

## Mini Piling Rigs

Mini Piling Rigs have been around since 1985 in Europe. They have been pioneered by companies like TESCAR, GEAX and others. While their larger brothers in the rotary hydraulic rigs are going for bigger and taller piling rigs, mini rigs are manufactured for special applications with severe height restrictions. Mini Piles are ideal for sites that have limited headroom and restricted access. Mini piling machines can construct small diameter holes, underpin existing structures, fit through doorways with their compact shape and inject grout to bond the soil.

*Read more on Page 2.*



FINDING  
COMMON  
GROUND®

Volume 1, Book 3, October 2015

**DFI of INDIA**

*News*

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**Quarterly e-Newsletter from  
Deep Foundations Institute of India  
[www.dfi-india.org](http://www.dfi-india.org)**

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## DEEP FOUNDATIONS INSTITUTE OF INDIA

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## The Cover Picture

## Mini Piling Rig

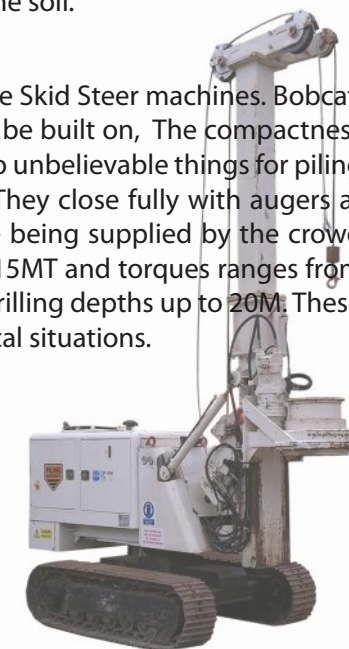
Mini Piling Rigs have been around since 1985 in Europe. They have been pioneered by companies like TESCAR, GEAX and others. While their larger versions in the rotary hydraulic rigs are going for bigger and taller piling rigs, mini rigs are manufactured for special applications with severe height restrictions. These machines are ideal for sites that have limited headroom and restricted access. Mini piling machines can construct small diameter holes, underpin existing structures, fit through doorways with their compact shape. These machines can also be equipped to inject grout to bond to the soil.

## Base Machine:

Surprisingly the base carrier on which the Mini Piling Rigs are built are the Skid Steer machines. Bobcat, Caterpillar, Kubota, Hitachi etc became the choice for these machines to be built on. The compactness of these machines with decent power train made these small machines do unbelievable things for piling engineers. Then come with telescopic augers, similar to a car antenna. They close fully with augers at their tips and then extend downwards into the ground with the torque being supplied by the crowd always near the ground. Typically these machine weigh from 2.50MT to 15MT and torques ranges from 25kNm to 40 kNm. The diameters can vary from 300mm to 800mm and drilling depths up to 20M. These rigs need very low headroom and can be the only solution for many critical situations.

These machines can find application in many challenging spots like:

1. Retrofitting of buildings and bridges by underpinning.
2. Adding new foundations inside existing buildings and factories.
3. Building new basements under existing buildings.
4. Working under power lines.
5. Soil improvement along roads and railway lines.
6. Under-reamed piling.
7. Micro Piling, Soil Nailing and Anchors.
8. In Tea gardens and farmlands.



There are many attachments available to these rigs like CFA (Continuous Flight Auger), Diaphragm Walling, Under reaming, Rock cutters and so on.

In India a few machines are already working and there is a great scope for more entrepreneurs to enter this new exciting and existing field.

*Courtesy: Mr. Mohan Ramanathan, ACT, Chennai*



## The Cover Picture



Tescar CF4R mini piling equipment



CF3 with Dwall grab attachment

## Ground versus Soil

Some of the practitioners of geotechnical engineering tend to confuse Ground with Soil. It is not just semantics but has deeper technical and philosophical implications. Soil is a material which can be handled, felt, seen, smelt, tasted and tested in small to medium size samples while 'Ground' is an entity that exists at site or as we refer to as "in situ". Just as the adage 'The total is more than the sum of the individual parts', predicting the behavior of the ground from the so called 'properties' measured on samples collected from the field is much more complex and involves 'judgment'.

In my fifty years of being a learner of Geotechnical Engineering, I have come to realize that Ground is an entity and very similar to 'Humans'. Both 'Humans' and 'Ground' are complex entities and exhibit behavioral responses rather than possess properties like other engineering materials. Humans have organs and traits such as being jovial, sad, friendly, angry, misanthropic, etc. but do not have properties. Their behavioral responses depend on genetics, environment in which they grow, personality they develop and to impetus they experience. The states in which humans exist can vary depending on the circumstances.

The genetics of ground is obviously defined by their formation. Thus it can be alluvial, marine, residual, colluvial, etc. depending upon how physiogamy forms the deposit. The weather, or more broadly the climate could alter its characteristics in the post-depositional state. Ground is continually affected by hydrological, tectonic and other atmospheric effects. Ground one tends to believe as a solid ground on which several engineering structures are built becomes suddenly a fluid under specific mitigating circumstances such as being loose saturated sand with small amount of fines but subjected to seismic activity of medium and to high intensity. Or a river in flood can erode the ground by removing the particles by its high velocity and we get 'scour'. A slope on which several civilizations thrived becomes unstable and even disastrous because of high intensity rain, a natural phenomenon coupled with human activities of deforestation, steepening of slopes, saturating it by ignorance or callousness, etc. Of late we have been witnessing deep excavation failures in several metros as the cost of land in urban locations is becoming exorbitant and society wants to reach the sky in terms of building.

The moral of the story is that we need to be more than just engineers to deal with the GROUND.

