



FCP TIMES

A MONTHLY NEWS LETTER FOR FLUID
CONVEYANCE PRODUCTS INDUSTRY



Tunnel Boring Machines: An overview

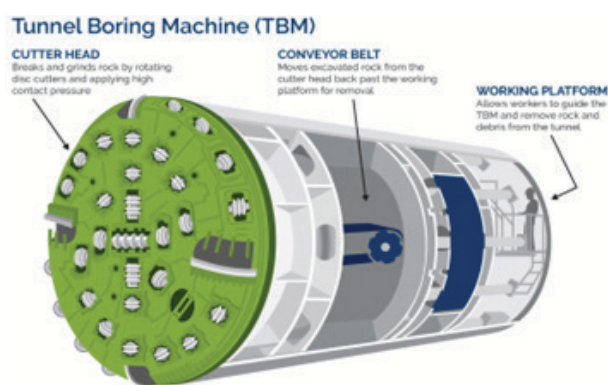
What is Tunnel Boring Machine?

A tunnel boring machine (TBM) is a machine used to excavate tunnels with a circular cross-section for tunnels and metros. It has a rotating head with cutting parts and runs on hydraulic or electric motors, though its power supply is 100% electric. It offers the advantages of limiting the disturbance to the surrounding ground and producing a smooth tunnel wall. TBM can dig full-face tunnels underground; this means it is done in a single mechanical operation by drilling. They usually weigh over 6,000 tons and span more than 150 meters in length, and they work in a variety of terrains, from sedimentary and volcanic rock to sandy or clay soils.



How Does a Tunnel- Boring Machine Work?

A tunnel-boring machine usually performs the excavation process with its rotating head that makes a hole in the ground by using a motor with a hydraulic or electric system. The tunnel-boring machine with cutting elements that can have different shapes and be made of different materials. Both depend on the tunnel's characteristics. The tunnel-boring machine's pushing force is a result of the action of perimeter jacks supported on rings which are, in turn, pushed against the tunnel wall by other jacks. This action gives the machine enough strength and grip for the rotary head to continue fulfilling its drilling function.



Behind the tunnel-boring machine is a platform on rails called "lagging equipment" or "buck-up," where other pieces of work equipment are located, such as fans, transformers, and a belt to remove the material being excavated.

After the excavation is done, the tunnel-boring machine stops, and next is installing the rings in the tunnel structure that will keep it steady. For this end, pieces of prefabricated, reinforced concrete are used.

What types of tunnel-boring machines are there?

Tunnel-boring machines are classified into two main groups:

Tunnelling machine: Designed to excavate hard or semi-hard rocks without the need for a support system. Its pushing force is transferred to the rotating cutting head through thrust cylinders. This type of tunnel-boring machine doesn't have steel cylinders behind the cutting wheel, so it doesn't perform the function of temporary shoring.

Shields: Designed to excavate in terrain that requires installing support systems. These are usually soft rock soils. The shields have an outer metal chassis that temporarily holds the ground and is positioned from the front to facilitate the assembly of the final shoring that ensures the tunnel's stability. The shields can be: open front, closed front, mechanical closure, pressurized closure with contained air, hydro shields, or earth pressure balance shields (EPB).

Applications of Tunnel Boring Machines:

Tunnel Boring Machines (TBMs) have revolutionized the Mining & construction industry by providing a fast and efficient way to excavate tunnels. The use of TBMs has greatly reduced the time and cost of tunnel construction, making it possible to build tunnels in challenging geological conditions.

1. Transportation Tunnels

The most common application of TBMs is in the construction of transportation tunnels. These tunnels typically require large diameter tunnels to accommodate trains, cars, and other vehicles. TBMs are used to excavate these tunnels as they can dig through hard rock, soft soil, and everything in between. TBMs are also used to excavate tunnels for subways, metros, and other underground transportation systems.

2. Utility Tunnels

TBMs are also used to excavate utility tunnels, which are used to house and protect utility lines such as water, gas, electricity, and telecommunications. Utility tunnels are typically smaller in diameter than transportation tunnels and are often constructed in urban areas where space is limited.

3. Mining Tunnels

TBMs are also used in the mining industry to excavate tunnels for the extraction of minerals and ores. Mining tunnels are typically smaller in diameter than transportation tunnels and are often excavated in hard rock conditions.

