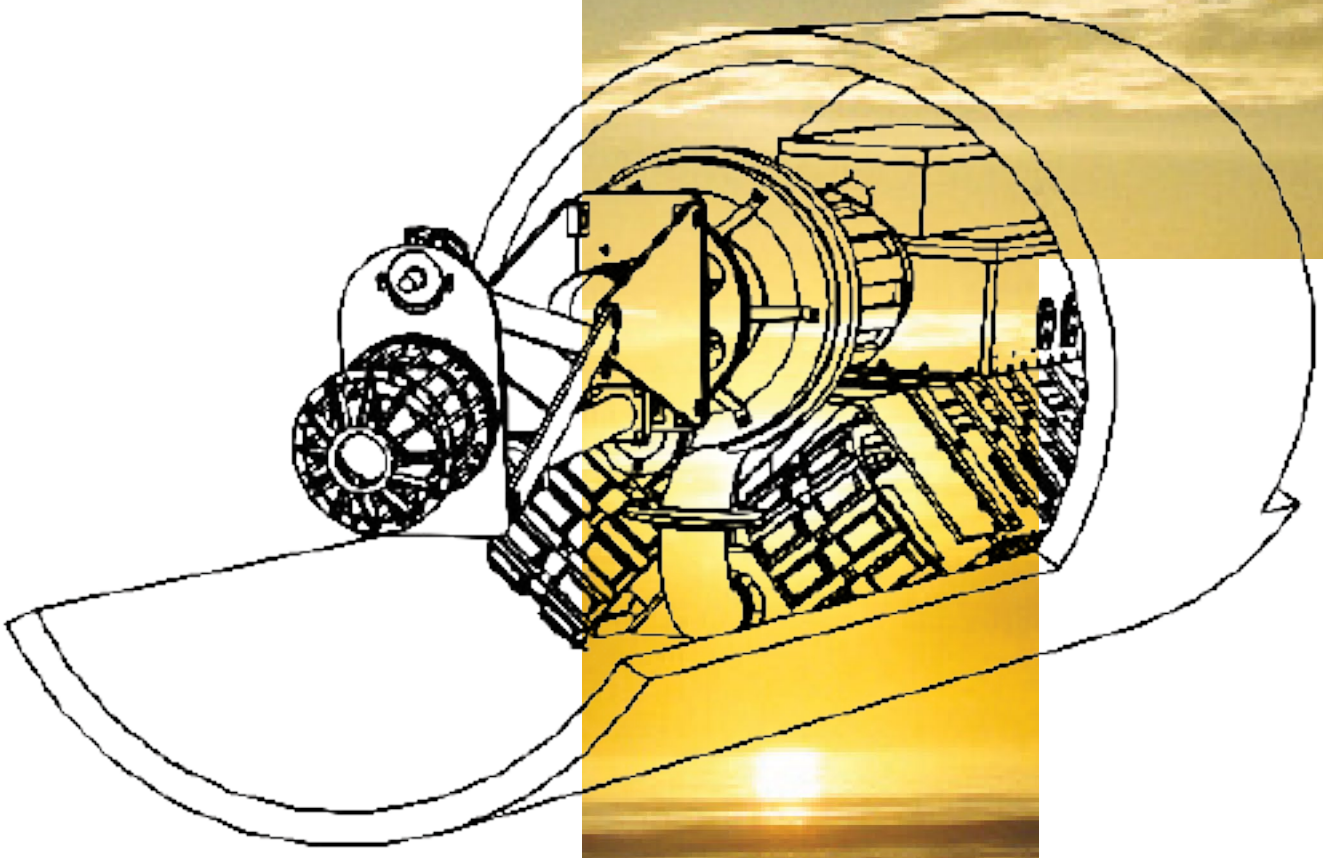
DSI Robotics

SERVICE PROFILE



Desilting Robots
Inspection ROVs
Maintenance
Robots
Robotic Dredgers

Water
Wastewater
Marine

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A Humble Beginning...

- *On 6th Aug. 2007, a call was received by DSI enquiring about a robotics survey system that can be used for pipeline surveys. The client was facing problems with the CCTV survey work of the pipelines contracted to them by DJB.*
- *Perceiving it as an interesting opportunity, a quick requirement analysis was done.*
- *On 24th August, 2007, about 10 days later than the initial meeting, DSI performed a successful test run of the "Woody", a prototype model of what would become India's first indigenously developed pipeline survey system.*
- *By November 2007, Woody had completed nearly 1.5km of pipeline conditional assessment at client's premises.*
- *Since then, DSI has positioned itself as a one-stop solution provider for all types of pipeline & underwater inspection robots.*
- *Currently we cater to a multitude of industry types ranging from Municipal, Chemical, Power as well as Marine & Offshore industries.*
- *Today, DSI boasts of robots as small as a few inches to up to 4 tonne robotic dredgers.*

Corporate Profile

Digital Surveillance Inc. (aka DSI), is an indigenous design and manufacture of Confined Space, Subterranean, Amphibious and Marine robotic platforms. DSI is the pioneer in the field of pipeline robotics in India and the only original manufacturer of Robotic Pipeline CCTV Inspection Systems in India and neighbouring countries.

DSI was started by a group of technocrats as a new high-tech startup in India in 2006, with the major objective of developing Robotic and Automation Technologies indigenously. DSI has developed world class state-of-the-art ROV platforms for inspection, cleaning, desilting, dredging & repair of Water, Wastewater (sewer/drainage/effluent) & Marine assets for Indian Municipal & Industrial Clients and is now eyeing international markets.

DSI is already established as the market leader in the field of Inspections for sub-surface pipeline infrastructure (primarily water, sewerage, drainage & marine pipelines). DSI's Beaver series of Robotic Pipeline CCTV Inspection Systems is a keystone product that has profound implications in these fields and has helped the asset owners save hundreds of crores in revenue losses. It has carved a new industry in this space and changed the way pipeline infrastructure works are done in India. DSI also provides consultancy services to civic agencies by helping them in assessing and investigating their pipeline infrastructure for the purpose of maintenance, rehabilitation and expansion.

Inspections Portfolio

- Industrial Pipeline Inspections
- Sewer Pipeline Inspections
- Water Pipeline Inspections
- Sea-water Intake Pipeline Inspections
- Sonar & Laser Inspections
- Leak Detection & NRW reduction
- Reservoir & Tank Inspections
- Boiler Tube Inspections (Upcoming)

Product Portfolio

- Underwater Observation Class Cameras
- Underwater LED Lights
- Pipeline CCTV Inspection Robots
- Laser Profiling Robots
- Root & Cement Deposits Cutting Robots
- Submersible Pan/Tilt/Zoom Cameras for special Industrial & Defense Applications
- Customized Robotic & Automation Systems

Service Portfolio - Work Class Robotics

- Robotic Desilting of Industrial Pipelines, Reservoirs & Sumps.
- Robotic Desilting of Sea-water Intake Pipelines & Effluent Pipelines. No restriction of monsoons or requirement of barge access from the sea.
- Robotic Dredging of Shiplift Systems, Reservoirs, Underground Tanks, Covered Drains, Canal Systems, Culverts, and other Marine assets with restricted access.
- Robotic Desilting of Sewer Pipelines (Upcoming).
- Robotic On-Spot-Repair of damaged pipelines (Upcoming).
- Clearing of hard to remove blockages like brick and cement deposits in sewers and drains (Upcoming).