Best wishes

*Prof. M.R. Madhav*

*(IIT Kanpur, JNTU Hyderabad, IIT Hyderabad, Past Vice President Asia Region, ISSMGE)*

*Geotechnical Engineering is a Science BUT Its Practice an ART*

## Message



## Forthcoming Events

One Day National Seminar on

### Recent Trends in Pile and Piled raft Foundation

DFI of India in association with IGS Baroda chapter is organizing a one day national workshop on RECENT TRENDS IN PILING AND PILED RAFT FOUNDATIONS. The seminar will be held at Vadodara at I.G. Patel Seminar Hall, Faculty of Social Work, Fatehgunj, on 4<sup>th</sup> December 2015.

Growing at a staggering double digit rate, India is considered to have one of the fastest growing economies in the world. Infrastructure development is predicted to be the prime activity for growth over the next few decades and foundation technologies will contribute immensely to the acceleration of this development. It's imperative for all stakeholders in the foundation industry to meet as often as possible to review these technologies and devise ways and means for their implementation in projects for the benefit of all. This national seminar is one step forward in this endeavor.

Seminar includes technical program with lectures by invited experts. Presentation includes case histories highlighting innovations and execution of the latest drilled piling systems, driven piling systems, and design considerations. Panel discussions will allow participants to interact with the experts.

The event will be of interest to contractors, developers, agencies, designers, consultants, educators and representatives from local, state and central government and public and private sector organizations involved in infrastructure projects.

IGS Baroda chapter is celebrating its silver jubilee year during 2015. During the last twenty five years, IGS Baroda chapter has arranged many National events including Indian Geotechnical Conference (1997). Chapter has received best chapter award two times. National Seminars / Conferences on various subjects such as grouting, geosynthetics, rock mechanics, remote sensing, environmental geotechnology, pile foundations, ground improvement techniques, case studies etc.

Registration fee is Rs 500/- per person. For registration and other details,

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Phone 0265-2564061, +91-9824042352, dravshroff@yahoo.co.in,  
ravikiran.vaidya@gmail.com

## From the Executive Body

The executive committee meeting of DFI of India was held on 28 September 2015 at IISc Bangalore. The meeting was attended by Dr. K.S. Ramakrishna, Mr. I.V. Anirudhan, Prof. S.R. Gandhi, Dr. V. Balakumar, Mr. Aravind Shrivastava, Dr. Kumar N Pitchumani, Dr. Sunil S. Basarkar, Mr. Mohan Ramanathan, Mr. Ravikiran Vaidya and Mr. Y Harikrishna attended the meeting.

Prof. G.L. Sivakumar Babu and Dr. P Raghuveer Rao were invitees. Progress on operator training programme, venue for the next annual conference, etc. were discussed. The committee congratulated Prof. G.L. Sivakumar Babu, Dr. P. Raghuveer Rao and their team for meticulous preparations for the DFI-India 2015 conference at IISc Bangalore.



## DFI 41<sup>st</sup> Annual Conference on Deep Foundations International Conference on Deep Foundations, Seepage Control and Remediation

New York Marriott Marquis | October 12-15, 2016

**Call for Abstracts Deadline:  
Friday, December 4, 2015**

Visit [www.deepfoundations2016.org](http://www.deepfoundations2016.org)  
for conference details

  
 Urban  
Deep Foundation  
Techniques

  
 Seepage  
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Solutions

  
 Deep Foundations  
on Land and  
near Shore

  
 Dam and  
Levee  
Remediation

  
 International  
Networking  
Opportunities



The executive committee members of DFI of India represent all the stakeholders in the foundation research, design and construction. The members will express their views about the role of DFI and other similar organizations in the development and transfer of modern technology for infrastructure development of India.



## PTC France

PTC 30 years in INDIA, more than 60 machines working!

PTC, founded in 1928, is a world leading company specialised in the design and manufacturing of pile driving and soil improvement equipment.

### INNOVATION PIONEER

We are recognized as the pioneer to launch breakthrough technologies that have become the standards of the market. PTC was the first to launch the hydraulic vibro drivers in the early seventies and the inventor of the variable moment technology, applied in resonance-free driving.

### PTC PILE DRIVING EQUIPMENT:

Vibrodrivers  
Excavator mounted Vibrodrivers  
Offshore Vibrodrivers  
Piling Rigs

Ground improvement equipment – Vibrolances

**Applications:** Driving and extraction of profiles: Sheet piles (PU, AU, AZ), H beams, casings up to 5m diameter, concrete & wooden piles.

Job site works: cofferdams, retention walls, anchor walls, harbour and bridge foundations, combined walls, vertical drains, cast in-situ casings and many more...

### PTC GROUND IMPROVEMENT EQUIPMENT:

Vibrolances  
Excavator mounted Vibrolances  
Stone Column Rig

**Applications:** To improve the soil bearing capacity, the settlement performance and the liquefaction potential.

Job site works: Bottom-feed stone columns, Top-feed stone columns and Vibro compaction

### WORLDWIDE AGENT NETWORK

PTC headquarters and factory are based in France. We guarantee 100% French manufacture and only European suppliers. We have subsidiaries in USA, Singapore, and Indian Ocean, and our agent network is present in more than 40 countries.