4. Hydroelectric Tunnels

TBMs are also used in the construction of hydroelectric tunnels, which are used to transport water from a dam to a power station. Hydroelectric tunnels are typically excavated through hard rock and can be several kilometres long.

Major Manufacturers of Tunnel Boring Machines:

Terratec, China Railway Construction Heavy Industry Corporation Limited – CRCHI, Herrenknecht India, Robbins Tunnelling & Trenchless Technology, Mitsubishi, Caterpillar, Kawasaki, Komatsu, Ishikawajima-Harima, China Railway Tunnelling Equipment (CRTE), Northern Heavy Industries Group Co., Ltd. ("NHI"), Shanghai Tunnel Engineering Co. Ltd. (STEC).

In India Terratec, CRCHI, Herrenknecht and Robbins are popular model of the Tunnel Boring Machines.

Applications of Hydraulic Hose Assemblies:

Hydraulic hose assemblies are critical components in tunnel boring machines (TBMs), which are used for excavating tunnels through various types of soil and rock. Here are the primary applications of hydraulic hose assemblies in TBMs:

1. Hydraulic Power Transmission

TBMs rely heavily on hydraulic systems to power various functions, including:

- **Cutter Head Drive:** Hydraulic motors drive the cutter head, which is the part of the TBM that excavates the material. Hydraulic hose assemblies deliver the necessary hydraulic fluid to these motors.
- **Thrust and Retract Cylinders:** These hydraulic cylinders push and pull the TBM forward and retract it for maintenance or adjustments. Hydraulic hoses carry the fluid required to operate these cylinders.

2. Support Systems

• **Shield Advance Mechanism:** TBMs use hydraulic systems to advance the shield (the protective casing of the TBM) as excavation progresses. Hydraulic hose assemblies are used to transfer fluid to these mechanisms.

• **Segment Erection:** In some TBMs, hydraulic systems are used to position and erect precast concrete segments that line the tunnel. Hoses carry hydraulic fluid to the cylinders and actuators involved in this process.

3. Control Systems

• **Steering and Alignment:** Hydraulic systems assist in the steering and alignment of the TBM. Hose assemblies transport hydraulic fluid to the control systems that adjust the orientation and trajectory of the machine.

• **Emergency Systems:** In case of an emergency, hydraulic systems can be used to retract or stabilize the TBM. Hose assemblies are integral in delivering hydraulic fluid to these safety mechanisms.

4. Material Handling

• **Conveyor Systems:** TBMs often have conveyor belts or other material handling systems to transport excavated material out of the tunnel. Hydraulic systems, controlled via hose assemblies, manage these conveyors.

• **Muck Removal:** Hydraulic systems power mucking equipment that removes and transports the excavated material from the cutting face. Hose assemblies ensure the hydraulic fluid flows efficiently to these systems.

5. Support and Stabilization

• **Ground Support:** Hydraulic systems are used to deploy ground support mechanisms like rock bolts or shotcrete systems to stabilize the tunnel face and walls. Hydraulic hoses transport fluid to these support systems.

• **Grouting Systems:** In some TBMs, hydraulic systems are used to inject grout or other stabilization materials into the ground. Hose assemblies are used to deliver the grout under pressure.

Key Considerations for Hydraulic Hose Assemblies in TBMs:

1. **Durability:** Given the harsh operating conditions (high pressure, abrasion, temperature extremes, and potential exposure to chemicals), hydraulic hoses must be highly durable and resistant to wear and tear.

2. **Pressure Rating:** Hydraulic hoses in TBMs must be capable of handling high-pressure environments to ensure reliable operation of the machine's various hydraulic systems.

3. **Flexibility:** Hoses must be flexible enough to accommodate the dynamic movements of the TBM and its components without kinking or breaking.

4. **Temperature Resistance:** TBMs operate in varying environmental conditions, including high temperatures. Hoses must be designed to withstand these temperature extremes.

5. **Compatibility:** The hydraulic hoses and fittings must be compatible with the hydraulic fluids used in the TBM's systems to prevent leaks and ensure efficient operation.

Basics of Hydraulic Hose Assembly

Hydraulic fluid can be passed between the components by using tubes, pipes, and hoses. But, the hydraulic hose is one of the most important components in the hydraulic system that reduces the size of your system by offering flexibility and safety. Is it possible to design a hydraulic system by using only tubes/pipes? Yes, it is. But, that system will have many limitations. Because tubes and pipes are not so flexible if any system needs to be constructed, it will have more connectors and the size of the system will also get increased. Along with the increase in connectors, the chance for leakage will also get increase and the maintenance will become complicated.



