- less expensive then available options
- needed to be designed, built and ready in a short time frame for upcoming job scopes
- needed to look professional and represent Maverick well on site

The Design and Build Process



Warren Tessari and Trent Reiter went to the drawing board at Maverick's R&D facility. Early discussions quickly narrowed the concept down to a pontoon design. This gave the greatest flexibility for setting the overall dimensions and stance, and was agreed upon as a generally stable platform.

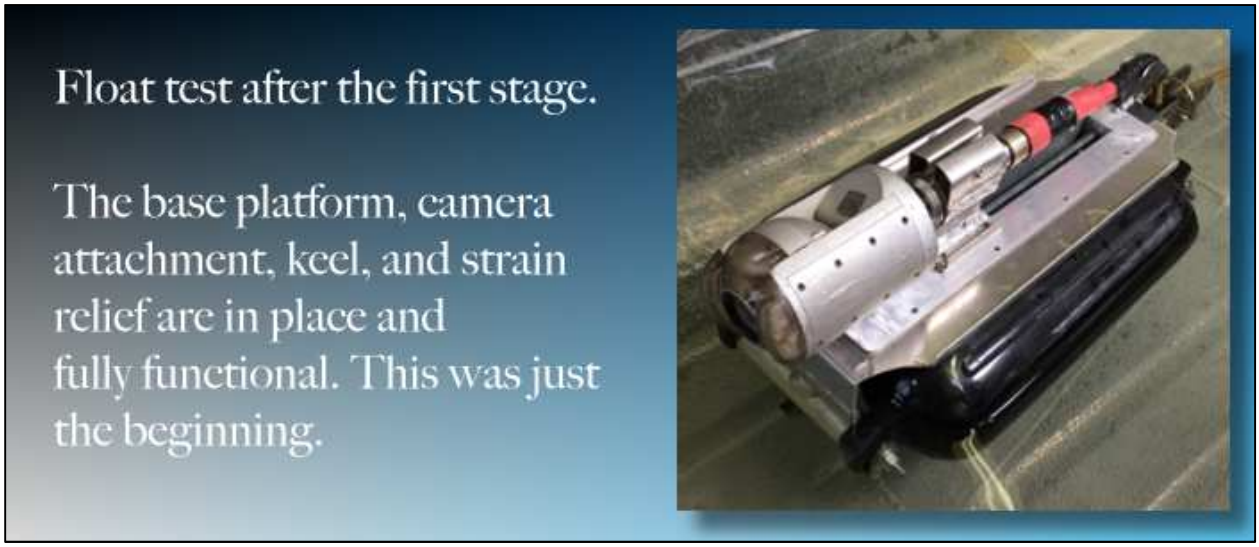
After a couple of quick sketches, materials were collected and fabrication started within the first day. One of the biggest challenges was the weight of the IBAK Orion explosion-proof camera head. This was the right inspection system for the application, however the camera presented some stability issues. Other, commercially-available rafts overcame this by tucking the camera back and low in the center of the platform's body. We decided, however that we wanted a full 360° circumferential field of view.

Another challenge was balancing the raft length-wise, especially when the cable was attached and under tension during an inspection.

Warren sourced out pontoon materials. These had to be readily-available, effective, durable, and safe for coated pipe. He settled on boat fenders. These come in a variety of sizes, are oil and chemical resistant, easy to source, and they are made to take a beating between boat hulls and docks.

The drawing board gave way to the work bench. Trent decided that the camera position should be easily adjustable along the length of the craft. He constructed an aluminum housing to hold the camera cable adaptor, and then attached it to a threaded rod for ease of positioning.

The main platform and components were constructed from aluminum to reduce weight. The stance was narrowed from the initial drawings to enable navigation of smaller pipes. A heavy keel steel keel was added for stability and to act as a solid attachment point for a tow rope and camera tether. Tether strain relief was incorporated into the rear portion of the keel.



The next stage was to deal with the tether. Because the camera would be pulling against the tether, and the weight of the tether would be affecting the stability and balance of the system, a solution was required. This answer was a separate raft, hinged and balanced, to carry the weight of the cable and absorb any tether pull in unwanted directions.

A heavy plate was added to the bottom of the rear pontoon car. The tether was fed through the keel, with plenty of room for movement. Balance and height adjusting systems were added to the coupling between the halves of the raft. Both keels incorporated plastic or rubber slides to prevent damage to pipe coatings.

At this point, only one pontoon was incorporated in the rear tail. After float tests, however, a second pontoon was added for additional stability and to create space for a future deck for carrying additional loads such as instrumentation power sources and controls.

The hinged design worked well to allow for easy manoeuvring and insertion into drain lines from catch basins. Next, a cage was required to protect the camera from the top of the pipe if the water level was particularly high. Trent decided that a welded aluminum cage would provide protection, be light weight, look good, and be a strong point for lowering the raft into a drainage system.

Trent shaped and welded aluminum bar into place and attached it to both ends of the main raft. Just enough clearance was left for the camera head to pan & tilt unobstructed. The cage was curved to stay out of the camera's field of view when inspecting the pipes' circumference.

After all of the final design and construction considerations, the system was retested, disassembled, and sent to the paint booth.

The Inspection Experts Have Their Say

It was time for the final test in Maverick's R&D facility before the system was sent out to a job site. Jon Hill and Marty McTeague, two of Maverick's Video Inspection Senior Technicians, were chosen as the testing crew.