AGENT IN INDIA: PILING ASSOCIATES  
24/36, Vishwanathapuram main Road,  
Kodambakkam, Chennai- 600024

+91 98203 79661  
+91 9789497376  
ram@pilingassociates.com



PTC 65HD vibrodriver extracting 29m long HEB300 for the extension of the New Delhi metro. Contractor: Afcons

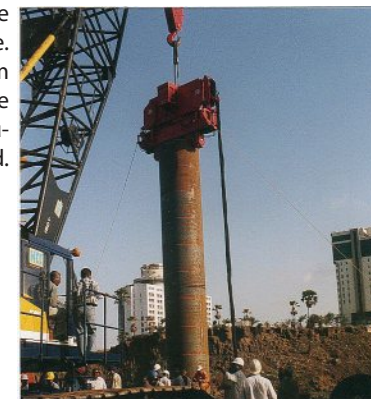


PTC 60HD vibrodriver driving a combined wall made of Arbed HZ975 and AZ18 sheet piles for a new wharf in the harbour of Visakhapatnam. Contractor: Afcons



PTC 75HD working in the Bandra-Worli sea link bridge. Driving 726 casings of 1.5 to 2m diameter for a bored pile application. Contractor: Hindustan Construction Co Ltd.

In Haldia, 2 PTC Vibrolances VL110 realising 2030 stone columns to reinforce the soil where oil tanks will be installed. Contractor: Bridge & Roof Company of India Ltd.



## Company Profile

## ITD CEMENTATION FOUNDATION &amp; SPECIALIZED ENGINEERING



**ITD Cementation** is a subsidiary company of the USD 1533 million ITD Group based in Bangkok, Thailand which is one of the largest construction companies in the region. We are today USD 283 million company diversified in Marine, MRTS, Specialized Geotechnical Works & Ground Engineering, Industrial & Buildings, Bridges, Roads, Water and Waste Water Systems. Headquartered in Mumbai, India and having Regional Office at Kolkata, Chennai and Delhi. ITD Cementation has been delivering prestigious projects for past eight decades and has earned a special customer preference for any Geotechnical & Foundation applications.

### Foundation & Specialized Engineering - Our Forte

Pioneers in the Piling, Diaphragm Walling, Drilling, Grouting & Rehabilitation works, Deep Excavations, River Front Developments, Ground Improvement works and Top Down Construction.

Foundation & Specialist Division has a significant Investment in Asset base viz. 32 Hydraulic & 7 Mechanical Rotary Rigs, 21 Pneumatic Pile Driving Rigs, 5 Hydraulic Impact Hammers, 3 Vibro Hammers, 8 Vibro Floatation Rigs, 33 Batching Plants etc.. and has always kept itself abreast of the technological up-gradations occurring anywhere in the Industry.

ITD Cementation has executed several iconic projects like 13.5 kms of Diaphragm Walling in a single project of Sabarmati River Front Development, 33000 nos Bored & Driven Cast-in-situ Piles for IOCL Paradip Refinery, Various Dam Rehabilitations, Ground Improvement, Slope Stabilization and many more geotechnical projects.

Our Marine department caters to several Deep Foundation and Ground Improvement works for Off-Shore and Near-Shore areas. These include Concrete & Steel Piles, ground improvement works for backup yards etc...

### LEADERS IN GEOTECHNICAL APPLICATIONS & INNOVATIONS

- ✓ Strong Design Team & Technical Backup
- ✓ 67m deep Bored piles at Krishnapatnam (A.P.)
- ✓ 68m long rock anchors for marine works at Jaigad, Maharashtra
- ✓ Engineered Reclamation of 90 hectares of land at JNPT, Mumbai, with total scope of 11 lakhs nos. of PVD
- ✓ 9297 Vibro Stone columns at Paradip refinery complex with 32 load tests
- ✓ Marine piling from platform & Jackup barges for Berth structure at Ennore Port, Chennai
- ✓ Sea Bed ground improvement using spudded barge at Kakinada Deep water Port (A.P.)
- ✓ Installation of 43 driven, cast in-situ piles by a Single Rig & a record of 211 piles in a single day at a project site at West Gujarat
- ✓ 87000 meter piling completed in 4 months at a single project site



13.5 kms Diaphragm Wall for Sabarmati River Development Project



Slope Stabilization at Raj Bhavan, Cabo Hill, Goa



Spun Pile Driving at Dahej, Gujarat



PVDs for Reclamation Works of 4th Container Terminal, JNPT, Mumbai



Prilling Tower (106 Meters) at Babrala (UP) resting on Ground Improved with Vibro-Stone Columns

[www.itdcem.co.in](http://www.itdcem.co.in)

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Email: [marketing@itdcem.co.in](mailto:marketing@itdcem.co.in)



## DEEP FOUNDATIONS AND RETAINING APPLICATION FOR PORT INFRASTRUCTURE DEVELOPMENT: DAHEJ SHIPYARD CASE STUDY

### Introduction and Project Background

Deep excavations and pile foundations are increasingly finding use in India's infrastructural projects and include thermal power stations, bridges & flyovers, metro stations, river fronts, forebays of intake wells and in harbour facilities. The Writer's firm had been involved in a prestigious project at Dahej, an emerging industrial port town of Gujarat state in Western India. The project involved construction of slip dock, harbour components and shiplift facilities for a green field port.

The construction, now complete, proudly boasts of largest shiplift facility in the world (232.65 x 47.3m) having lifting capacity of 180000 DWT. The project scope comprised construction of large diameter bored cast-in-situ piles (464 nos. of 1500 and 1200mm diameters), diaphragm wall (1000 and 600mm thick exceeding 19000 m<sup>2</sup>) and civil works for shiplift, slip dock and various harbour components.

### Facilitating Land Based Operations for Piling and Diaphragm Wall Works

The speed and progress was the very essence of this fast track project, and hence a scheme was formulated to transform the marine piling into a typical land piling scheme by constructing a temporary rock fill cofferdam which surrounded the working pile area. The reclamation scheme facilitated speedy and easy construction foundations and excavation support schemes. Considering the tidal variations, the area inside the coffer dam was filled up to +12 m level with locally available soil. Subsequently after construction of shiplift platform fill was removed to form shiplift facility as per design requirements. The provision of cofferdam led to reduction of the project time by more than 50%.