What is Hydraulic Hose Assembly?

Tube, reinforcement, and cover are the major parts of every hydraulic hose. The inner tube will be closer to the fluid and the reinforcement & cover will act as a shield that protects the tube. This is about the structure of the hose. It is not easy to connect these hoses together or to join them with other

components. When the user simply connects hoses, it can cause leakages. To prevent this, technicians/engineers use fittings that are normally constructed with metal. The fitting has a socket, that wraps the outer cover of the hose and a stem that enters inside the inner tube.

The procedure of effectively attaching fittings on both ends of the hose and then connecting it with the hydraulic system components for proper transmission of pressurized hydraulic fluid is called hydraulic hose assembly. For hydraulic hose assembly, the most important step is selecting a suitable hose and fitting required for the application. Now, let's discuss the other factors that need to be considered for an effective hose assembly.

Hose size:

Hydraulic hoses are available in different sizes from different manufacturers. It is the responsibility of the technician/engineer to analyse the hose requirements and select an appropriate one. Inner diameter is the key factor considered for hose selection. Hoses with a larger diameter and smaller diameter will affect the system's performance. That is if a hose with a larger diameter is selected, it will reduce the fluid pressure. Similarly, smaller diameter hoses will reduce the fluid flow. Both this information can be proved using Pascal's law.

Temperature & Pressure:

The operating environment of hydraulic systems will be different. It is necessary to consider the outer temperature and the inner temperature of the hose. Hydraulics used in automobiles will have high temperatures outside which can result in the damage of the hose cover and will gradually

cause hose leakage. Not only this, if you consider any system that works continuously without an oil cooler, the inner temperature will be greater and cause wear in the inner tube. So, it is necessary to consider how much pressure a hose can withstand.

Fluid Compatibility:

Hydraulic fluid selection depends on the system applications. Various properties of fluids are considered before selecting them. But, fluids have a key role in improving the lifespan of hoses. Most of the mineral oils are compatible with common hose varieties. But still, the user needs to consider fluid compatibility while selecting hoses and fittings.

Hydraulic Hose Assembly Replacement

Once after assembling the hydraulic hose, it is necessary to maintain it properly. Both internal and external factors will affect the lifespan of the hose assembly. Contaminants, pressure, temperature, corrosion, etc are the internal factors and external factors are those created by technicians by pulling, crushing, kinking, etc.

Hose assembly replacements can be done only with a proper visual inspection. Some symptoms of hose assembly failures are listed below.

- Hose Leakage
- Exposed wire (Abrasion)
- Cracked fittings
- Kinks in the hose
- Cracked or corroded fittings
- Twisted Hoses

Compression Fitting Types and Applications

Compression fittings, a term often interchangeable with instrumentation or tube fittings, are made up of a compression nut, ferrule and fitting body. There are single and double ferrule compression fittings, each suitable for a leak tight seal. However, double ferrule fittings are used in higher pressure applications and provide superior media containment. Both types are used for the transfer of liquids or gas, often of caustic media and/or at very high pressures in certain instrumentation tube fitting applications.

Applications:

Gas Line Compression Fittings:

Compression fittings are also ideal for connecting gas lines. Brass fittings are often used when running low pressures above ground. If using PTFE tape, ensure it's rated for gas grade connections. Additionally, in the event of leaks, many gas line compression fittings must be accessible and not hidden behind walls, under floors or underground. They must be easy to reach, in case maintenance is required.

Chemical Processing:

Due to the media being transferred and the conversion processes in the chemical industry, instrumentation fittings must be stable, highly corrosion resistant and able to withstand wide temperature ranges. From sampling to production processes, instrumentation fittings play a critical role in the chemical industry.

Oil & Gas:

Instrumentation compression fittings are used for upstream and downstream applications. They are used heavily in oilfield logging and other exploration. Tube fittings made of stainless steel and the other exotic alloys mentioned above are prevalent on offshore oil rigs, especially in harsh conditions.

Medical & Pharmaceutical:

Medical device equipment and pharmaceutical production are highly dependent on instrumentation components. They are

used in life monitoring devices, surgical equipment and the processing of chemical compounds used in pharmaceutical production.