Achievements in Robotics

DSI had designed India's first Pipeline Survey Robot for the works of Delhi Jal Board in 2008. We launched India's first Industrial Tank-type design robotic platform in January, 2011. A major breakthrough was achieved when DSI indigenously developed a fully submersible and underwater operable PTZ camera with an explosion proof design in 2009. DSI feels proud to have achieved a state-of-the-art world class Sewer Inspection Robot with the launch of its Beaver series in 2013.

DSI is also India's first and one of the only four companies in the world who have created a water pipeline inspection system for pressurized waterlines. DSI has also designed storm drain & marine crawlers that can operate in submerged conditions for survey of non-pressurized water transport pipelines, covered drains, water tunnels, large-scale drainage systems, industrial pipelines and marine pipelines. The Beaver Marine robot can provide single running length inspections of up to 8 km from a single point of access in the pipeline. This allows for quick and easy inspections of most industrial, water transport and marine pipelines directly from the land access point without the need to venture into the sea or river bodies.

DSI has now developed the World's first Robotic Pipeline Desilting System for cleaning of industrial and marine pipelines. DSI has also developed the Asia's First Underwater Operable Robotic Dredger for specialized applications of dredging marine assets and canal systems with restricted access. It can also provide active desilting of reservoirs, settling tanks and wells. DSI has also developed a remote-controlled pontoon-based ladder dredge that can be customized on-site as per project requirements. This has great applications for desilting of chemical/effluent reservoirs and contaminated lakes or ponds.

DSI is also developing inspection technologies for chemical pipelines, boiler pipelines and for the shipping industry. The firm has a long-term goal of transgressing into the field of Defense Robotics & Aerial Surveillance platforms which is still nascent in India. The Skydog® series of UAVs and Otter™ series of underwater ROV's are a step in that direction.

Manufacturers of:

Beaver	OWL inspection cameras	ORCA ROBOTIC PIPELINE DESILTING	Seahorse Robotic Dredgers
Pipeline Inspection, Repair & Maintenance ROVs	**Underwater Operable, fully submersible cameras**	**Marine Pipeline Desilting Robots**	**Seahorse Robotic Dredgers**
Products & Services	Products	Services only	Services only

History & Achievements

Digital Surveillance Inc (aka DSI), is the pioneer in the field of pipeline and marine robotics in India.

DSI was started in 2006, with the major objective of developing Robotic and Automation Technologies indigenously. DSI has developed world class state-of-the-art inspection technologies for the Water & Wastewater (sewer/drainage) infrastructure industry and is now eying the global market.

The Indian industrial environment benefits from its vast resource of cheaply available skilled and non-skilled labour. It is not DSI's intention to substitute human labour but to find solutions to problems where either human access is not possible or at high risk or legally not allowed. DSI provides specialized inspection, repair & maintenance services to various public and private sector organizations using self developed robotic machines to enhance productivity, increase efficiency, reduce execution time, eliminate risk to human life while maintaining a cost effective solution to problems that have limited or no solution using classical methods.

We were awarded as the Most innovative SME of the year in SME Emerging India Awards 2018 judged by The National Productivity Council of the Government of India

Mr. Amit Agrawal, Proprietor, Digital Surveillance receiving Winner Trophy in the category - 'Most Innovative SME of the Year' from Shri Chaudhary Birender Singh, Hon'ble Union Minister of Steel, Govt. of India & Mrs. Juuhi Rajput, MD, Arrucus Media Private Limited

We also received Both the TOP 100 SME Award & INNOVATION AWARD at the India SME Forum Awards 2017 supported by the Ministry of Small & Medium Enterprises (MSME), Government of India, for our pioneering work in the field of Pipeline Inspection Robotics. The award was conferred by the Honorable Union Minister of MSME (Ministry of Small and Medium Enterprises, Government of India), Shri. Kalraj Mishra himself.

DSI is already established as the market leader in the field of sub-surface pipeline infrastructure (primarily water, sewerage, drainage & marine pipelines). DSI's Beaver series of Robotic Pipeline CCTV Inspection Systems is a keystone product that has profound implications in these fields and has helped the asset owners (municipalities, Jal Boards, et cetera) save hundreds of crores in revenue losses. DSI has also helped the Indian contractors by reducing their Capital Expenditure and Operational Losses, and providing them with a level playing field with international contractors who were dominating the water and sewer industry in the field of trenchless technology services. It has carved a new industry in this space and changed the way pipeline infrastructure works are done in India.

DSI had designed India's first Pipeline Survey Robot for the works of Delhi Jal Board in 2007 and launched the first commercial version in 2008. We launched India's first Industrial Tank-type design robotic platform in January, 2010. A major breakthrough was achieved when DSI indigenously developed a fully submersible and underwater operable PTZ camera and LED lights with an explosion proof design in 2009. DSI feels proud to have achieved a state-of-the-art world-class Sewer Inspection Robot with the launch of its Beaver series in 2012 which is now a commercial success.

DSI has also designed Storm-drain & Marine crawlers that can operate in submerged conditions for survey of non-pressurized water transport pipelines, covered drains, water tunnels, large-scale drainage systems, industrial pipelines and marine pipelines. The Beaver Marine robot can provide single running length inspections of up to 4 km from a single point of access in the pipeline. This allows for quick and easy inspections of most industrial, water transport and marine pipelines directly from the land access point without the need to venture into the sea or river bodies.

DSI has now developed the World's first Robotic Pipeline Desilting System for cleaning of industrial and marine pipelines. DSI has also developed India's first underwater-operable robotic dredger. Additionally, we have pioneered a remotely controlled lightweight floating platform-based robotic dredger for specialized applications of dredging marine assets and canal systems with restricted access. These can also provide active desilting of culverts, inverted-siphons, reservoirs, settling tanks and wells.

DSI is also developing inspection technologies for chemical pipelines, boiler pipelines and for the shipping industry. The firm has a long-term goal of transgressing into the field of Defense Robotics & Aerial Surveillance platforms which is still nascent in India. The Skydog® series of UAVs and Seahorse™ series of underwater ROV's are a step in that direction.

Innovation Timeline

- India's first **Pipeline CCTV Inspection System in 2008.** The state-of-the-art Beaver™ series was launched in 2013.
- India's first **fully-submersible and underwater-operable PTZ camera in 2009.**
- India's first **underwater operable LED lighting system in 2009.**
- India's **first pipeline inspection (Track based) crawler for long distance inspections of up to 4 km** from single access which is beneficial in case of cross-country water pipelines and marine pipelines, in 2014.
- A Robotic Sewer Pipeline Desilting ROV was designed in 2014 by us but manufacturing has started now due to lack of industry support until the starting of Smart City Mission.
- India's first indigenously-designed **fully-submersible underwater-operable dredging ROV in 2016.**
- World's first **Robotic Pipeline Desilting System for Marine pipelines in 2016.**
- India's first **indigenously-designed pontoon-based remote-controlled dredging ROV in 2017.**
- India's first **Laser Profiling System for pipelines in 2017.**
- A new innovative design of a **marine pipeline crawler system (that can travel along the pipe crown)** for inspections of up to 4 km from single access in 2017.
- Long Range **CCTV Inspection Robot for Conditional Assessment of Water Mains** developed and implemented in Pune (January 2019).
- Successfully finished design work for an innovative **Sewer Desilting Robot in January 2019. Fabrication/Manufacturing started in February 2019.**

Reference List

Digital Surveillance Inc. is a trusted name in the Indian water & sewer pipeline infrastructure industry has been successfully implementing Robotic Inspection, Desilting & Dredging for over a decade.