The shiplift system was planned to be operated through steel lifting platform suspended by wire ropes attached to hoist drums. This platform was raised and lowered vertically by a series of hoists. These hoists, equal in numbers at both the piers, rested on pile foundations as seen in schematic (Fig. 1).

Actual sea bed level in the piling area was observed ranging from +7.00m to -3.5 m. This marine site is known for being amongst the highest tidal range in India, namely  $\pm 10$ m. Schematic levels of the pile are reported in Fig. 2.

### Piling Scheme

Initially, marine piling was envisaged, since the piling area was located at sea and away from the main landmass. This would have involved marine gantry cantilever platforms. Based on the construction and design requirements of the piles, it was decided to use guide casing of diameter 100mm excess of the proposed pile diameter so that the permanent liner casing could be inserted conveniently and further, it would cut valuable progress time required for driving of liners. After initial boring and laying temporary guide casing, boring operations was carried out upto a depth of 21m which corresponded to the proposed dredging level. Thereafter a permanent liner was inserted into this borehole extending to -10m level (Fig. 2). The outer guide casing was thereafter, extracted and further boring operation was carried out up to -25m elevation, with the borehole stability maintained with bentonite slurry. With this methodology, 464 vertical piles of 1200 and 1500mm diameter were executed at shiplift area.

The project also comprised additional 60 nos of 1200 and 1500mm diameter raker piles, bored at a rake of 1 in 10. Raker bored cast-in-situ piles were constructed by tilting the Kelly frame of the hydraulic

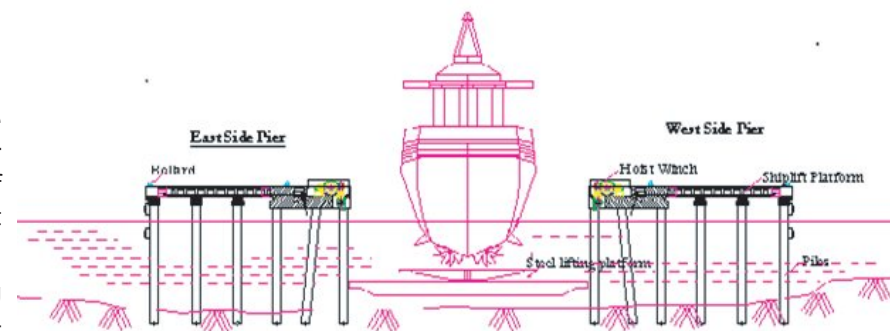


Fig. 1: Shiplift Schematic

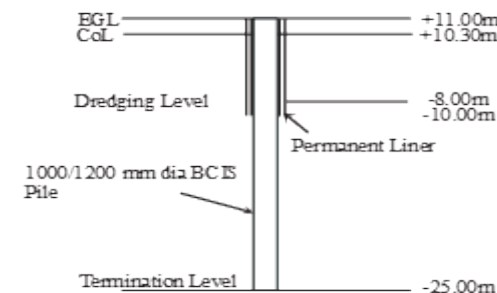


FIG. 2: Schematic of Pile and Levels

## Technical Article

## DEEP FOUNDATIONS AND RETAINING APPLICATION....

Article continued

rig. On achievement of the desired rake, the kelly frame was locked. Thereafter the rig was centered and after surveying the final rake, piling operations were carried out.

## Diaphragm Walls

Diaphragm walls were used for Quay walls and Slip Dock area. Diaphragm wall panels (30 nos) comprised T-sections each 5.1m wide, 1000mm thick with depth of 38m. Trenching of T-panels were undertaken by hydraulic rigs (180kN.m capacity) with Kelly mounted grabs (Fig. 5). The reinforcement cages weighed up to 32MT and in many cases involved three service cranes for lifting operation, with final lowering undertaken by a 136 MT crane (Fig. 6). This successful lifting operation involved detailed lifting analysis and designing. Great care has been taken on site during the each and every operation.

Productivity rate for each T-paneled D-wall was, on an average, 5 days with bulk of the time consumed in trenching operations (3 days). Lowering of the cages and the stop ends were done in a single piece involving precision monitoring and skilled supervision.

Immediately after completion of the project, a formal delivery of Ship MV Ananya Naree, a 32000 DWT double hull bull carrier (shown under construction in Fig. 7), is a befitting example of how project planning and innovative schemes on site can assist in a fast track delivery of project outcomes.

Article by ITD Cementation India Limited, Mumbai



Fig. 3: Piles along Shiplift Facility & Quay Wall Location



Fig. 4: Excavation at Shiplift area & Exposed Vertical & Raker Piles.