Power Generation:

Compression fittings allow for leak free connections in process, power, nuclear and other critical power generating applications. In many instances, particularly nuclear applications, exotic metals such as Hastelloy-C, Monel, Inconel and other high corrosion resistant materials are required.

Aerospace:

Tube fittings are used in virtually any conceivable application or piece of equipment in aerospace, and suppliers are required to carry specific certifications and accreditations. Instrumentation components are used in everything from life support systems in aircraft and other equipment, to shipbuilding.

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EC640 spiral hose fact sheet



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EC110 one and EC210 two wire braided hydraulic hose sales sheet



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ENGINEERING
TOMORROW



Imperial Auto Industries Ltd Acquires Metallwerk Biebighäuser GmbH

Imperial Auto Industries Ltd, a leading global manufacturer of fluid transmission products, has acquired the assets of Metallwerk Biebighäuser GmbH ("Biebighäuser"), a German manufacturer of metal tubular assemblies for the automotive industry. The acquisition also includes Biebighäuser's Slovakian subsidiary and was executed through IAIL's German arm, Imperial Auto Germany GmbH.

Biebighäuser manufactures and supplies critical components to some of the largest European OEMs including Volkswagen, BMW and Mercedes through its highly automated processes and diverse capabilities across multiple divisions. This strategic move further expands Imperial's presence in Europe, unlocks meaningful revenue potential, and strengthens Imperial's positioning to address the increasing demand for electric vehicle (EV) components.

"This acquisition offers us direct access to German passenger vehicle OEMs and opens opportunities to engage with the truck and industrial segments in the region. This development enhances our relationship with the OEMs and, further accelerates our growth in Germany and other parts of Europe." said Tarun Lamba, Managing Director and CEO of Imperial Auto. *"We are thrilled to welcome over 400 members to the Imperial Auto family, strengthening our global team and capabilities."*

Imperial Auto is backed by Warburg Pincus, a leading global growth investor. Imperial has delivered strong organic growth over the past three years and has more than doubled its top line driven by robust organic growth in both domestic and exports markets. With this acquisition, the Company is expected to generate revenues of over Rs. 4,500 crores.

Tata Hitachi to invest ₹200cr in FY'25, localisation remains top priority

Tata Hitachi Construction Machinery, announced that it would invest Rs 200 crore in its two manufacturing plants to stay ahead of the curve in quality, innovation and localisation. The company, a 40:60 joint venture between Tata and Hitachi of Japan, aims at ramping up localisation. The company, a 40:60 joint venture between Tata and Hitachi of Japan, aims at ramping up localisation levels to 70 per cent over the next 2-3 years, its Managing Director Sandeep Singh said. The company plans to produce 60-tonne dump trucks in India, leveraging technology from Hitachi Canada, primarily used for the mining industry, he said. Additionally, the company intends to introduce more models in India as part of the 'Atmanirbhar' (self-reliant) policy started long back, the official said.



"We will invest a total of Rs 200 crore in our two plants in West Bengal's Kharagpur and Dharwad in Karnataka. This will help us stay at the forefront of innovation and increase self-reliance to 70 per cent in 2-3 years from the current 65 per cent," Singh said. He stated that the Kharagpur plant is the largest excavator plant in southeast Asia with an investment of Rs 1,100 crore. The market size of excavators is approximately 1.25 lakh units, with Tata Hitachi commanding a 24 per cent share, he said.

Yuvraj Overseas Pvt Ltd. received IATF certification

Yuvraj Overseas Pvt Ltd., a prominent manufacturer of hose fittings headquartered in Ludhiana, has recently earned the esteemed IATF 16949:2016 certification from TÜV Rheinland. This certification, recognized globally in the automotive industry, is a testament to the company's dedication to maintaining high standards of quality management and continuous improvement in its manufacturing processes.

Achieving the IATF 16949:2016 certification signifies that Yuvraj Overseas has met rigorous requirements, including the implementation of advanced quality management systems, effective risk management practices, and enhanced customer satisfaction measures. The certification is expected to drive a significant shift in the company's approach to quality, embedding a culture of excellence throughout its operations.

Yuvraj Singh, Director of Yuvraj Overseas, highlighted that this milestone represents a crucial step in the company's strategic vision. The certification will not only bolster the internal quality culture but also streamline operational efficiencies, ensuring that the company consistently delivers products that meet or exceed industry standards.