Robotic Inspection & Desilting services of WATER ASSETS

We have executed Robotic desilting/dredging of Water Assets for:

- M/s Nirma Udyog Ltd for desilting and inspection of their seawater intake pipeline at their Saurashtra Chemicals Ltd plant in Porbander, Gujarat.
- M/s Lavgan Dockyards Private Ltd for Robotic desilting/dredging of their Reservoir Area under the Shiplift at Jaigarh in Ratnagiri, Maharashtra.
- M/s Kleen Water Technologies for the works of the IOCL refinery at Paradeep in Odisha for their client M/s LANCO Infratech Ltd.

We have conducted conditional assessment surveys of Seawater Intake Pipelines for:

- M/s Adani Power Ltd for inspection of their Seawater Intake Pipelines at their Mega Power Plant under the name of Udupi Power Corporation Limited in Udupi, Karnataka.
- M/s Nirma Udyog Ltd for desilting and inspection of their seawater intake pipeline at their Saurashtra Chemicals Ltd plant in Porbander, Gujarat.
- M/s Gujarat Heavy Chemicals Ltd for inspection of their Seawater Intake Pipelines at their Soda Ash Plant in Verawal, Gujarat.
- M/s Kleen Water Technologies for the works of the IOCL refinery at Paradeep in Odisha for their client M/s Trenchless Engineering Services Private Limited

We have conducted conditional assessment surveys of water pipelines for:

- M/s Tamil Nadu Water Investment Company Ltd for inspection of municipal water pipeline network in T.Nagar, Chennai for Chennai Metro Water Supply & Sewerage Board (CMWSSB) under the Smart City Mission.
- M/s L&T Construction for inspection of water mains in Pune for Pune Municipal Corporation (PMC).
- M/s Kleen Water Technologies for their works of Delhi Jal board.

Robotic Inspection & Desilting services of WASTERWATER ASSETS

We have conducted Investigative Desilting of sewer & storm water pipelines for:

- M/s Tamil Nadu Water Investment Company Ltd for desilting and inspection of municipal Sewer pipeline network in T.Nagar, Chennai for Chennai Metro Water Supply & Sewerage Board (CMWSSB) under the Smart City Mission.
- Nestlé India Research Centre in Manesar (Haryana) through their consultant M/s Uretek India Pvt Ltd for desilting and inspection of sewer and storm water pipeline network.
- M/s Jhajjar Power Ltd for Inspection & Desilting of their sewer & storm-water pipeline network.

We have conducted LASER profiling inspection surveys of sewer pipelines for rehabilitation works being carried out by following companies:

- M/s Insituform Pipeline Rehabilitation India Private Ltd for their works of Delhi Jal board (DJB).
- M/s KK Spun O-Liner JV for their works of Peripheral Sewer Project of Delhi Jal board (DJB).

We have conducted conditional assessment surveys of sewer/stormwater/effluent lines for:

- M/s Pratibha Industries Ltd. for their interceptor sewer contract work under ECIL for Delhi Jal board.
- M/s DSCL-Fengshun-Wabag Consortium for their interceptor sewer contract work under ECIL for Delhi Jal board.
- M/s Samsung Electronics India Ltd through their consultant M/s Amity India for the inspection of their sewer and rainwater pipeline network.
- M/s ERM Consultants for their various projects, including a hazardous Bio-waste pipeline for a International pharmaceutical giant.
- M/s Gypsum Structural India Pvt Ltd for their rehabilitation works across India.
- M/s TTI Consulting Engineers India Private Ltd for their consulting works with Hyderabad Water Supply and Sewerage Board (HWSSB) and Delhi Jal board (DJB).
- M/s Michigan Engineers Pvt. Ltd. for works of Delhi Jal Board (DJB) (Client: Aarsleff Michigan JV)
- M/s Werm India Ltd. for their works of Delhi Jal Board (DJB) and New Delhi Municipal Corporation (NDMC).
- M/s Vishwa Infra & Service Pvt. Ltd. for their interceptor sewer contract work under ECIL for Delhi Jal board.
- M/s Kleen Water Technologies for their works of Delhi Jal board , Ganga Action Plan (Varanasi) & HWSSB (Hyderabad)
- M/s Rubicon Inspection Systems Pvt. Ltd. for their works of Delhi Metro Rail Corporation (DMRC).
- M/s Capital Engineering Corp. for their rehabilitation works across India, including the prestigious JICA funded Varanasi Trunk Sewer pipeline rehabilitation work.

The DSI Advantage

WORK CLASS ROBOTICS

DSI has 13 years of hard-core on-site experience of successfully executing projects using its indigenously designed and manufactured ROV platforms in extremely challenging and hazardous environments. DSI is the pioneer and undisputed leader of indigenous inspection class robotics in India. Over the last 6 years, DSI has adapted and scaled up its rugged inspection platforms to create large ROV platforms that can handle desilting, dredging, cleaning and repair works successfully.

- **Only company in India** and neighbouring countries **providing robotic services** using indigenously designed ROV platforms.
- **Provides the unique capability of customization and build-to-order robotic solutions** as per project requirements.
- **Increases efficiency** and **Quality of Service.**
- **Provides both Qualitative & Quantitative measurement of executed work** in environments where such capability was not available.
- **Reduce the risk to human life** by eliminating manual intervention in hazardous and inaccessible environments.

THE UNDISPUTED LEADER IN INSPECTION CLASS ROBOTICS

High Quality Video data

DSI provides high quality DVD resolution color video of survey. DSI can also provide an optional facility for reports in the Delhi Jal board (DJB) prescribed format. Video and report data are submitted on a CD with an option for hard copy reports. Also DSI uses self-designed High intensity white light LED illumination ranging from 900 lumen to 5,000 lumen, that provides vivid and clear colored image/video.

LASER & SONAR profiling options

DSI has developed LASER profiling and measurement capability indigenously. We provide direct measurement technology which has much higher accuracy for measurement of inner diameter and calculation of liner thickness compared to image estimation technology like Ring laser. Further it gives a real profile of the actual cross-section of the pipe and reliably measures the actual ovality of the pipe. DSI also provides SONAR-profiling of operational sewer pipelines, both for fully surcharged and partially surcharged pipelines. Please note, laser profiling is not possible for operational pipelines while sonar profiling is not possible for dry pipelines.

Speed of survey

Our in-depth knowledge of the capabilities of our system and its usage combined with over a decade of R&D experience with various types of pipelines allows our engineers, operators and technicians to give you an unparalleled speed of executing the surveys. Further Digital recording, playback and USB-backup at the site itself allows for better coordination with your staff in preparation of the report and hence quick submission of work. Being a manufacturer ourselves, it is possible for DSI to expand its operations by deploying multiple units or customizing longer inspection lengths.

Flexibility

DSI has a wide range of ROV platforms providing Inspection capability from 100 mm to 6000 mm. We have the capability to inspect operating sewer pipelines in pre-desilting scenarios besides the regular requirement of post-desilting /pre-lining scenarios. Standard cable lengths of 150 m to 200 m is generally used. Longer running lengths are available for inspection of trunk/interceptor sewers and long industrial/water pipelines ranging from 300 m to a few kilometres.

Technical expertise

DSI has expertise in inspection of submerged and fully flooded pipelines. We are experts in Underwater, Marine and Confined Space inspections. We provide both LASER & SONAR profiling services besides Pipeline CCTV inspections. Our services include conditional assessments, pipe location & mapping, pipe profiling, silt-level-estimation, et cetera.