FIG. 5: Kelly operated hydraulic grab



FIG. 6: Cage Lifting. (a) Initial Stage, (b) Advanced Stage



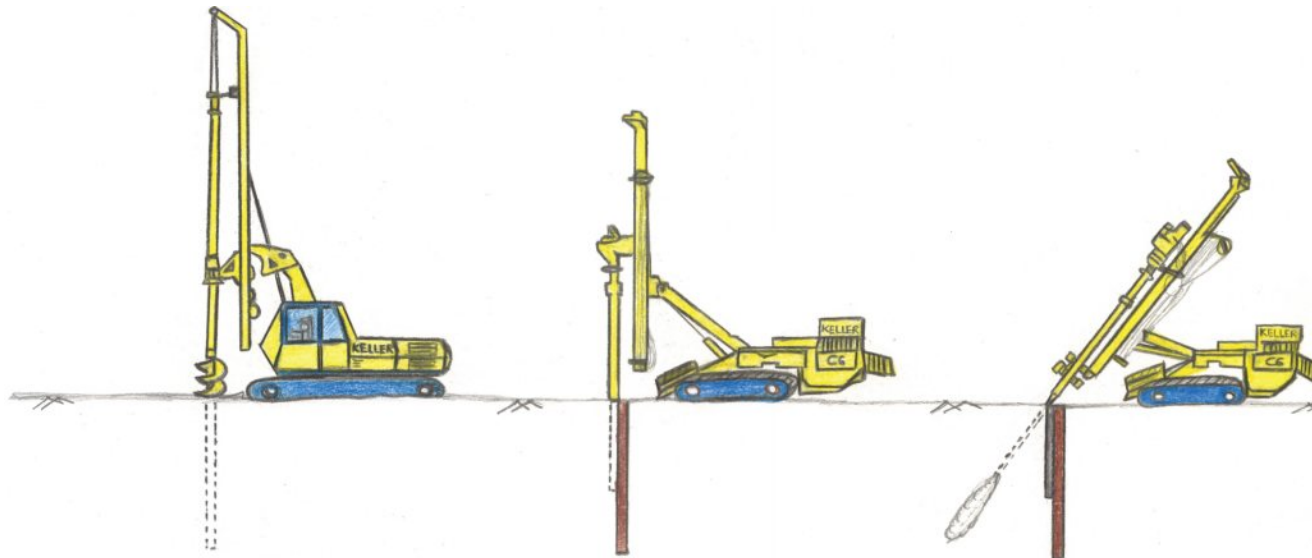
FIG. 7: Exposed Diaphragm Wall along Slip Dock Area



Fig. 8 Completed DW at Slip Dock with Pontoon Gate under Construction



## A Complete Retention System using Contiguous Bored Piles



Step 1 - Positioning and Installing CB Piles

Step 2 - Installation of Grout Columns

Step 3 - Installation of Inclined Soil Anchors



Step 4 - Pile chipping & Casting of Capping Beam

Step 5 - Stressing of Anchors

Step 6 - Final Excavation



Step 1A: Positioning of Hydraulic Piling Rig & Installation of Temp Casing



Step 1B: Contiguous Bored Pile Drilling in Progress

Technical photo feature of relevance are invited from the readers. The feature shall preferably illustrate a modern technology or testing procedure. Please prepare the feature with six to eight good quality pictures with brief and crisp description.



## Photo Feature

A Complete Retention System  
using Contiguous Bored Piles



Step 1C: Installed Contiguous Bored Piles



Step 2: Installation of Grout Columns



Step 3: Installation of Inclined Soil Anchors



Step 4A: Pile Chipping

Technical photo feature of relevance are invited from the readers. The feature shall preferably illustrate a modern technology or testing procedure. Please prepare the feature with six to eight good quality pictures with brief and crisp description.



## Photo Feature

A Complete Retention System  
using Contiguous Bored Piles



Step 4B: Cage fabrication of Capping beam



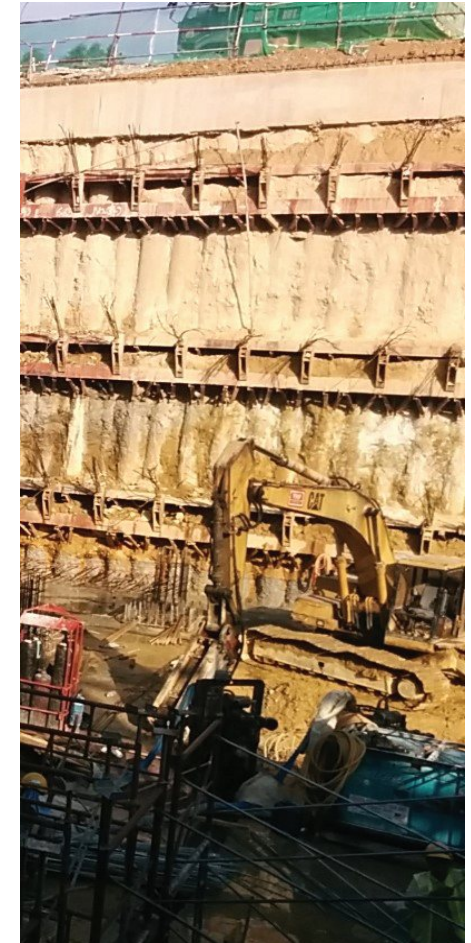
Step 4C: View of Capping Beam after Concreting



Step 5: Stressing of Anchors



Step 6 Final Excavation



Final Excavation-another site

Courtesy **KELLER**

Technical photo feature of relevance are invited from the readers. The feature shall preferably illustrate a modern technology or testing procedure. Please prepare the feature with six to eight good quality pictures with brief and crisp description.



## From OAKLAND

### DFI's 40<sup>th</sup> Annual Conference on Deep Foundations, Oakland Report by Mr. Mohan Ramanathan, ACT, Chennai

Addressing the Board of DFI on 11th Oct, 2015

On 11th Oct, I attended the Meeting of the Board of DFI. After a brief self introduction of the attendees, the business meeting began. When the regional chapters were called up, I represented DFI India chapter. I made a brief presentation on the chapter activities and the events so far conducted and planned in the future. I also presented my plan for Operator Training which was well received. Many useful suggestions came up. Our latest Newsletter was also distributed. All attendees appreciated the work and progress of our chapter.

