



# GULF TUNNELING

COMPANY PROFILE



الخليج للأنفاق  
GULF TUNNELING



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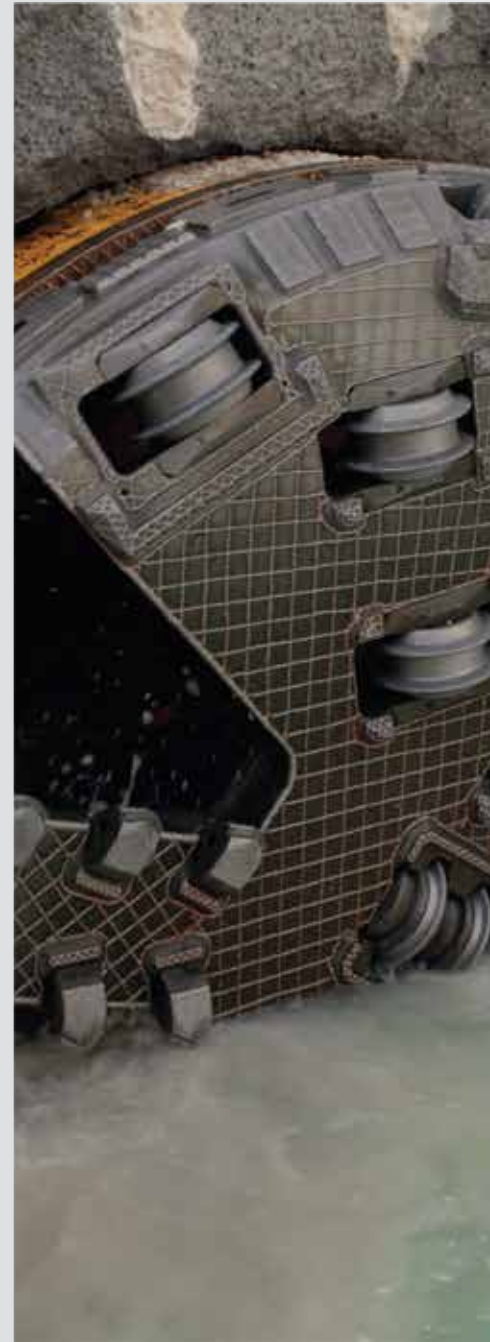
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# 01

## COMPANY PROFILE



04

GULF TUNNELING

# GULF TUNNELING

Gulf Tunneling (GT) is an engineering firm that specializes in planning and executing complex boring & tunneling works. We are considered the biggest self-contained Micro-Tunneling company in the GCC. Our acquired technological & operational experience—coupled with the rapid growth of the region—allows us to partake in great infrastructure projects and developments throughout the State of Qatar, with over 75,000 meters of tunnel currently installed or ongoing.

Our underground installations have reached remarkable depths, on every type of ground condition, with pipe diameters reaching several meters. We have served government agencies, gas majors, private contractors, and private developers using our field-expertise and our fleet of equipment (including TBMs, separation plants, control containers, cranes, water tankers, and more). Our services include installation of all kinds of underground gravity and pressure pipelines for drainage, water mains, and utility tunnels.

Since inception in 2002, GT has become a leader in the field of Micro-Tunneling. Our technical & commercial team is multinational, comprised of professionals with project experience from around the world. HSE has always been a top priority: we have maintained a record of zero Loss-Time Incidents (LTI) in every project.

At Gulf Tunneling, our objective is excellence.

## COMPLEX BORING & TUNNELING WORKS

*“biggest self-contained  
Micro-Tunneling company  
in the Gulf”*

*OVER 75,000 METERS OF  
TUNNEL CURRENTLY INSTALLED OR ONGOING*

LIMITLESS SHAFT DEPTHS

MILLIMETER PRECISION

INJURY-FREE OPERATIONS

# 02

## ORGANIZATION CHART & KEY STAFF



# KEY PERSONNEL

## Summary of Experience

### GULF TUNNELING IN-CHARGE

Houssam Rassmy , Bsc Civil Eng.

- Experienced in Tunneling & Boring Works; 21 years (GCC & Egypt)
- Employed by GT : 13 Years

### OPERATIONS IN-CHARGE

Nader Dahab, BSc Civil Eng.

- Experience in Construction & Tunneling : 22 Years (GCC & Egypt)
- Employed by GT : 9 years

### SENIOR MICRO TUNNELING ENGINEER

HUSHAM HUSSEIN IBRAHIM, Bsc.ENG. MECHANICAL

- Experienced in Tunneling & Boring Works : 22 Years (GCC & Sudan)
- Employed by GT : 8 Years

### SENIOR MICRO TUNNELIGN ENGINEER

TAREK ABD EL RAHMAN ABO LAILA, Bsc.ENG. MECHANICAL

- Experienced in Tunneling & Boring Works : 17 Years (GCC & Egypt)
- Employed by GT : 12 Years

### HORIZONTAL DIRECTION DRILL IN-CHARGE

Mostafa Hussien El-Saeed, Bsc.ENG. MECHANICAL

- Experienced in HDD Works : 2 Years (GCC)
- Employed in GT : 1 Years

### MAINTENANCE IN-CHARGE

WASSIM ELIAS EID, Bsc.ENG. MECHANICAL

- Experience in Maintenance Field : 8 Years (GCC & Syria)
- Employed in GT : 6 Years