Reliability

The Beaver series Sewer pipeline CCTV Inspection Systems achieved State-Of-The-Art capability in 2014 and are extremely reliable. Our engineers, operators and technicians are well versed with our systems and able to conduct inspections reliably. Since our ROV platforms are indigenous products, we are not dependent on manufacturers for repair and maintenance service. Owing to this we are able to provide inspections seamlessly.

Customization Facility

Our capability of complete in-house R&D and manufacturing allows for project oriented customization or a de novo development based on requirement.

Reduced Operational losses

Reliability of our work, quality of our reports, in-house repair & maintenance, wide range of options, efficient service and flexibility to adapt to new requirements, ensures that your work does not suffer increased operational losses due to unavailability of CCTV survey owing to equipment breakdown, challenging conditions or quality of work. Also by subcontracting the work to us, you are relieved from the often high costs of repair and maintenance in case of specialized systems like these.

Non-competitiveness

DSI is not directly in sewer infrastructure laying / rehabilitation works, nor is it a sister concern of any such company. Hence, we are arguably your most trusted partners. You can be rest assured that our company is most discreet in such matters.

Overall, making DSI as your partner for Pipeline CCTV surveys ensures complete peace of mind for you.

CCTV Inspections

Beaver is a robotic system designed for CCTV inspection of municipal & industrial water, wastewater & sewerage pipeline networks. It is a robust and rugged design that has been designed for Indian environments while still providing the highest precision desired from a robotic system. Beaver is a 100% indigenous product which has been designed and built from scratch by DSI including electronics, hardware as well as software.

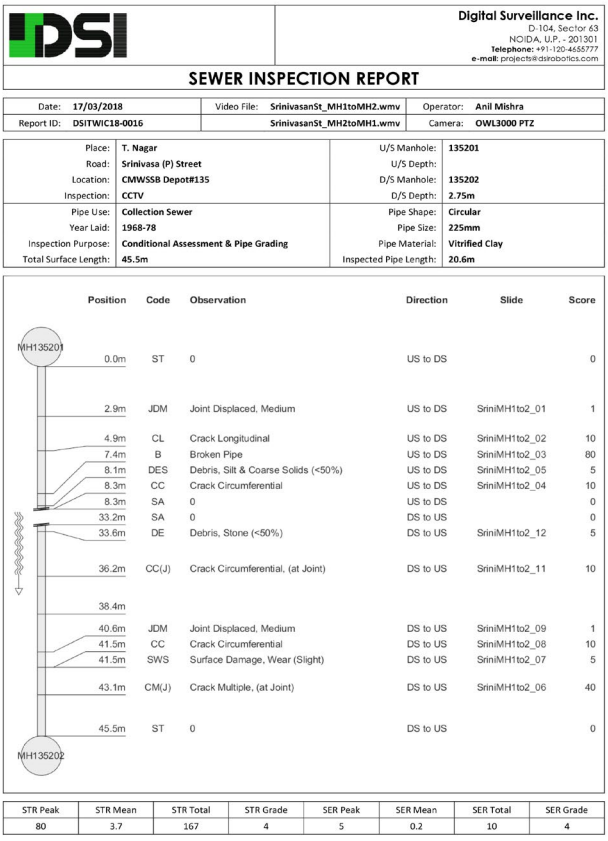
Beaver boasts of all the advanced features available anywhere in the world for pipeline robots while still providing the benefits of Indian Warranty & Support. It is no doubt that Beaver enjoys more than 70% market capitalization in India.

MUNICIPAL PIPELINE INSPECTION SOLUTIONS

DSI ROBOTICS

Features

- Capability to inspect pipes of sized 100mm and above
- Single Inspection length upto 2km (on request)
- 1080p HD Video also available
- Sonar inspections also available for inspections of running sewer lines.
- Fully Remote Controlled Inspection eliminates any risk to human life.
- Pre & post desilting inspections as well as pre & post lining inspection services available.
- Conditional Assessment & Pipe Defect Code Identification as per WRc Standards
- All the robots used by us are made using our in-house design and manufacturing facilities, this implies minimal downtime and maximum efficiency for our clients
- We also entertain specialize enquires which may require project based customizations. Please call our sales departments for detail.



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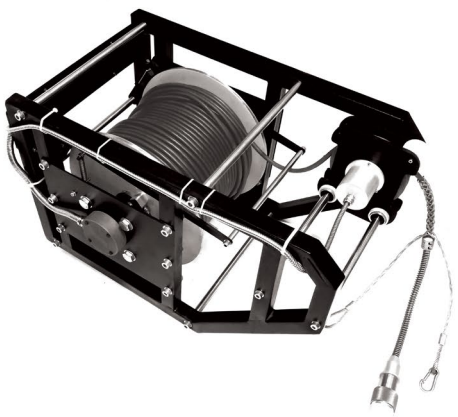
SEWER INSPECTION REPORT

Date:	17/03/2018	Video File:	SrinivasanSt_MH1toMH2.wmv
Report ID:	DSITWIC18-0016		SrinivasanSt_MH2toMH1.wmv
Operator:	Anil Mishra		
Camera:	OWL3000 PTZ		

Place:	T. Nagar	U/S Manhole:	135201
Road:	Srinivasa (P) Street	U/S Depth:	
Location:	CMWSSB Depot#135	D/S Manhole:	135202
Inspection:	CCTV	D/S Depth:	2.75m
Pipe Use:	Collection Sewer	Pipe Shape:	Circular
Year Laid:	1968-78	Pipe Size:	225mm
Inspection Purpose:	Conditional Assessment & Pipe Grading	Pipe Material:	Vitrified Clay
Total Surface Length:	45.5m	Inspected Pipe Length:	20.6m

Position	Code	Observation	Direction	Slide	Score
MH135201					
0.0m	ST	0	US to DS		0
2.9m	JDM	Joint Displaced, Medium	US to DS	SriniMH1to2_01	1
4.9m	CL	Crack Longitudinal	US to DS	SriniMH1to2_02	10
7.4m	B	Broken Pipe	US to DS	SriniMH1to2_03	80
8.1m	DES	Debris, Silt & Coarse Solids (<50%)	US to DS	SriniMH1to2_05	5
8.3m	CC	Crack Circumferential	US to DS	SriniMH1to2_04	10
8.3m	SA	0	US to DS		0
33.2m	SA	0	DS to US		0
33.6m	DE	Debris, Stone (<50%)	DS to US	SriniMH1to2_12	5
36.2m	CC(J)	Crack Circumferential, (at Joint)	DS to US	SriniMH1to2_11	10
38.4m					
40.6m	JDM	Joint Displaced, Medium	DS to US	SriniMH1to2_09	1
41.5m	CC	Crack Circumferential	DS to US	SriniMH1to2_08	10
41.5m	SWS	Surface Damage, Wear (Slight)	DS to US	SriniMH1to2_07	5
43.1m	CM(J)	Crack Multiple, (at Joint)	DS to US	SriniMH1to2_06	40
45.5m	ST	0	DS to US		0
MH135202					