Meeting with Piling Equipment Manufacturers on 14th Oct, 2015

This meeting was arranged by Mary Allen of DFI. This was an exclusive meeting with the Manufacturers. Representatives from Bauer, Mait, Casagrande, Soilmech and Liebherr were present. I presented a brief of my plans for Operator training in India. They all appreciated the efforts. Some useful tips also came up. ADSC also has a similar program in USA and they promised to guide us.

On the whole, it was a great experience.

I thank DFI of India chapter for deputing me for the Oakland Conference.



Attending DFI board meeting



Mr. Mohan Ramanathan with Jon Wolosick, DFI President and Ms. Theresa, Executive Director, DFI



## Resounding Success in Oakland

Report from DFI USA

The energy and enthusiasm of the 40th Annual Conference in Oakland pervaded every activity over the course of the event. The attendance was a record-breaking 912 people. Committee meeting rooms were packed, the exhibit hall was buzzing, and many of the lectures were standing room only. The conference was held October 12th-15th at the Oakland Marriott City Center. Conference co-chairs James Johnson of Condon Johnson and Terry Tucker of Malcolm Drilling did an excellent job organizing the event and even called for nice weather to complete the experience. Bryan Cortnik, C.E., S.E. of Hohbach-Lewin and Yogesh Prashar from M2 Consulting were Program Chairs and Dr. Antonio Marinucci, P.E. was the Program Advisor.

The pre-conference activities included a DFI Board of Trustees meeting and a meeting of our technical committee and working group chairpersons, individual meetings of the 18 Committees and 3 Working Groups, as well as a networking reception sponsored by the Women in Deep Foundations Committee.

### Conference Opening

The conference opened with the story of DFI's origin told by Theresa Engler, executive director. She had met with Jack Dougherty and Bill Loftus, two of the founders of DFI. She recounted the origins of "The Piling Institute" which eventually became the Deep Foundations Institute. Next, Bill Loftus (4th and 7th president) and Geordie Compton (executive director from 1998-2006), addressed the conference attendees with their fond memories and anecdotes of the early years of DFI.

In keeping with the theme of the conference, "Four Decades Shaping our Future", there was a DFI History Display where attendees could learn about the achievements and milestones of the last 40 years.

The first session, Mega Projects, kicked off with a presentation from Eric Halpin, P.E. from U.S. Army Corps of Engineers. He spoke on "National Infrastructure Challenges" and touched on the history of infrastructure in the U.S and the poor ratings that the ports, roads, and bridges have received compared to other countries.

Halpin discussed dam and levee risk characterization and challenged attendees to "preach our nation's infrastructure." Other mega-projects presented were California's High Speed Rail plans, California's nearly 15 billion dollar "water fix" program, the Transbay Transit Center and the Panama Canal Pacific Access Channel.

*Continue in page 16*



### Report of Workshop on Recent Trends in Piling and Ground Improvement, NITK Surathkal- by Dr. BM Sunil

The DFI-NITK workshop on "Recent Trends in Piling and Ground Improvement" sponsored by TEQIP-I1 and supported by Simplex Infrastructures Limited, Chennai, was held on 31st July 2015 at National Institute of Technology Karnataka (NITK), Surathkal. On Day 1 the program was scheduled from 09:00 to 18:00. Prof. Swapan Bhattacharya, NITK Director inaugurated the workshop. Dr. V. Balakumar of Simplex Infrastructure Ltd., Chennai, was the guest of honour. Six lectures were delivered by Invited Speakers drawn from different sections of deep foundation industry and reputed Institutes of higher learning such as IIT Madras and NITK Surathkal. Dr. C.R. Partha Sarathy Geotech, Bangalore, Dr. Kumar Pitchumani, AECOM, Chennai, Prof. S. R. Gandhi and Dr Subadheep Banerjee, IIT Madras, Chennai, Prof. R. Shivashankar, N.I.T.K Surathkal and Dr. V. Balakumar, Simplex Infrastructures Limited, Chennai were the resource persons. The lectures, covered up the subjects on design, analysis and testing on pile foundations and some aspects of ground improvement techniques. About 110 people including the professional engineers and graduate and post graduate students attended the workshop. Chairman of the IGS Surathkal Chapter and Organising committee member Prof. R. Shivashankar, Prof. Sitaram Nayak Organising committee members and Dr. Sunil B. M. Organising Secretary spoke during opening and closing ceremonies. This event was very successful, and it made good impacts on the participants from Mangalore and Udupi Districts and other delegates. Day 2 began with the field visit. A field visit was arranged for the participants to a piling site near B.C Road (about 35 kms from N.I.T.K. Surathkal) and to a push box tunnel site for a ROB (Railway over bridge). During the site visit the participants had an opportunity to see the construction techniques of deep foundation (pile foundation) and other geotechnical activities.



Invocation



Dr. V. Balakumar, Guest of Honour



Distinguished Delegates

#### Titles of the Invited lectures

Dr.C.R.Partha Sarathy, Geotech, Bangalore, Laterally loaded piles  
 Dr.Kumar Pitchumani, AECOM, Chennai - Ground improvement techniques and their applications  
 Prof. Gandhi S.R., IIT Madras, Chennai - Pile foundations and Applications  
 Dr. Subadheep Banerjee, IIT Madras, Chennai - Piles subjected to earthquake  
 Prof. R. Shivashankar, NITK Surathkal - Design of pile foundations  
 Dr. V. Balakumar, Simplex Infrastructures Limited, Chennai - Design and installation issues in rock socketed piles - A Review

### DFI of India Members - 2015

#### Corporate Member Class IV

L&T Construction

#### Corporate Member Class III

Keller Ground Engineering India Pvt. Ltd.