### SAFETY ENGINEER

Akber Khan National Education Board Occupation Safety & Health

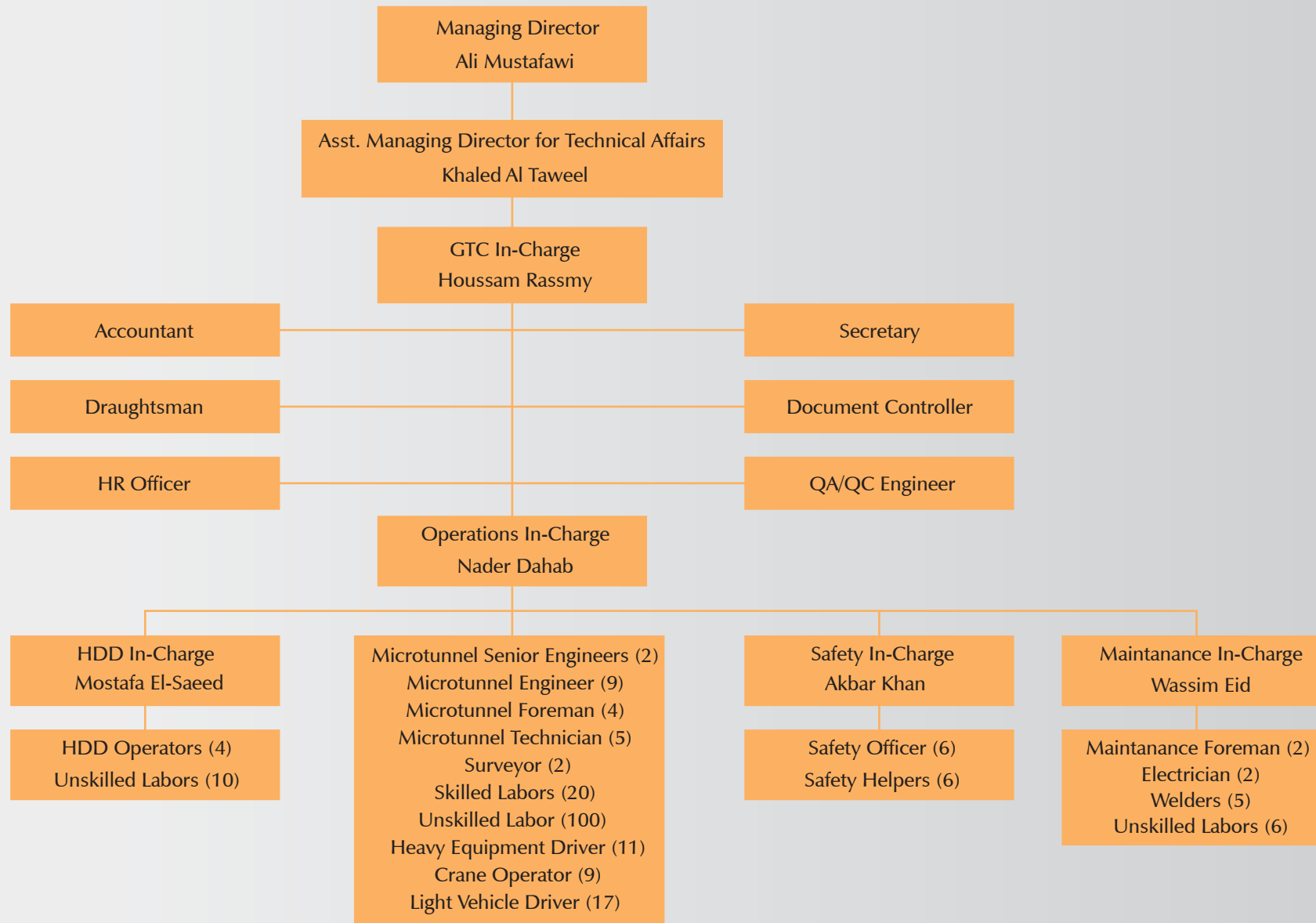
- Experience in HSE Field : 6 Years (GCC)
- Employed in GT : 2 Year

### QA/QC ENGINEER

RONALD LENCHICO B.Sc. in Mechanical Engineer

- Experience in Quality Control : 9 Years (GCC & Philippines)
- Employed in GT : 1 Year

# GTC Organization Chart







*EXPERIENCED. PASSIONATE. QUALIFIED.*

## HOUSSAM EL-DIN MOHAMED RASSMY

Current Position: Gulf Tunnelign In-Charge

Qualifications: B.Sc. Eng. Ain Shams University – Cairo 1989

Career Summary: Over 21 Years' experience as a Tunneling Operating Engineer

### EMPLOYMENT RECORD:

2002 – Present	Gulf Tunneling	As a Gulf Tunneling In-Charge, Doha - Qatar
1998 – 2002	Silver Coast Construction & Boring Co. LLC Millennium T & GM	As a Micro Tunneling Operating Engineer, Abu Dhabi, UAE
1996 –1998	Astraco Construction	Micro Tunneling Operating Engineer, UAE
1995 – 1996	Admak	Micro Tunneling Operating Engineer, Bahrain
1994 – 1995	Behzad	Micro Tunneling Operating Engineer, Bahrain

## NADER FADL MAAMOUN DAHAB

Current Position: Operations In-Charge

Qualifications: B. Eng. Civil Engineering

Zagazig University  
Egypt - 1993

Career Summary: Over 22 Years' experience as a Tunneling Operating Engineer.

### EMPLOYMENT RECORD

2006 - Present	Gulf Tunneling	As an Operations In-Charge
2005 - 2006	General Construction Co.	Senior Project Engineer Abu Dhabi, UAE
1997 - 2005	Al Manbaa Drilling Est.	Assistant Project Manager bu Dhabi, UAE
1995 - 1997	Cairo Water Consortium	Tunneling Engineer, Cairo, Egypt
1994 - 1995	Greater Cairo Utility Data Center	Civil Engineer. Cairo Egypt
1993 - 1994	Mechanical Engineer Group Co.	Civil Engineer, Cairo Egypt



## HUSHAM HUSSEIN IBRAHIM

Current Position: Senior Micro Tunneling Engineer

Qualifications: B. Eng. Mechanical Engineer Birla Institute of Technology, India

Career Summary: Over 22 Years' experience as a Tunneling Operating Engineer.

### EMPLOYMENT RECORD

2007 - Present	Gulf Tunneling	Senior Micro Tunneling Engineer
2002 - 2007	Al Manbaa Drilling Establishment	Mechanical Engineer Abu Dhabi, UAE
1998 - 2002	Al Mansoori Abu Dhabi, UAE	Mechanical Engineer
1994 - 1998	Al Manbaa Drilling Establishment Abu Dhabi, UAE	Mechanical Engineer
1993 - 1994	El Rodwan Trade & Service Co Ltd.	Engineer, Sudan

TAREK ABDL EL RAHMAN ABO LAILA

Current Position: Senior Micro Tunneling Engineer

Qualifications: B. Eng. Mechanical Engineering Zagazig University  
Egypt - 1992

Career Summary: Over 17 Years' experience  
as a Tunneling Operating Engineer.