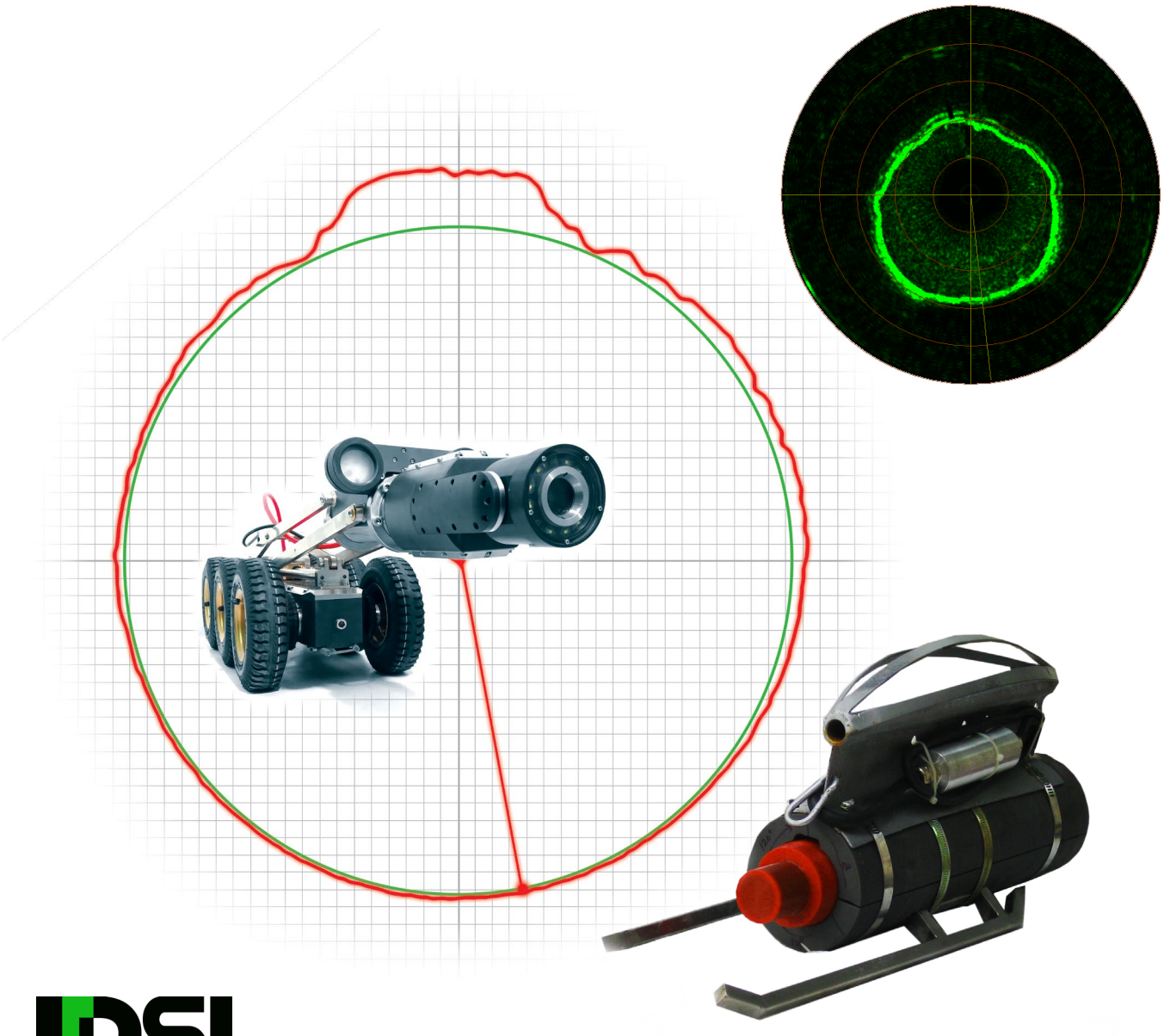
STR Peak	STR Mean	STR Total	STR Grade	SER Peak	SER Mean	SER Total	SER Grade
80	3.7	167	4	5	0.2	10	4



Laser & Sonar Inspections

DSI's indigenously designed Laser & Sonar Inspection systems are highly advanced quantitative inspection tools that can provide pipeline engineers & contractors with accurate empirical data on the existing shape and dimensions of pipelines and tunnels. By using both Laser & Sonar inspection, tangible qualitative data can be analysed mathematically allowing for flexibility in preparation of estimates & DPRs.

These technologies are extremely important for initially estimating the optimum thickness of the liner and then calculation of resultant Inner Diameter after rehabilitation. This can provide significant cost savings to the rehabilitation contractor (in terms of cost savings on liner) and the desired quality and performance to the Pipeline Asset Owner (QoS measurement). Laser/Sonar profiling inspections can also provide ovality checking of existing pipes to ascertain if there is an impending collapse. Sonar profiling can provide significant cost savings in maintenance works by performing very accurate silt level estimation before awarding of contract.



MUNICIPAL PIPELINE INSPECTION SOLUTIONS

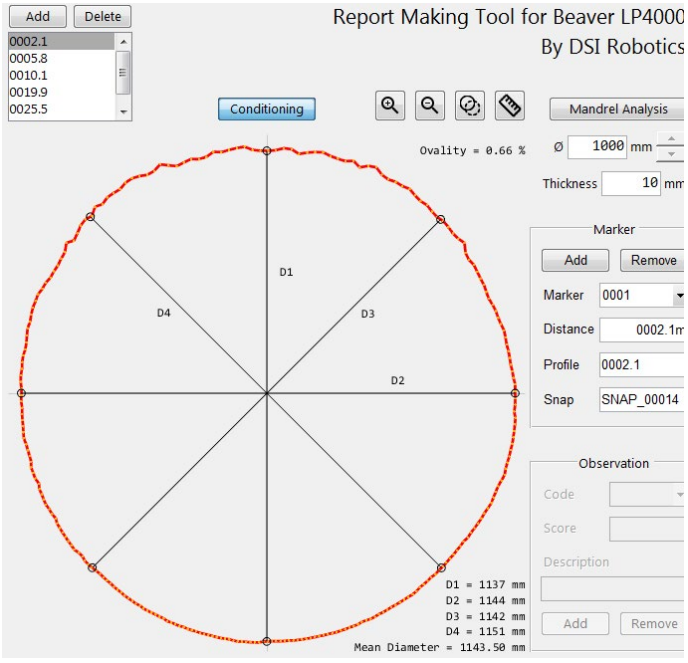
DSI ROBOTICS

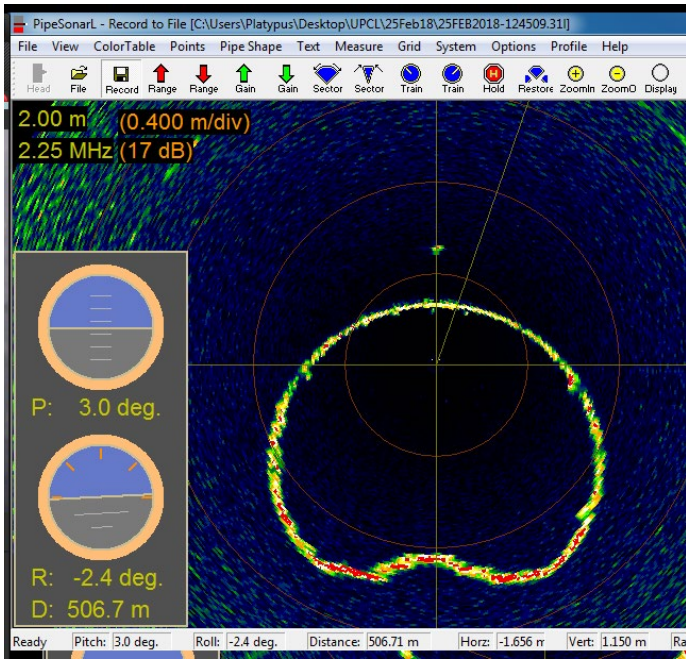
Laser Profiling

- Class 2 Laser
- Visible Red Beam, 650nm
- Accuracy > 99%
- Repeatability error < 0.8%
- Profile points: 265
- Maximum & Minimum Pipe Diameter: DIN300-1800mm (Larger pipes available on request)
- Integrated PTZ Camera provides simultaneous CCTV footage in a single inspection run
- 1/2.8" Sony EXMOR Progressive Scan CMOS Sensor, (up to 1080p HD Video)
- Pan: 360° continuous, Tilt: -111° to +111°, Zoom: 120x
- Variable Pan, Tilt & Zoom Speeds
- Live measurements of pipe diameter, ovality, & integrated mandrel calculations of the pipe
- Environmental Performance: IP68, up to 30m depth capability*