In addition to fortifying its position in the highly competitive Indian market, Yuvraj Overseas is setting its sights on expanding its footprint in international markets. The IATF 16949:2016 certification will serve as a valuable asset in accessing and competing in global markets, where stringent quality standards are a prerequisite for success. This strategic move is expected to open new avenues for growth and establish the company as a reputable player in the global hose fitting industry.

Hy-Tech Engineers in Expansion Mode

Hy-tech Engineers Ltd, a prominent manufacturer of hydraulic fittings based in India, has announced a major expansion of its forging capacity with the inauguration of a new plant at their Kawthe (Near Pune) location. This strategic move marks a significant milestone for the company, enhancing its ability to meet growing market demands.

The new facility features two advanced mechanical presses—one with a capacity of 750 tons and the other with 400 tons. The addition of this equipment is set to increase Hy-tech Engineers Ltd's forging output by 800,000 units per month.

With this expansion, the company's total forging capacity, including operations at their existing Nashik plant, now reaches a substantial 1.9 million units per month. This boost in production capability underscores Hy-tech Engineers Ltd's commitment to strengthening its market position and delivering high-quality hydraulic fittings to its clients.

The new plant at Kawthe will play a crucial role in supporting the company's growth strategy and enhancing its service offerings. The additional capacity is expected to improve supply chain efficiency and accelerate response times to customer needs.

Technical workshop to be held from Aug 24th to Aug 31st

FCP Index and Connections will be organizing a 6 days long Technical workshop on Hoses, Fittings and Hose Assemblies in Pune from Aug 24th to Aug 31st 2024. This technical workshop will give an opportunity to participants to learn various aspects like Hose and Fitting Standards, Selection of Hoses, Identification of fitting threads, how to make hose assemblies etc. On 24th and 26th Aug. Online training session will be held, while from Aug 28th to Aug 31st, practical and classroom sessions will be conducted in the training centre in Pune.

L&T Secures ₹2,500-5,000 Crore ONGC Offshore Contract

Larsen & Toubro's (L&T) hydrocarbon vertical has been awarded a significant contract by the Oil & Natural Gas Corporation (ONGC) for the Daman Upside Development Project-Wellhead Platforms and Pipelines (DUDP-WP) off India's west coast. Valued between ₹2,500 and ₹5,000 crore, the contract involves the engineering, procurement, construction, installation, and commissioning of four wellhead platforms, a 140-km pipeline, and associated topside modifications at the Tapti Daman block in the Western offshore region.

Subramanian Sarma, Whole-time Director & President (Energy) at L&T, commented: *"This order demonstrates ONGC's confidence in L&T, forged through the execution of multiple complex offshore projects, and reinforces L&T's commitment to contributing towards India's energy security."*

Cabinet approves 8 high-speed road corridor projects

The government, approved eight national high-speed road corridor projects of length 936 km entailing investment of Rs 50,655 crore to improve logistics efficiency and connectivity across the country.



The projects approved by the Cabinet Committee on Economic Affairs include 6-Lane Agra-Gwalior National High-Speed Corridor, 4-Lane Kharagpur-Moregram National High-Speed Corridor, 6-Lane Tharad-Deesa-Mehsana-Ahmedabad National High-Speed Corridor, 4-lane Ayodhya Ring Road, 4-Lane Section between Pathalgaon and Gumla of Raipur-Ranchi National Highspeed Corridor, and 6-Lane Kanpur Ring Road.

Eimco Elecon India Limited Announces Reduction in Order Size

Eimco Elecon (India) Limited announced a reduction in its order size from JMS Mining Private Limited, which initially totalled INR 53.61 Crores (excluding GST) for the manufacturing and supply of coal mining equipment.

JMS Mining has decided to reduce the order value by INR 23.18 Crores (excluding GST). This adjustment involves a decrease in deliveries scheduled for the fiscal year 2025-26.