EMPLOYMENT RECORD

2003 - Present	Gulf Tunneling	Senior Micro Tunneling Engineer
1998 - 2003	Arab Contractors	Micro Tunneling Operating Engineer & Maintenance Site Eng., Kuwait
1995 - 1998	Arab Contractors	Maintenance Engineer, Kuwait
1993 - 1995	Military Force	Engineer, Egypt.

## ALI MAHER AHMED GHANEM

Current Position: Micro Tunneling Engineer

Qualifications: B.S. Mechatronics Engineering

Career Summary: Over 9 Years' experience as a Micro Tunneling Engineer.

### EMPLOYMENT RECORD:

2011 - Present	Gulf Tunneling	Micro Tunneling Engineer, Doha - Qatar
2009 - 2011	Al Harbi Trading & Construction Ltd Saudi Arabia	Micro Tunneling Engineer
2007 - 2009	Arab Contractors Co. (Osman A. Osman & Co)	Micro tunneling Engineer
2006 - 2007	The Egyptian Company for Construction Development	Micro Tunnelling Engineer



## DAVID MAMACHAN ABRAHAM

Current Position: Micro Tunneling Engineer

Qualifications: Diploma in Industrial Electronics Engineer  
Two Year Specialization in Engineering Drawing

Career Summary: Over 17 Years' experience as a Micro Tunneling Engineer.

### EMPLOYMENT RECORD:

2008 - Present	Gulf Tunneling    Micro Tunneling Engineer, Doha - Qatar
1998 - 2008	Assistant Maintenance Engineer <ul style="list-style-type: none"> <li>• India Municipality , India</li> <li>• Al Hassanain Trading Corp., Bahrain</li> <li>• AJECT</li> <li>• Al Rashid Company , KSA</li> <li>• Ministry of Affairs MSCP Project - Oman</li> </ul>

## SAMEH SAFWAT AHMED IBRAHIM

Current Position: Micro Tunneling Engineer

Qualifications: Bachelor of Engineering

Career Summary: Over 9 Years' experience as a Micro Tunneling Engineer.

### EMPLOYMENT RECORD:

2013 - Present	Gulf Tunneling	Micro Tunneling Engineer Doha - Qatar
2010 - 2013	Green Line Arabia Co. (Kuwait and Oman)	Micro Tunneling Engineer
2010 - 2010	Vadnais Micro Tunneling (Muscat, Oman)	Micro Tunneling Engineer
2007 - 2010	Arab Contractors Company Micro Tunneling Engineer (Egypt)	
2006 - 2007	Egyptian Company for Constructed Development (Egypt)	Maintenance Engineer & Assitant Operator

# ALAA ELDIN AHMED ALI HOZIAN

Current Position:   Micro Tunneling Engineer

Qualifications:       B.Sc Degree of Engineering (Elec. & Power Department)

Career Summary: Over 9 Years’ experience as a Micro Tunneling Engineer.

## EMPLOYMENT RECORD:

2013 - Present	Gulf Tunneling Doha - Qatar	Micro Tunneling Engineer,
2012 - 2013	Vadeneis Micro Tunneling Company (UAE)	Micro Tunneling Engineer
2009 - 2012	Al Harbi Trading Contracting Co. Ltd. (Saudi Arabia)	Micro tunneling Engineer
2006 - 2009	Egyptian Company for Construction Development (Egypt)	Micro Tunnelling Engineer



# MOHAMMAD HAJJAJ

Current Position:   Micro Tunneling Engineer

Qualifications:       Shoubra Faculty of Engineering, Benha University

Career Summary:   Over 6 Years’ experience as a Micro Tunneling Engineer.

## EMPLOYMENT RECORD:

2011 - Present	Gulf Tunneling	Micro Tunneling Engineer, Doha - Qatar
2011 - 2011	Concord for Engineering & Contracting	Electrical Engineer
2009 - 2011	Concord for Engineering & Contracting	Micro tunneling Engineer

KRISHNA KUMAR VENKATA SAMY

Current Position:   Micro Tunneling Engineer

Qualifications:       B. Eng. Instrumentation & Control Engineering. 1997 - India

Career Summary: Over 17 Years’ experience as a Micro Tunneling Engineer.

EMPLOYMENT RECORD:

2008 - Present	Gulf Tunneling	Micro Tunneling Engineer, Doha - Qatar
2004 - 2008	Thrusboring Construction Company (TAMIMI Group) Micor Tunneling Engineer , Kuwait	
2001 - 2002	Civil Works Company	Engineer, Damam, KSA
1998 - 2002	India Municipality	Engineer, Mumbai, India

## AHMED HELAL FAWZY

Current Position: Micro Tunneling Engineer

Qualifications: B.Sc of Engineering, Mechanical Power Department

Career Summary: Over 5 Years' experience as a Micro Tunneling Engineer.

### EMPLOYMENT RECORD:

2013 - Present	Gulf Tunneling Doha - Qatar	Micro Tunneling Engineer,
2011 - 2013	Thrust Boring Construction Company (TCC)	Micro Tunneling Engineer
2010 - 2011	Alexandra Construction Company	Implementation Engineer



## SIMON VARGHESE

Current Position: Micro Tunneling Engineer

Qualifications: B.Sc. Mechanical Engineer,  
St. Joseph's College - Chennai, Anna University India

Career Summary: Over 5 Years' experience as a Micro Tunneling Engineer.

### EMPLOYMENT RECORD:

2010 - Present	Gulf Tunneling	Micro Tunneling Engineer, Doha - Qatar
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# MADHU THALASSERIL VARGHESE

Current Position: TBM Operator

Qualifications: Bsc Physics (University of Kerala)

Career Summary: Over 9 Years’ experience as a Micro Tunneling Engineer.

## EMPLOYMENT RECORD:

2014 - Present	Gulf Tunneling	TBM Operator, Doha - Qatar
2012 - 2014	CHYE-JOO Construction Pte Ltd	TBM Engg - Operator - Singapore
2006 - 2007	Easso Lifts Pvt Ltd	Electronics and Electrical Department

## WASSIM ELIAS EID

Current Position: Maintenance In-Charge

Qualifications: B. Eng. Mechanical Engineering,  
Al Bath University - Syria 2006

Career Summary: Over 8 Years' experience as a Maintenance Engineer.