Sonar Profiling

- 2.25Mhz high-resolution fluid-compensated transducer
- Visible Red Beam, 650nm
- Accuracy > 98%
- Repeatability error < 1%
- Profile points: 400
- Maximum & Minimum Pipe Diameter: DIN300-6000mm
- Provides sharp underwater profile of pipe surface & silt level under the waterline of sewers
- Can be used for profiling of both partially & fully surcharged running sewers without stopping their operation
- Live measurements of pipe diameter, ovality, silt level & any defects found in the pipe
- Environmental Performance: IP68, up to 1000m depth capability*

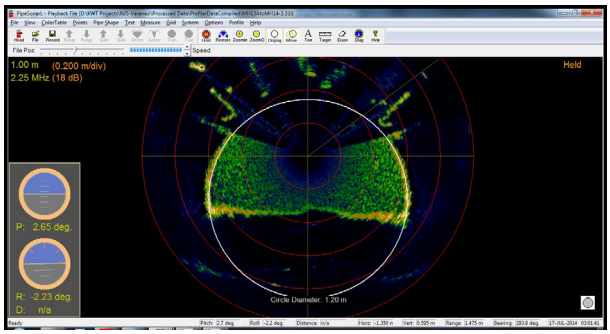




Online Robotic Sewer Inspections

Online Conditional Assessment of running sewer lines is an indigenously designed robotic technology that was first introduced in the Indian market by our company **(DSI)** in 2014. Since then DSI has conducted several kilometres of online sewer inspections. This technology is a great asset for both the municipal corporations & consultants as it can be used to economically assess the pipe condition without incurring the additional cost of flow diversion and desilting.

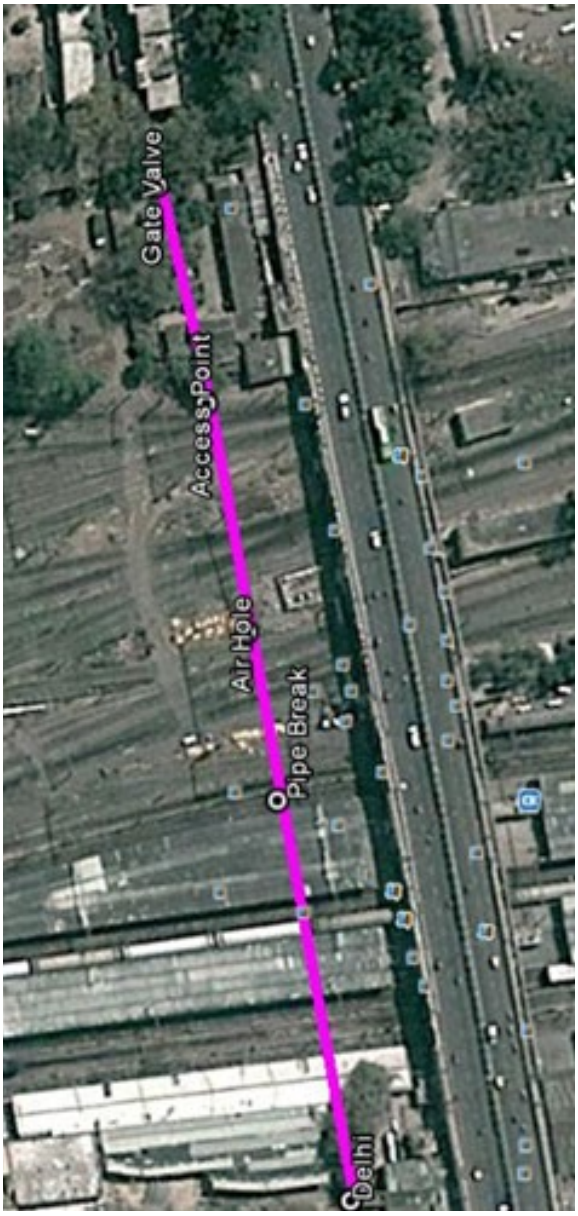
These inspections can be used to generate Pipe Gradation reports & gather GIS data of live trunk sewer lines. Pipes of sizes DIN 450mm & above (fully & partially surcharged) can be inspected with this technology.

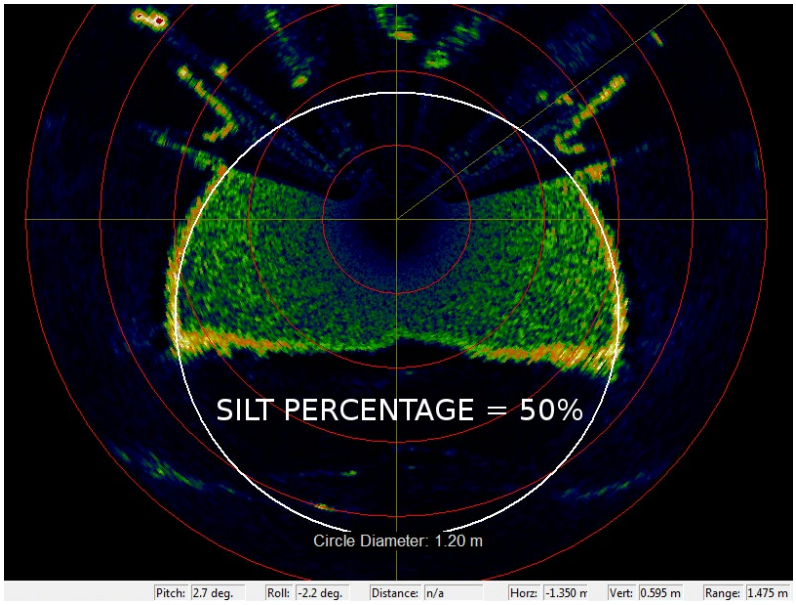


MUNICIPAL PIPELINE INSPECTION SOLUTIONS

DSI ROBOTICS

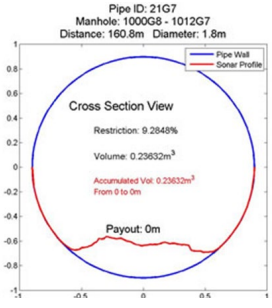
- Conditional Assessment & Pipe Defect Code Identification as per WRc Standards
- Acoustic Profiling of Pipe
- Silt level/Volume Estimation
- Pipe Location & Underground Pipe Tracing
- GIS Mapping
- Pipe Gradation Report





- Inspection of Running Sewers
- No de-Watering Required
- No Flow-Diversions
- No Interruption of Service
- Huge Cost Savings
- Estimate Desilting & Rehabilitation Requirements

Condition Grades	Criticality	Re-inspection Frequencies		Rehabilitation Priority
		Category A	Category B	
5	High	N/A	N/A	Immediate
4	High	-	5 years	High
3	Medium	3 years	15 years	Medium
2	Low	5 years	20 years	Low
0 - 1	Low	10 years	20 years	Not required



Marine Inspections

DSI is a market leader in providing world class pipe/tunnel inspection services for the marine and industrial sector in India. We are bespoke placed in this industry since all robots used by DSI have been designed & developed in-house by our team of highly experienced & skilled engineers.