#### Corporate Member Class I

PANASIA Project Consultancy Pvt Ltd. (new)

#### Affiliate Member

Geo-Ground Engg Operations India Pvt Ltd

#### Corporate Individual members

Pradeep Kumar D, PANASIA Project Consultancy Pvt Ltd (new)

#### Individual Members (all category - new)

Krishnendu Mandal, MYTHCON, Kolkata

Manguesh P Bhiva,

Ramasamy Ananth, Consultant

Ravishankar J B, GRIPS INDIA

Borthakur Nirmali (Mrs.), NIT, Silchar, Assam

Ilamparuthi K., Anna University, Chennai

Umesh Kumar, BSEIDC Ltd., Kathiar, Bihar

Sreejith G H, Public Works Department, Kerala

Jayachandran Srinivasan, L&T Construction, Gujarat

Kongubangaram Vidyasagar, L&T Construction, Tamilnadu

## DFI-India 2015, Bangalore

28-30 September 2015

A conference on 'Deep Foundation Technologies for Infrastructure Development in India' (DFI-India 2015 Conference) was held at the J N Tata Auditorium, National Seminar Complex, Indian Institute of Science (IISc) Bengaluru from September 29-30. The two day event preceded by a one day workshop on Piled-Raft Foundation Systems, was organised by the Deep Foundation Institute of India, in association with the Indian Institute of Science, Bengaluru, Indian Geotechnical Society Bangalore Chapter, and the American Society of Civil Engineers- India Section. Professor G L Sivakumar Babu of the Department of Civil Engineering, IISc who was the chairman of the Conference, welcomed the guests, keynote speakers, exhibitors and delegates to the inauguration ceremony held in the morning of September 29. Mr. Vijay Kumar Dhir, Director Projects, Bangalore Metro Rail Corporation Ltd (BMRCL) was the Chief Guest, Prof. BRS Murthy Retired Professor of Civil Engineering, IISc and Chairman Task force for Construction Quality, Government of Karnataka was the guest of Honour, Prof. M. Sudhakar Rao, Chairman, Department of Civil Engineering, IISc Bangalore was the Presiding Officer of the ceremony. Other dignitaries on the dais were Mr. James A Morrison, Past President, Member Board of Trustees Deep Foundations Institute (DFI), USA, Dr. K.S.Rama Krishna, Member Board of Trustees DFI, USA and Chairman, Deep Foundations Institute of India (DFI of India), Mr. Jyri Niskanen, Head of Sales, Foundation Equipment, Junttan Oy, Finland, Dr. P. Raghuvver Rao, Senior Scientific Officer, Department of Civil Engineering, IISc Bangalore and the Conference Organising Secretary.

In his inaugural address, Mr.V.K.Dhir spoke eloquently about the urgent need to bring the Indian Standards and Specifications on par with the international standards and specifications, for the engineers who design, plan and prepare the drawings, specifications and contract conditions to carefully study the geological and geotechnical features, variations of the ground and their impact on the constructability aspects and contract conditions, and for the contractors to continuously upgrade the knowledge and skills of the executing teams of engineers, supervisors and equipment operators so that the safety, quality and productivity match with those of the best in the world. He emphasised the importance of such a holistic approach in the implementation of all infrastructure projects and appreciated the role of DFI of India and IISc in bringing all these stake holders on to one forum such as this Conference.

Prof.BRS Murthy spoke about the inseparability of the industry academia interaction and on how one



## Deep Foundation Technologies for Infrastructure Development in India, DFI-India 2015 at Bengaluru

By Dr. K.S. Ramakrishna, Chairman DFI of India

supplements and compliments the other in all major civil engineering projects such as calibration, critical testing, complex analysis, proof design, etc.

Mr.James A.Morrison while explaining the activities of DFI worldwide gave assurance to extend all support to DFI of India in its efforts to disseminate knowledge of latest foundation technologies to the Civil Engineering community in India and to improve skills in the design and construction of deep foundations and underground structures. He also stated that DFI would be happy to consider granting funds to research projects of practical value to the deep foundations industry in India and scholarships to students engaged in such research.

Foundations transfer the loads of the structures to the earth. Heavier structures require deeper foundations, and sometimes, the piece of earth at the site may not be suitable for transferring such heavy loads. In such cases, pile foundations are preferred in order to ensure the safety of the structure. Piles are inseparable parts of offshore structures like port and harbour facilities, offshore oil and gas platforms. Similarly, deep excavations and underground construction, particularly in urban areas such as Bengaluru are fraught with several challenges and uncertainties which make the job of a geotechnical engineer very unique among the civil engineers.

India, one of the fastest growing economies in the world, should rapidly ramp up its physical infrastructure. Experts believe that deep foundation technologies are of critical importance as the country is trying to accelerate the construction of infrastructure projects. In this context, the Conference was very successful in attracting different stakeholders of the foundation industry to the event and in disseminating knowledge of the latest foundation technologies.

The Three day pre-conference workshop and Conference saw expert speakers from different countries of the world, eg., Brazil, Canada, Finland, Germany, Greece, Poland, Singapore, UAE and USA, speaking about deep foundations technologies and case studies. The pre-conference one day workshop on Piled Raft Foundation Systems was conducted by Prof. Rolf Katzenbach, University of Darmstadt, Germany. The topic of the workshop is of national importance because most of the current and future urban and semi-urban development will be vertical and Prof.Katzenbach embellished his day long lectures with several case studies based on his vast experience of foundations for tall towers around the world. Dr.Poh Teoh Yaw, Deputy Director, Deep Excavations and Geotechnical Department, Building and Construction Authority (BCA),



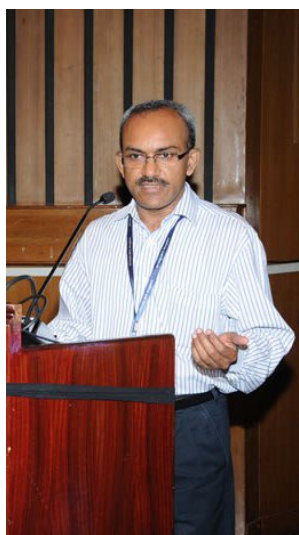
## DFI-India 2015 at Bengaluru - report cont..