### EMPLOYMENT RECORD:

2009 - Present	Gulf Tunneling	Maintenance Engineer, Doha - Qatar
2007 - 2009	General Company of Phosphate and Mines Gecopham	Mechanical Engineer, Homs.Syria

## MOSTAFA HUSSIEN EL-SAEED

Current Position: Horizontal Direction Drill In-Charge

Qualifications: Bsc Mechanical Engineering.

Career Summary: Over 2 Years' experience as a HDD Engineer.

### EMPLOYMENT RECORD:

2015 - Present	Gulf Tunneling	HDD In-Charge
2008 - 2015	Tamimi Thvustboring (t.c.c) HDD Site Engineer.	



## AKBER KHAN

Current Position: HSE Engineer

Qualifications: NEBOSH (IGC) National Education Board Occupation Safety & Health (International General Certificate) Pass (U.K)

Career Summary: Over 6 years experience in HSE field.

### EMPLOYMENT RECORD:

2013 - Present	Gulf Tunneling	HSE Engineer.
2011 - 2013	Al Habtoor Leighton Construction Co (LLC)	HSE Engineer. Dubai (UAE)
2009 - 2009	Al- Mouwasat Construction Company	HSE officer KSA (Dammam)

## RONALD L. LENCHICO

Current Position: QA/QC Engineer

Qualifications: B.Sc in Mechanical Engineer

Career Summary: Over 9 Years' experience as QA/QC Engineering Field

### EMPLOYMENT RECORD:

2014 - Present	Gulf Tunneling	QA/QC Engineer
2008 - 2014	Mitsubishi Motors Qatar Automobiles Company (Doha-Qatar)	QC Service Advisor
2007 -2008	Toyota Motors Toyota Balintawak Incorporated (Philippines)	QC Service Adviser (TSA)
2006 - 2007	Splash Philippines Incorporated (Philippines)	Quality Control Operation Division

# EXPERIENCE

# 03



## Gulf Tunneling's Completed & Ongoing Projects Micro - Tunneling

Project Name	Client	Main Contractor	Tunneling Details	
			Pipe Sizes (mm)	Qty (m)
Barwa Commercial Avenue Project	Barwa	Hochtief	800	317.13
Doha & Rayyan Sewerage Phase 3 CP 626/3	Ashgal Drainage	Nael Bin Harmal	400	790
			500	630
			600	660
			1000	2380
GTC 269/2008 New Reservoirs & Assoc. Pipelines Gharaffa, West Bay, Salwa Indust, Bani Hajr Water Station	Kahramaa	Qatar Bulding Company	2000	81
Doha Expressway D-ring Road Interchange ERC 1400/D20/C4	Roads Affair Ashghal	QBC Terna JV	2000	2749
Lusail Development Sewerage treatment	Qatrai Diar / Lusail	Qatar Bulding Company	2000	1120
Head Works Construction at Airport, And Salwa Doha SW and Messaid GTC 177/2007	Kahramma	Qatar Bulding Company	1600	240
			1200	281.31
Muraikh Area Drainage and Outfall CP 565	Drainage Affairs, Ashghal	Qatar Bulding Company	600	130.38
			800	258.15
			1000	738.1
			1200	117.12
			1600	1133.65
			2000	1699
PS 25 & 26 Catchments Sewerage Phase 2 CP 622/2	Drainage Affairs, Ashghal	Qatar Bulding Company	2400	4362
			600	73
			800	148
			1200	565
			1600	977
Development of Roads at North Khalifa & Markhiya Area, Zone 32 & 33	Ashgal Roads	QBS International	2000	637
			400	197
			600	57
			800	1135



## Gulf Tunneling's Completed & Ongoing Projects Micro - Tunneling

Project Name	Client	Main Contractor	Tunneling Details	
			Pipe Sizes (mm)	Qty (m)
PS 25 & 26 Sewerage Catchments CP 622/1	Drainage Affairs, Ashghal	Qatar Bulding Company	350	60
			400	60
Abu Hamour Area Sewerage Phase 1 CP 624 & 625	Drainage Affairs, Ashghal	Qatar Bulding Company	300	1648
			600	876
			1000	1860
GTC 78 Upgrading of West bay & Gharaffa West Station	Kahramaa	Hassan Juma Backer	1000	154.94
			1200	390.58
Industrial Area Sewerage Phase 1 CP 394	Drainage Affairs, Ashghal	Qatar Bulding Company	600	162
			800	1577
			900	844
BP#1G-1B (3) Al Luqta Micro Tunnels and Ducts	Qatar Foundation for Education City	Qatar Bulding Company	1200	508
Zoo Road to Rayyan Road CP 174/1	Drainage Affairs, Ashghal	Qatar Bulding Company	1000	1144
PS 25 & 26 Catchments Sewerage CP 622	Drainage Affairs, Ashghal	Qatar Bulding Company	600	73
Interconnecting Barwa City & Barwa Commercial Avenue	Barwa / Hochtief	MACE	3000	335
Reinforcement of Water Transmission - GTC 275/2009	Kahramaa	HBK	1200	100
Road crossing	Ashgal Roads	Yuksel-Midmak /Aject	3000	378
Lusail Development Project Construction (CP2)	Qatrai Diar / Lusail	Aljaber&Partenr	1600	1170
Al Wukair RPS and Associated Pipelines GTC 299/09	Kahramaa	Qatar Bulding Company	1000	53.06
			1200	54.28
Construction Al Nassriya Area Sewerage Phase 3 CP 745/3	Ashghal	Qatar Bulding Company	400	286
Construction Al Nassriya Area Sewerage Phase 2 CP 745/2	Ashgal	Qatar Bulding Company	400	1389