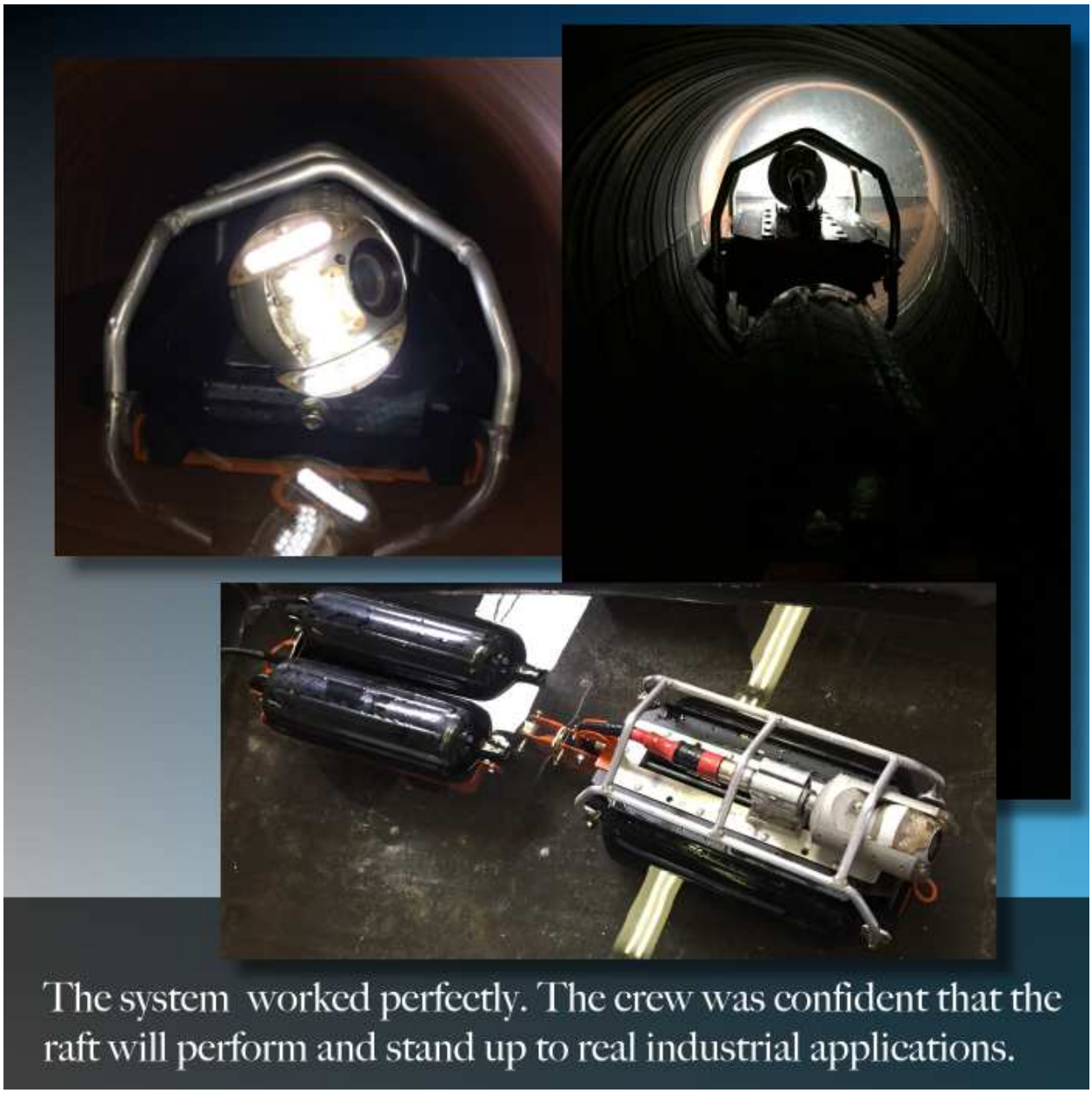
A 16" pipe was prepared and lowered into the test pool. A water level of 6" was chosen as the minimum for raft applications. Any less, and an explosion-proof scissor crawler would be used for drainage lines.

The field technicians were on hand to not only give a final opinion on the design and basic functions, but to assess the ease of assembly, camera protection, adaptability, durability and other features. They perform daily remote video inspections on a wide range of sites, and they only accept tools that can live up to their demands and the expectations of Maverick's clients.

The system worked perfectly in the final tests. With the dual-pontoon configuration, it could tip past 90° and still right itself quickly. The deployment and protection cage was easy to grab by hand or with a hook. It was easy to assemble and deploy, and provided a stable inspection platform.

The light weight of the system made it an easy one-person lift. The technicians tested the camera position adjustment, articulating carriage for drainage system deployment, and camera field of view. The overall system was rugged enough and had more than sufficient functionality for their needs.

Although appearance was not their primary concern, they were very happy with the aesthetic elements of the design and its professional appeal. Maverick crews and equipment get a lot of attention when they are setting up on industrial sites, so it is always nice to have tools that look well made and durable with a quality fit and finish.



Conclusion

Ryan Brosda was satisfied that the project met all of his requirements. In addition to the functionality, appearance, and quality of the custom platform, the entire process was under budget and ahead of deadline. It took less than a week to create from start to finish and cost less that ⅓ of the price of a commercially available solution. This also avoided passing on shipping costs and delays to our clients, keeping our services competitive. This modest budget and quick turnaround didn't sacrifice any quality or features, and in fact surpassed other options with an effective, durable and modular design.