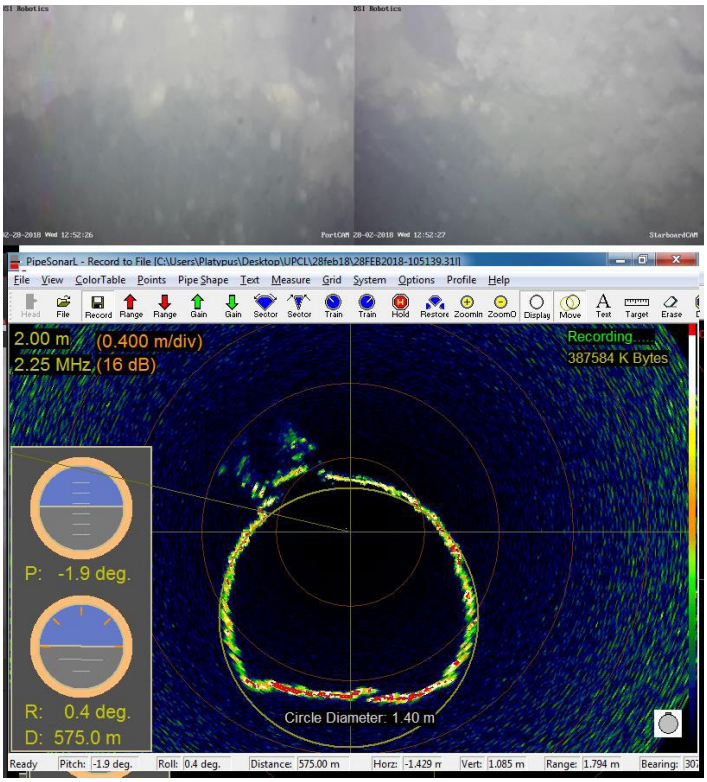
DSI is the only company providing underwater visual and acoustic inspection for seawater intake pipelines to provide real-time silt level estimates and pipe conditional assessment in Indian Subcontinent. Our newly developed Marine Trekker Crawler has the capability to inspect pipes of >2km length in a single stretch. It is a unique design (patent pending) that allows for inspection of pipes up to 70% siltation and heavy biofouling.

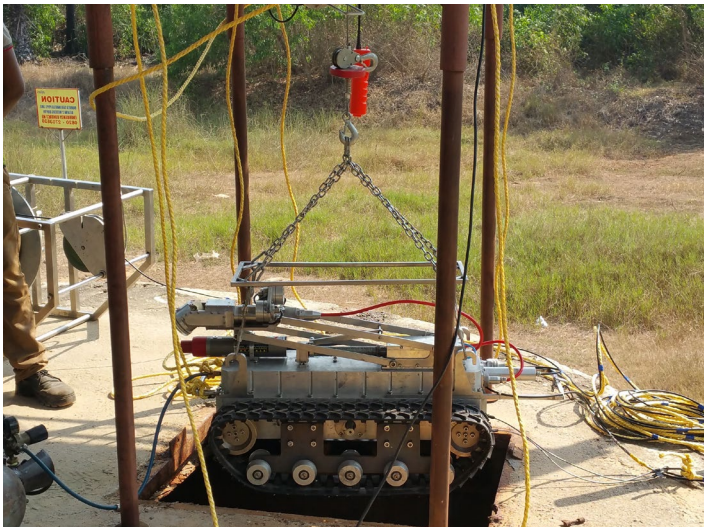
MARINE PIPELINE INSPECTION SOLUTIONS

DSI ROBOTICS

Features

- Capability to inspect pipes of sized 600mm and above
- Single Inspection length of 2km. Even greater lengths are possible on request (up to 8km)
- 1080p HD Video
- Sonar Profile provides inspection in heavily turbid environment.
- Fully Remote Controlled Inspection eliminates any risk to human life.
- Unique design (patent pending) that allows the crawler to inspect up to 70% silted pipes* with heavy biofouling without any problem.
- Silt Level and pipe ovality measurements at 1m intervals provides complete pipe information.
- These inspections are extremely helpful for maintenance engineers as they allow for advance planning of all their maintenance activities.





Marine Pipe Cleaning

Seawater intake structures require frequent desilting to remove the excess silt build-up that reduces their hydraulic performance. Diver based desilting is often performed in the industry to counter this problem. However such a practice is often highly risky as well as inefficient due to the human factor involved.

DSI has developed the ORCA Pipeline Desilting Robotic Systems that provide higher reliability and safety than diver based methods as well as extending the distance limitations often associated with them. ORCA is an extremely efficient robot that uses our (over a decade of) experience in designing underwater robots. It is a rugged, robust and customizable system that can be tailored to suite most marine pipe/tunnel desilting needs. ORCA robots use electro-hydraulic hybrid drives for extreme power required to carry large submersible dredging pumps of capacities up to 180HP.

Features

- Rubber Tracks eliminate risk of damage to pipe coatings.
- Both Hydraulic & Electric version of tracks available
- Up to 2 tonnes payload capacity
- Up to 3-DOF actuation available on pump suction for efficient cleaning.
- The system can be integrated with HD cameras and Sonar profilers for real-time feedback.
- The ORCA carries a plethora of onboard sensors for better control and system awareness.
- Supplementary Water Jet pumps can be added for better agitation of sand and clay.
- All operations can be controlled remotely by a single operator.

Seahorse Robotic Dredgers

- *Canals*
- *Reservoirs*
- *Shiplifts*
- *Liner-safe*

Silt build-up is a common problem in several marine, offshore & industrial setups. This requires dredging, but lack of accessibility prevents implementation of regular dredging solutions. DSI's Seahorse dredges have been designed as a bespoke solution to these problems. Seahorse dredges are totally unmanned and can be remotely controlled.

Additionally special features like liner safe suction head, cutter-suction head, waterjets, suction augers, variable draught and freeboard, etc. can be added to fit specific needs. The application of Seahorse Robotic dredgers extend from confined space scenarios like Shiplifts and Cooling Tower Sumps to lined structures like canals, reservoirs & underground tanks further they provide a unique solution for desilting of Culverts & Inverted Siphon Systems in canals & other water systems.

CONFINED SPACE DREDGING SOLUTIONS

DSI ROBOTICS

Features

- Dredging depths up to 16m (can be increased).
- On-Site Assembly & Construction allows dredging in remote inland areas where transportation of full-scale dredges is not possible.
- Unique Solution for lake desilting at high altitudes in mountainous region.
- Remote Controlled operation allows better efficiency as the operator is better aware of the dredge operation and discharge characteristics.
- High Discharge rates of >1200 m^3/hr using submersible dredge pumps of up to 400HP
- Various types of suction available like Cutter Head, Auger Type, Excavator Bucket, Liner-Safe, etc.
- Both Mechanical & Waterjet based agitation depending on site conditions.