## Gulf Tunneling's Completed & Ongoing Projects Micro - Tunneling

Project Name	Client	Main Contractor	Tunneling Details	
			Pipe Sizes (mm)	Qty (m)
Head Works Construction from Duhail & Umm Qarn RPS & Associated Pipelines GTC244/2008	Kahramaa	Leighton Contracting Company	900	93.78
			1200	221
			1000	53
Labor City Rising Main, Industrial Area Labour City Infrastructure	-	Abudlla Nass Group	1000	64.20
Al Kaaban RPS & Associated Pipelines GTC 426/2011	Kahramaa	Leighton Contracting Company	1000	84.00
Doha & Rayyan Sewerage Phase - 2 CP 626/2	Ashgal Drainage	Qatar Bulding Company	200	2100
			300	5790
			400	3090
			500	813
			600	2407
			1000	1366
Upgrading of Infrastructure of Al Muntazah Street Extension Package -13	-	Al Jaber & Partners	3000	180
			2400	158
			2000	1190
QRP Dukhan Road (East Contact)	Qatari Dair	Saudi Bin Laden Group Limited	2400	4327
Lusail Development CP 4 Road A1, Road A6, Marina and Southern Interchanges	-	Midmac Yuksel JV	3000	2115
			2400	2392
Peripheral & Surrounding Roads at Qatar National Museum	-	Solid General Construction	800	137
			1200	808
			1600	395
Design and Cosntruction of Abu Hamour (Musaimeer) surface and ground water drainage tunnel - Phase 1	Ashgal Drainage	Salini Impregilo SPA Qatar Branch	800	50.3
			1000	478.2
			1200	331.1
			2400	439.5
Sewer Extension & House Connections Al Jazeera / Qatar Television Stations	Ashgal Drainage	Temalco Contracting & Trading	200 / 765	63

## Gulf Tunneling's Completed & Ongoing Projects Micro - Tunneling

Project Name	Client	Main Contractor	Tunneling Details	
			Pipe Sizes (mm)	Qty (m)
Construction of Roads and Infrastructure in Al-Kheesa North and East (Rawdat Al-Hamama District) Package 1	Ashgal Drainage	CGC - SACYR Joint Venture	2400	1014
Construction of Roads and Infrastructure in Bani Hajer North (Rawdat Egdaime) Phase 1 & 2 Package 1	Ashgal Drainage	CGC - SACYR Joint Venture	OD 965 / 1080 2400	765 460
Qatar National Library Station (Green Line)	-	Mechanical And Civil Engineering Contractors (MACE)	1100	Re measurable
Pipelines for Mega Reservoirs, Corridors Main 1 Package C (GTC600/2013C) and Main 2 Package A (GTC599/2013A)	Kahramaa	Al Jaber Engineering LLC	2000 2400	1058.65 1252.5
Roads and Infrastructure in Wakra West, MMUP PH2 PKG 14 (Package 1)	-	Lane-Solid-Tadmur Joint Venture	400 500 600 100 1200	1212 426 25 1635 1655
GTC 599/2013 - Pipelines for Mega Reservoirs, Corridor Main 2 - Package B,	Kahramaa	China Harbour Engineering Co. Ltd	1200 1400	Re measurable
Construction of East Corridor P011 (Package 2)	Ashgal Drainage	China Harbour Engineering Co. Ltd	1200 900	Re measurable

## Gulf Tunneling's Completed & Ongoing Projects (Horizontal Direction Drill)

Project Name	Client	Main Contractor	Tunneling Details	
			Pipe Sizes (mm)	Qty (m)
BP#1G-1B (3) Al Luqta Micro Tunnels and Ducts	Drainage Affairs, ASHGHAL	QBC	600	889
Qatar Power Transmission System Expansion Phase V111/EHV Power Cable gtc 142/D/2006	Kharamma	Marubeni	700	640
Lusail Development Project Sewerage Treatment Works TAC/LUS/101/09	Al Diar	QBC	200	108
Existing Distribution Network GTC 276/2009	Kahramaa	Al Waha Contracting	300	152.5
Desing and Construction of Traffic Diversion for Wakra Ras Abu Abboud Road Intersection GTC 40	-	QBC	160	56
Head Works Construction at Airport, Old Salwa, Doha SW & Messaid Town GTC 177/2007	Kharamma	QBC	300	247
Qatar Power Transmission System Expansion Phase V111/EHV Power Cable GTC 142/E/2006	Kharamma	QBC	300	126.4
Lusail Development Primary Construction Package 4, Construction of Traffice Diersion CP 4	-	QBC	150	55.5
Khartiyath Ground Water Lowering System C 782	Ashgal	QBC	355	143
CIVil Project C 281	Ashgal	QBC	150	220
CIVil Project C 280	Ashgal	QBC	200	120
Development of mainroads in Zone 46 C016G	-	Hamab Bin Khalid Contracting (HBK)	400	70
Al Wakra Security Complex	-	Al Madar Contractin	250	108
Street Lighting Installation and Landscaping Upgrade	-	Conserv Trading & Contracting	150	32



## Gulf Tunneling's Completed & Ongoing Projects (Horizontal Direction Drill)

Project Name	Client	Main Contractor	Tunneling Details	
			Pipe Sizes (mm)	Qty (m)
Al Muntazah Street Package 13	-	Al Jaber & Partners	100	16
Al Muntazah Street Package 13	-	Al Waha Contracting	300	37
QRP Dukhan Road (East Contact)	Qatari Dair	Saudi Bin Laden Group Limited	-	-
NDIA Street Lighting Installation and Landscaping Upgrade	-	AlNakheel Agriculture & Trading	300	367.32
			150	308
			400	267
			200	752.5
			600	149
GTC 558 - Kahramaa 2013	Kahramaa	New Horizon Contracting & Maintenance	500	114
			255	27
			200	12
Qatar Petroleum for Upgrade of TSE Distribution Network GT13102600	-	Temalco Contracting & Trading	200	16
			400	304
Construction of Supreme Education Council Headquarters, Doha	-	Al Huda Engineering Works	161	700
			300	29
Workers Hospital & Integrated Healthcare Centre at Mesaieed Industrial Area	-	Contraco WLL	700	152
Commercial Building at Al Muntazah	-	Lers Trading & Contracting Co.	600	60
Qatar National Library Station (Green Line)	-	Mechanical And Civil Engineering (MACE)	700 mm Bore Size	32