Singapore gave an excellent lecture on practices and performances of foundations for high-rise buildings in Singapore. Around eighty avid engineers attended the workshop.

Industry support to the conference came from Junttan OY, Finland, Gmmco India, Nuclear Power Corporation of India Ltd, AECOM, Keller Ground Engineering India Pvt Ltd, BAUER Group, Germany, MHWirth Germany, and United Foundations India Pvt Ltd. One of the salient features of the conference was exhibition of latest equipment based deep foundation and excavation technologies, instrumentation, monitoring and testing technologies, analysis and design software, special enabling materials for foundation, deep excavation and construction, etc. by M/s. Junttan OY, Geo Ground Engineering Operations India Pvt Lt., Keller Ground Engineering India Pvt Ltd., Panasia Project Consultancy Pvt Ltd, Smart Structures/Soil Engineering, USA, OASYS Ltd (Software House of ARUP), HBL Power Systems, Laviosa Trimex Industries Pvt Ltd., L&T Geo Structure, Sarathy Geotech and Engineering Service Pvt Ltd., Ultra Enviro-Systems Pvt Ltd and Earth Products India Pvt Ltd. The Conference highlighted the importance of coming together all the stakeholders of Indian Construction Industry,

particularly the Foundation Construction Industry to deliberate the issues and find solutions for the acceleration of India's infrastructure construction. The wide spread of the topics clearly showed that deep foundations are indeed versatile, and they continue to play an important role in the world.

Conferences and workshop are a serious stuff and participants needed something to relax and re-energize. Thanks to the scintillating Bharathanatyam performance by Dr.Shridhar, Anuradha and their team from Khechra Academy, in the evening on September 29 and the well organised banquet.



Dr. P. Raghuveer Rao, IISc, Bangalore, Organising Secretary



Prof. G.L. Sivakumar Babu  
Conference Chair



Inauguration



Prof. Rolf Katzenbach, Darmstadt, Germany



Salute the Students volunteered for the organisation of this wonderful conference

**SAVE THE DATE**

DFI International Conference on Deep Foundations, Seepage Control and Remediation (41st Annual Conference on Deep Foundations) - October 12-15, 2016, Marriott Marquis, New York, NY.  
**CALL FOR ABSTRACTS - DEADLINE December 4, 2015**  
<http://www.deepfoundations2016.org>

## WHAT CAN DFI DO FOR YOU?

### Overview

DFI is an international association of contractors, engineers, suppliers, academics and owners in the deep foundations industry. For more than 30 years, we have brought together professionals for networking, education, communication and collaboration. As a member, you help create a consensus voice and a common vision for continual advancement in the planning, design and construction of deep foundations and excavations.

### Find Common Ground. Become a Member of DFI

Network with thousands of members and industry professionals worldwide  
 Get involved locally through DFI's active presence in Europe, India and the Middle East  
 Strengthen your knowledge base and obtain practical information at seminars, short courses, workshops and conferences  
 Collaborate with colleagues by joining one of 15 active Technical Committees, Regional Chapters or a DFI group  
 Stay informed through the flagship Deep Foundations magazine and the peer-reviewed DFI Journal  
 Gain visibility with a corporate member listing on the DFI website, which has 20,000 views each month  
 Connect and communicate with industry peers through social media such as DFI's LinkedIn Groups  
 Access OneMine.org and download up to 100,000 articles, technical papers & books from DFI & organizations all over the world - at no cost

Visit [www.dfi-india.org](http://www.dfi-india.org) OR [www.dfi.org](http://www.dfi.org)  
 to know more and to become a member

### Resounding Success in Oakland, Report from DFI USA contd from 12

#### Legends Awards Ceremony

The brand new Legends program awards ceremony was an excellent addition to the annual conference. Scot Litke served as emcee and interviewer in a unique and intimate setting with the awardees and their spokesmen. Charles Berkel, deceased Contractor Legend, was represented by Alan Roach, longtime friend and employee. Stefano Trevisani introduced and translated for his father, Davide Trevisani, who was the first Manufacturer Legend. Rick Ellman honored George Tamaro, previous Partner at Mueser Rutledge Consulting Engineers and the first Engineer Legend, who joined the ceremony via Skype. The audiovisual was great and gave it a "David Letterman feel" as Litke interviewed the recipients. The first DFI Legends ceremony was unforgettable.

#### Awards and Closing

At the Awards Reception and Banquet, the winners of DFI's most prestigious awards were celebrated.

The 40th Annual Conference was an astounding success— with world-renowned speakers, informative technical sessions, new technical poster presentations, 21 technical committee and working groups meeting, and 125+ exhibits of innovative products and services. It was the ideal technical conference for staying up-to-date with deep foundation trends and developments or connecting with industry professionals from across the globe to gather and share experiences, exchange ideas and build relationships. We've come full circle – the first annual conference was held just across the bridge in San Francisco. In the past four decades, DFI and its members have been shaping the future of the deep foundations industry. Here's to another 40 years!



Davide Trevisani, DFI Manufacturer Legend seated in center, with family and colleagues



Bernie Hertlein, Distinguished Service Award Winner and Scot Litke, Past Recipient

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