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COMMODITY INDEX							
Months	Alloy Steel - Forging (20 MnCr5) Rs/ Tonne	Alloy Steel - Forging (EN8) Rs/Tonne	Nickel US \$/ Tonne	Zinc US \$/ Tonne	Synthetic Rubber SBR	EPDM- Rs. Per Kg	Carbon Black- Rs. Per Kg
Jul-23	70500	69500	20862	2389	140	234	106
Aug-23	69000	68000	20548	2410	141	229	118
Sep-23	69400	68400	19629	2488	146	228	123
Oct-23	71000	70000	18275.7	2450	160.11	232.5	116.19
Nov-23	69250	68250	16894	2541	165.92	233.27	115.5
Dec-23	70600	69600	16388.7	2501.7	159.07	228.83	115.73
Jan-24	71000	70000	16091.4	2521.5	157.92	223.04	116.32
Feb-24	70750	69750	16307.6	2364.5	160.64	223.32	116.1
Mar-24	70400	69400	17432.8	2462.4	164.19	224.38	115.15
Apr-24	70000	69000	18172	2730.4	173.34	224.13	111.98
May-24	70800	69800	19520	2955.7	178.51	225.14	112.15
Jun-24	70500	69500	17508	2813	176.2	218	113.2

BACKHOE LOADERS SALES IN INDIA- 2024												
Month	JCB	Excorts	Mahindra	Case	Tata Hitachi	Bull Machines	Bobcat	CAT	Manitou	ACE	Total 2024	Total 2023
Jan	4576	16	81	137	92	59	35	69	35	48	5148	4705
Feb	3610	57	86	133	117	31	54	108	39	35	4270	3938
Mar	4030	77	114	196	171	24	60	167	42	35	4916	4100
Apr	2648	26	75	143	60	24	63	82	24	25	3170	3220
May	2246	28	71	141	76	20	72	106	63	21	2844	2742
June	2426	17	73	146	67	49	39	129	28	31	3005	3137

COMPACTORS SALES IN INDIA -2024											
Month	Case	HAMM	Dynapac	JCB	L & T	Excorts	Volvo	AMMAN	Others	Total 2024	Total 2023
Jan	101	98	36	61	47	15	25	10	17	410	450
Feb	127	122	55	64	44	32	25	12	9	490	366
Mar	213	153	65	73	64	44	42	15	30	699	505
Apr	103	113	52	69	49	21	24	7	12	450	352
May	94	73	21	45	33	15	23	8	12	324	151
June	56	44	18	46	26	18	13	4	8	233	147

EXCAVATORS SALES IN INDIA- 2024													
Month	Tata Hitachi	JCB	Hyundai	Sany	Kobelco	CAT	Komatsu	Volvo	Liugong	XCMG	CNH	Total 2024	Total 2023
Jan	614	561	680	510	166	123	140	82	32	207	8	3123	2658
Feb	661	557	531	405	169	130	169	76	36	229	6	2969	2505
Mar	819	580	537	514	232	156	186	97	142	209	6	3478	3159
Apr	412	488	450	357	95	102	175	86	60	203	6	2434	2362
May	478	425	388	275	109	96	144	73	17	216	5	2226	2107
June	424	394	333	299	105	95	136	91	97	204	5	2183	1801

TRACTORS SALES IN INDIA- 2024												
Month	Mahindra Group	TAFE Group	Sonalika	Excorts Ltd	John Deere	New Holland	Kubota	Captain	VST	Others	2024	2023
Jan	36930	11003	11515	8185	5739	3501	1732	921	483	2436	82445	65635
Feb	31590	8307	9841	7449	5906	3016	1735	498	341	2577	71260	69034
Mar	24274	10878	8682	8054	5523	3062	1301	482	475	1022	63753	82450
Apr	35805	13005	9649	7168	5779	2867	1324	200	208	940	76945	79481
May	29019	8515	9225	7655	5149	2898	1157	215	220	2044	66097	82920
June	29616	8646	9244	7536	5520	2863	1218	195	205	1361	71029	98434

Source : Industry Inputs

AUTOMOBILE SALES IN INDIA- 2024						
Month	2- Wheelers	3- Wheelers	Personal Vehicles	Commercial Vehicles	2024	2023
Jan	1458849	97675	393250	89208	2038982	1753513
Feb	1439523	94918	330107	88367	1952915	1706436
Mar	1529875	105222	322345	91289	2048731	1960780
Apr	1643510	80105	335123	90707	2149445	1669100
May	1534856	98265	303358	83059	2019538	1944675
June	1375889	94321	281566	71029	1822805	1765208

MARKET LEADERS			
			
JCB (Backhoe Loaders)	Case (Compactors)	Tata Hitachi (Excavators)	Mahindra (Tractors)
			
Hero (2 Wheelers)	Bajaj (3 Wheelers)	Maruti (PV)	Tata Motors (CV)