## Gulf Tunneling's Completed & Ongoing Projects (Horizontal Direction Drill)

Project Name	Client	Main Contractor	Tunneling Details	
			Pipe Sizes (mm)	Qty (m)
GTC 543A/2012 - Extension of Distribution Network at Doha and Vicinity - Phase V (Package A)	-	Qatar Arab Contractors	300	2000
			400	100
			500	200
Dukhan Road East Contract	Qatari Dair	Unicorp - Advanced Vision JV	700 mm Bore Size	130
GTC/467/2013 - 3 Years Call Off Contract for Extension of Water Distribution Mains and Service Connection @ Al Khor	Kahramaa	Refan Trading & Contracting (AALCo)	300	34
			160	24
			200	48
			500	113
			150	99
GTC 438/2011 - Replacement of Distribution Networks in Identified Doha Areas Phase (IV)	Kahramaa	Alwaha Contracting & Trading Co	C	65
			200	132
			300	22
			400	144
Commercial Building at Al Muntazah	-	Lers Trading & Contracting Co.	600	60
Construction of New Security and HSE Building at RLIC	-	Al Alia Trading & Contracting Co.	400	40
Car Park Project	-	Fajr Al Gazyra Trading & Contracting	250	250
C 281	-	Qatar Building Company	250	70
			110	76
-	-	Koop Water Management Middle East	400	173
Epic for Waste management Facility at RIC (GC131097001	Qatar Petroleum	Al Alia Trading & Contracting Co.	500	300
-	-	Doorex Engineering	110	76
Roads and Infrastructure in Wakra West MMUP PH2, Pkg 14	-	Fajr Al Gazyra Trading & Contracting	700	150

# MICRO-TUNNELING THE IDEA

04



## ■ MICRO-TUNNELING

As the name implies, micro-tunneling is the term for constructing small tunnels. These small diameter tunnels make it impossible to have an operator inside the actual machine. Instead, the micro-tunnel boring machine (“MTBM”) must be operated remotely.

## ■ OPERATOR

The operator directs the machine remotely from the safety of a control room on the ground’s surface. The operator is given constant feedback about the machine location, orientation, and corresponding hydraulic devices via a computer console. Machines also have video cameras and laser guidance that give the operator more information. The operator controls the MTBM and the jacking frame with *millimeter* precision.

## ■ PIPE

In most micro-tunneling operations the pipe is inserted from the entrance and pushed behind the machine. This process is often called “Pipe Jacking”. As the machine advances, more tunnel liner is pushed from the entrance; thus, the speed of the advancing machine is controlled by the speed at which the pipe is inserted.

## ■ FRICTION

As the length of tunnel increases, the friction against the earth around the pipe also increases.

Two practices are used to minimize this friction. First, “over-cutting” gives a slight gap between the inner edge of the tunnel and the outer edge of the liner. This requires a cutter wheel with a diameter  $\frac{1}{2}$  inch (12mm) to 4 inches (100mm) larger than the outside diameter of the liner. Second, an economical and ecologically friendly lubricant, often bentonite slurry, is injected into this gap.

In addition to the actual lubrication effect, the pressure of the lubricant also prevents the gap from collapsing.

## ■ LONGER TUNNELS

In addition to the jacking frame, smaller jacks, called “interjacks,” may be inserted between sections of longer tunnel liners. These interjacks push the two sections of liner apart, while friction on the liner sections between the interjack and the tunnel entrance prevent the liner from sliding backwards. Therefore, the liner behind the interjack does not move, and the sections in front of it receive additional pushing force.





# MT TECHNICAL DESCRIPTION

05

# 1. MICRO-TUNNELING IN BRIEF

**GT** uses the world's most reliable Micro-Tunneling machine, Herrenknecht AVN type—complete with all equipment—to drive non man-entry tunnels, using pipe-jacking techniques in the trenchless concept of pipe works. This modern machine type now allows access to the working face from the jacking pit via a door just behind the cutting face. Obstacles such as sheet piles, steel girders, and boulders can now simply be removed. This new access also provides the ability to replace worn cutter rings, allowing tunneling in hard rock to be extended to retention lengths of over 500m.

This system is ideal for use in urban areas. Additional ground-improvement processes will be unnecessary (such as compressed air, ground treatment, or freezing), and the convenient size of the launching and reception shafts allow for:

- *Minimal disturbance to traffic*
- *Maximum possible conservation of protected landscape areas*
- *Compact containerized equipment design on the surface*

## CREW

The Gulf Tunneling crew that is responsible for the Herrenknecht AVN machines operation and maintenance are:

- MT engineer/operator
- MT fitter & welder
- MT electrician
- 7-5 laborers

M/S Herrenknecht will provide direct technical assistance and/or presence on a need-to basis in the rare case of unforeseen difficulties during execution.

## SYSTEM COMPONENTS

Micro-tunneling system components used on most projects include:

- *Micro-tunneling machine c/w cutting head*
- *Control container c/w power pack module*
- *Jacking frame*
- *Interjack stations*
- *Separation plant c/w tanks with fresh water storage capacity*
- *Mobile crane to set up the machine and to handle the pipes*
- *Bentonite pump and bentonite system*
- *Feed and slurry pumps*
- *Pipe rack to hold feed and slurry pipes*
- *Shaft feed and flexible slurry lines*
- *Launch seals*
- *Laser guidance system*
- *Generator with sufficient power output for all components' requirements*
- *Launch and reception shafts*
- *Jacking pipes 3 meters long*
- *Water supply*

## KEY ADVANTAGES TO MICRO-TUNNELING/PIPE-JACKING

Micro-Tunneling and Pipe-Jacking is reliable and cost-effective. Key advantages include:

- *Minimal earth moving (only for launching & receiving shafts)*
- *Absence of ground-water lowering (thus preventing dangerous settlements of building foundations and road services)*
- *Optimal protection for people and nature*
- *Minimal effect to traffic and pedestrian mobility above ground*
- *Flexible driving alignment (i.e. curved or linear)*
- *All-weather construction (thus allowing for rapid completion and meeting deadlines)*
- *All ground-condition tunneling (including clay, silt, sand, gravel, and limestone)*



## 2. TUNNELING PROCESS

Structural and mechanical components create a system for tunneling activities. The following pages provide a brief description of the main components in Micro-Tunneling construction.



## 2.1 Micro-Tunneling Machine c/w Cutting Head

The cutting head of the tunneling machine is fitted with disc cutters to cut the entire face of the tunnel, and is designed in a manner to operate in saturated ground with water pressure.