MEDIA COVERAGE

Pics: Shyam Sonar

SPOT THE LEAKAGE, STEM THE LOSS

EFFORT TO SAVE WATER

A private contractor with the Pune Municipal Corporation has brought in an underwater gadget to spot leakages in the water supply pipelines of the city. The survey is being carried out as part of the 24x7 supply system. Nearly 350km of pipelines will be checked in the first phase of this study

ITS OPERATION

- Fully automatic machine
- Operated using remote control
- Can be used in the pipeline with a diameter of 600mm or above

WHERE IS THE SURVEY?

- Started in areas close to Parvati water works
- All areas will be covered
- The checks will go on for the next four months

CAPACITY Can check **2KM** at one go

It has a **headlamp** and a **camera**

HOW DOES IT WORK?

- The gadget is about **two and a half feet in length** and **one foot wide**
- The gadget is lowered into the pipeline **with the help of ropes**
- It swims through the **water capturing images**
- These images are **transmitted back to a monitor**

Technical staff watches the images and spots the leaks

WHAT'S THE IDEA?

- Water losses amount to nearly 30%
- Systematic leakage detection and repairs will bring down "non-revenue" water in the distribution system to 15%
- Such close -monitored checks will minimize damage to the pipelines and stem water loss

पाणीगळतीसाठी तयार केलेला रोबोट.

रोबोट यंत्राच्या मदतीने पाणीगळती रोखणार

२४ बाय ७ समान पाणीपुरवठा योजने अंतर्गत महापालिकेकडून उपाययोजना

लोकमत न्यूज नेटवर्क

पुणे : शहरातील पाणीगळती रोखण्यासाठी २४ बाय ७ समान पाणीपुरवठा योजने अंतर्गत पुणे महापालिकेकडून अत्यंत आधुनिक यंत्रांचा वापर सुरू केला आहे. महापालिकेच्या पाणीपुरवठा विभागाने गुरुवार (दि.२४) रोजी निलायम चित्रपट गृहाजवळील परिसरात रोबोट यंत्राच्या मदतीने पाणीगळती शोधण्याचे काम सुरू केले.

पाण्याची गळती शोधणारे हे मशिन जलवाहिनीमध्ये सोडल्यानंतर ते दोन्ही बाजूंच्या एक किलोमीटर पर्यंतची गळती शोधत आहे. या गळतीचे फोटो काढले जात आहेत. शहरात सध्या पाण्याची ३५ ते ४० टक्के गळती होत असून, लवकरच ही गळती अत्याधुनिक यंत्राचा वापर करून १५ ते २० टक्के कमी करण्यासाठी प्रयत्न करणार आहे. या अत्याधुनिक यंत्राद्वारे सध्या निलायम चित्रपटगृहाजवळील भागात पाणीगळती तपासणीचे काम सुरू करण्यात आले आहे. या यंत्राच्या मदतीने शहरात सर्व ठिकाणी होणारी पाणीगळती शोधणे व ती रोखण्यासाठी उपाय योजना करण्यात येणार आहे, अशी माहिती महापालिकेचे पाणीपुरवठा विभागातील अधिकारी व्ही.जी. कुलकर्णी यांनी दिली.

आता रोबो शोधणार जलवाहिनीची गळती

एकाच वेळी चार किलोमीटरपर्यंत तपासणी शक्य

सर्व फोटो : अमित रुके

जलवाहिनीतील गळती शोधणाऱ्या रोबोची जुळवाजुळव करताना.

जुळवाजुळव होऊन कामगिरीसाठी सज्ज असलेला रोबो.

दोरीच्या मदतीने जलवाहिनीमध्ये रोबोला उतरवण्यात आले.

रोबोने पाठवलेल्या माहितीची खातरजमा करताना इंजिनीअर.

प्र. टा. प्रतिनिधी, पुणे

शहरातील जलवाहिन्यांमधील गळती शोधण्याबरोबरच त्याबरून येतलेले पाणी, पाइपची क्षमता तपासण्यासाठी महापालिकेने 'रोबो'चा वापर सुरू केला आहे. समान पाणीपुरवठा योजनेचे काम घेतलेल्या ठेकेदार कंपनीने 'रोबो' आणला असून, त्याद्वारे एकाच वेळी चार तासांमध्ये चार किलोमीटरची तपासणी करण्यात येत आहे. 'रोबो'ला जोडलेल्या कॅमेऱ्यामध्ये जलवाहिनीच्या आतील दृश्ये रेकॉर्ड करण्यात येत असल्याने गळती शोधून तत्काळ दुरुस्ती करणे शक्य होणार आहे.

महापालिकेच्या पाणीपुरवठा विभागाने नीलायम थिएटरजवळ १४ इंच जलवाहिनीला कापे घेऊन 'रोबो' तेथे सोडला होता. एकावेळी एका दिशेने दोन किलोमीटर अंतर 'रोबो' जातो. त्यानुसार नीलायमजवळ जलवाहिनीत सोडलेल्या रोबोने पूरम चौकापर्यंतच्या जलवाहिनीची तपासणी केली. पूरम चौकात पाण्याचा व्हॉल्व्ह असल्याने त्यापुढे तो जाऊ शकला नव्हता. या 'रोबो'ला जोडलेल्या कॅमेऱ्यामध्ये आतील दृश्ये कैद झाली असून, त्याची 'सीडी' मिळाल्यानंतर लगेचच आवश्यक ती दुरुस्तीची कामे हाती घेणार असल्याची माहिती पाणीपुरवठा विभागाचे प्रमुख व्ही. जी. कुलकर्णी यांनी दिली.

'रोबो' अशी शोधणार गळती

'रोबो'ची रुंदी १५ इंची आणि लांबी १८ इंची असून, त्याला सध्या मोठ्या जलवाहिनीमध्ये सोडण्यात आले आहे. रोबोला दोन्ही बाजूंनी हेडलाइट असून, समोरच्या दिशेने कॅमेरा बसविण्यात आला आहे. हा कॅमेरा झूम करणे, आजूबाजूला फिरवणे रिमोटद्वारे शक्य आहे. त्यामुळे एखाद्या ठिकाणी वाहिनी पुटली असेल, तर तेथेही तपासणी करणे शक्य होणार आहे. शिवाय झाडांची मुळे, वाहिनीमध्ये पडलेल्या वस्तू कॅमेऱ्याच्या मदतीने टिपता येतात. ही सर्व माहिती संबंधित कंपनीकडून पाणीपुरवठा विभागाला 'सीडी'द्वारे देण्यात येणार आहे. त्यानुसार गळतीच्या ठिकाणी दुरुस्ती करणे तसेच वाहिनीची क्षमता तपासून समान पाणीपुरवठा योजनेसाठी उपयोग होऊ शकतो की नाही, याचा निर्णय घेता येणार आहे. या 'रोबो'चा वापर करून ताशी एक ते दीड किलोमीटरची तपासणी करण्यात येते. छोट्या व्यासाच्या जलवाहिनीसाठी छोटा रोबो तयार करण्यात आला आहे. मात्र, त्याचा वापर अद्याप करण्यात आलेला नाही, असे कुलकर्णी म्हणाले.

Our Customers

Delhi Jal Board

Michigan Engineers Pvt. Ltd.

DSI ADVANTAGE

- Economical Prices
- Rugged Designs for Harsh Environments
- International Quality
- Customized Design & Fabrication
- Indian Warranty
- Bespoke Turnkey Solutions
- On-site Service & Maintenance Capability

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