The excavated material passes through openings in the cutting head to the crushing & mixing chamber. The conical crushing chamber reduces the excavated material to a size suitable for conveying to the surface separation plant. Transportation of crushed material is achieved by using injected water through the feed nozzles, which carry it through the back pipe. Crushing the excavated material minimizes blocking of system components.

The cutting wheel is driven by means of hydraulic motors located within the cutting head assembly. This renders both excavating and crushing powers independent from the distance to the launch shaft.

The rotation of the cutting head and transportation of the excavated material is continually controlled and operated while the TBM progresses forward.

The advance movement of the cutting head is achieved by the jacking forces from the pipes behind as they are pushed forward with hydraulic rams located in the jacking frame.

The following are special features for AVN machines:

- Designed for soft ground, mixed ground, and especially hard rock conditions by use of different cutting wheels (full face excavation)
- Central access to cutting wheel for tool replacement (back-loading system)
- Highly reliable steering operation due to inductive measuring system
- Variable flushing modes / jet systems to suit different ground conditions
- Superior cone crusher
- Heavy-duty, long-life main bearing and high torque peripheral drive
- Hydraulic power pack in machine can
- Completely remote-controlled

(All machines compatible with U.N.S. Guidance System.)





## 2.2 CONTROL CONTAINER

Both the control station and the power pack modules are housed within the same standard control container, thus facilitating the setup and relocation around the site. For the machine, the container will be located adjacent to the launch shaft.

The control container is a management device, where all system components can be operated and monitored via the on-board computer system and an array of measurement devices. Three steering cylinders enable millimeter boring precision from the operator's panel in the control container. Steering movement in any direction allows operator to correct alignment or curve the drives with the simple push of a button.

The control room is set as close as possible to the excavated shaft, so convenient monitoring by the operator is continuously available.





## 2.3 JACKING FRAME

The jacking frame consists of hydraulic rams, which constantly push the jacking pipes into the bored tunnel. The jacking frame rests on the floor of the launch shaft. The shaft wall provides the reaction to the pipe thrusting forces by means of a concrete thrust pad, that is cast into place after the frame is positioned.



## 2.4 LASER & GUIDANCE SYSTEM

A laser guidance system was developed specifically for use with this Herrenknecht AVN machine. An electronic laser is preset to the desired grade and alignment (i.e. vertical & horizontal axis) where the target plate is hermetically sealed within the cutting head. This enables the laser beam to define the exact position of the cutting head *at all times* during the drive.

The system consists of a target unit and a laser set. Via the main processor, the actual position for the cutting head is calculated and displayed graphically on a monitor conveniently located in the operator's control panel. A measuring wheel also provides continuous measurement of the tunnel length.

The computer-controlled guidance system constantly monitors all operating functions of the system, with continuous data updates that enable print-outs whenever necessary. A complete time-log of each drive is also recorded for future reference.

Furthermore, the guidance system provides a constant record of the following data:

- Date & time
- Total drive length (m)
- Line & level (mm)
- Vertical & horizontal angle of the cutting head assembly (mm/m)
- Stroke of all steering cylinders (mm)
- Thrust of the jacking rig (tons)
- Torque at the cutting wheel (bars)



## 2.5 MATERIAL CONVEYANCE AND SEPARATION

A feed pump located next to the fresh water tank on the surface pressurizes the feed water to the crushing chamber/cone nozzles. The reduced excavated material mixes with feed water to form slurry. This is pumped out by slurry pumps (located inside the tunnel and at the bottom of the launch shaft) towards the separation plant where materials are separated from water and clean water is returned to tanks.





## 2.6 BENTONITE PUMP & BENTONITE SYSTEM

The bentonite pump and system's main purpose is to reduce friction. The activity of the *slurry pumps* (used to remove the spoil) is constantly monitored to maintain maximum recovery of excavated material. This is necessary because the spoil tends to flow towards the pipe/soil annulus, and that increases the external friction between these surfaces.

The bentonite mixture acts as a lubricant and face support medium in the pipe jacking process. Through *injection nozzles* in the pipe, the mixture is forced into an annulus that results from a deliberate diameter difference between the tunneling machine and the concrete pipe. The resulting upward pressure reduces pipe friction and, subsequently, the necessary jacking forces.

In any desired product pipe, a bentonite station with three ball valves may be installed. This station connects each valve to the evenly-distributed nozzles on the circumference of the product pipe. An electrical signal from the container activates the individual pneumatically-controlled valves. A pneumatic actuator opens the ball valve and enables bentonite to flow through the selected nozzle.



## 2.7 LAUNCHING SEAL

A steel launch seal, coated in flexible polyurethane foaming agent, will be fixed onto a concrete eye properly located on the launching shaft wall face. The cutting head starts its boring at precisely that specified location. The purpose of the seal rubber is to prevent any injected materials and fines from coming through the opened boundary.



## 2.8 INTERJACK STATION

Interjack stations are used for *long distance* pipe jacking to move the pipeline in separate sections. The skin friction resulting in feed resistance is divided by the number of interjack stations; consequently, the allowed jacking force of the pipe will not be exceeded.

The position and number of interjack stations in line are subject to change, depending on the soil conditions. The first interjack station is installed at a distance of approximately 50m behind the machine with subsequent stations installed at approximate distances of 150m.





# HDD 06

# HORIZONTAL DIRECT DRILLING

Directional boring, commonly called horizontal directional drilling or “HDD,” is a steerable trenchless method of installing underground pipes, conduits, and cables in a shallow arc along a prescribed bore path by using a surface-launched drilling rig, with minimal impact on the surrounding area. Directional boring is used when trenching or excavating is impractical.

Directional boring minimizes environmental disruption. It is suitable for a variety of soil conditions and jobs including road, landscape, and river crossings. Installation lengths up to 2,000m have been completed, and diameters up to 1,200 (56 mm) have been installed in shorter runs. Pipes can be made of materials such as PVC, polyethylene, ductile iron, and steel, as long as the pipes can be pulled through the drilled hole.

Directional boring is used for installing infrastructure such as:

- telecommunications and power cable conduits
- water lines
- sewer lines
- gas lines
- oil lines
- product pipelines, and environmental remediation casings.

It is used for crossing waterways, roadways, shore approaches, congested areas, environmentally sensitive areas, and areas where other methods are costlier.

HDD is used instead of other techniques to provide less traffic disruption, lower cost, deeper and/or longer installation, no access pit, shorter completion times, added directional capabilities, and overall environmental safety.



The technique has extensive use in urban areas for developing subsurface utilities as it avoids extensive open cut trenches. Uncontrolled drilling can lead to damages of existing utilities, however; so, the HDD method necessitates that the operator has complete information about the existing utilities so that he plans the whole alignment in a way that prevents any damage to them. Different government agencies have established legislation to ensure safe work execution and to authorize such work in urban environments. Different trenchless-technology promoting organizations have developed guidelines for this technique in order to standardize of the techniques.



# EQUIPMENT

07



# CONTROL CONTAINERS



sn	Equipment No	Manufacturer	Can be used with
1	M699C	Herrenknecht (Germany)	AVN600 to AVN1200
2	M1097C	Herrenknecht (Germany)	AVN600 to AVN1200
3	M1085C	Herrenknecht (Germany)	AVN1600 to AVN3000
4	M1086C	Herrenknecht (Germany)	AVN600 to AVN1200
5	M1252C	Herrenknecht (Germany)	AVN1600 to AVN3000
6	M1568C	Herrenknecht (Germany)	AVN600 to AVN1200
7	M1570C	Herrenknecht (Germany)	AVN600 to AVN1200
8	M1610C	Herrenknecht (Germany)	AVN600 to AVN1200
9	M1421C	Herrenknecht (Germany)	AVN1600 to AVN3000
10	M1803C	Herrenknecht (Germany)	AVN1600 to AVN3000
11	M1818C	Herrenknecht (Germany)	AVN1600 to AVN3000

# TBM MACHINES

sn	Equipment No	Manufacturer	Extension Kit
1	M841M AVN600	Herrenknecht (Germany)	-
2	M1567M AVN600	Herrenknecht (Germany)	-
3	M751M AVN800B	Herrenknecht (Germany)	-
4	M700M AVN800A	Herrenknecht (Germany)	Extension 1000 mm Dia
5	M1548M AVN800A	Herrenknecht (Germany)	-
6	M1569M AVN1000	Herrenknecht (Germany)	-
7	M1098M AVN1200	Herrenknecht (Germany)	-
8	M1210M AVN1600	Herrenknecht (Germany)	-
9	M1084M AVN2000	Herrenknecht (Germany)	Extension 2400 mm Dia
10	M1290M AVN2400	Herrenknecht (Germany)	Extension 3000 mm Dia
11	M1421M AVN2400	Herrenknecht (Germany)	
12	M1802M AVN2400	Herrenknecht (Germany)	Extension 3000 mm Dia
13	M1817M AVN2400	Herrenknecht (Germany)	-



# EQUIPMENT LIST - SEPARATION PLANTS

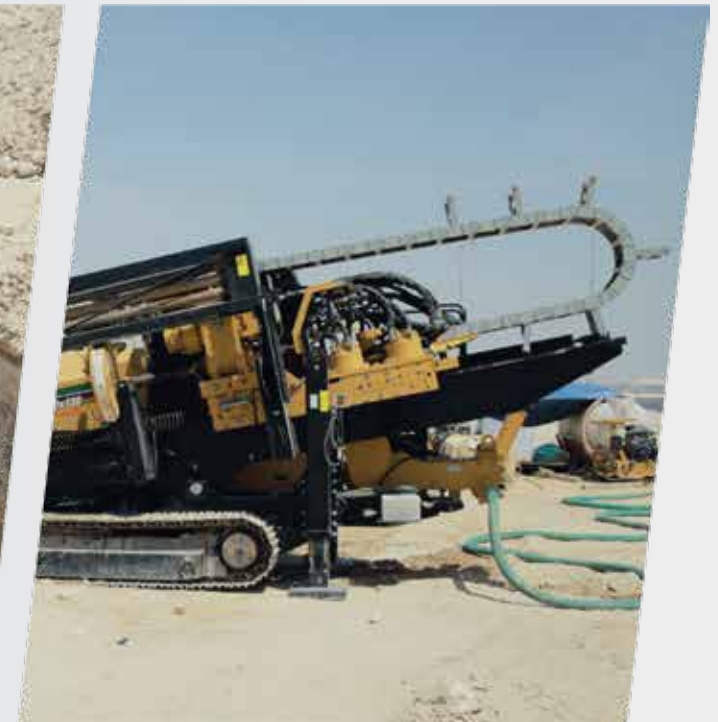
sn	Equipment No	Capacity	Manufacturer
1	SM-01	220 m3/hour	Schauenburg (Germany)
2	SM-02	220 m3/hour	Schauenburg (Germany)
3	SM-03	300 m3/hour	Schauenburg (Germany)
4	SM-04	150 m3/hour	Schauenburg (Germany)
5	SM-05	150 m3/hour	Schauenburg (Germany)
6	SM-06	150 m3/hour	Ramill Tech (Malaysia)
7	SM-07	500 m3/hour	Schauenburg (Germany)
8	SM-08	500 m3/hour	Schauenburg (Germany)
9	SM-09	500 m3/hour	Schauenburg (Germany)





# HDD MACHINES

sn	Equipment No	Manufacturer	Type	Capacity
1	HDD-01	Vermeer (USA)	D100x120 Series II	700 mm Dia
2	HDD-02	Ditch Witch (USA)	JT3020 Mach 1	400 mm Dia
3	HDD-03	Vermeer (USA)	D36x50DR Series II	600 mm Dia





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## HEALTH, SAFETY & ENVIRONMENT



Our policy is simple — every Gulf Tunneling employee bears a responsibility towards HSE issues.

We actively involve each member to ensure accident prevention, risk management, and environmental safeguarding.

As we pursue OHSAS and ISO Certifications 14001 & 9001, we conduct our activities under an integrated system that pledges the following:

- Highest quality tunneling
- Continuous improvement in all occupational health and safety systems
- Minimization of environmental damage, especially pollution
- Control and reduction in use of energy and natural resources
- Optimization of latest technologies to diminish waste
- Strict compliance with all applicable laws, requirements, regulations, and provisions

Our proactive commitment to prevention has allowed Gulf Tunneling to maintain a record of no Loss Time Incidents (LTI) since inception.







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