

LEADING SCIENCE AND TECHNOLOGY
DIAMOND QUALITY

KINGDREAM

Kingdream Public Limited Company
Add: 5#， 1 Road, Huagong Park, East Lake New-Tech.
Development Zone, Wuhan, China

KINGDREAM

KINGDREAM
OIL DRILLING BIT

Kingdream Public Limited Company



Contents



01-03 ›

Brief Introduction of Kingdream

2 Research and development
3 Product manufacture and quality control
3 Customer service



05-10 ›

Roller cone bit

7 Introduction of bit series and nomenclature
8 Additional feature
10 Bit application chart
10 Bit structure characteristics
11 Bit shank thread and recommended make up torque
12 API roller cone bit tolerances
12 Nozzles



11-28 ›

13 MD series bit
15 SUPER–MD series bit
17 MiniMD series bit
19 HF series bit
21 SWT series bit
23 A series bit
25–26 HJ/HJT/GJ/GJT series bit
27–28 HA/HAT/GA/GAT series bit
29 YC series bit
30 SKF series bit
31–32 SKH/SKG series bit
33 SKW series bit



29-30 ›

Diamond bits

35 Nomenclature of products
35 Optional features
35 Bit shank thread and recommended make up torque
36 API diamond bit (PDC bit) tolerances
36 Classification of formation hardness and table of bit selection
36 Nozzle data of PDC bits
37 KM series
38 KS series
39 KMD/KSD series
40 KMH series
41 KMC series



31-32 ›

Appendix

42 Diamond drill bit application instruction
43 Testing method to optimize drilling parameters
44 Downhole problems and treatment actions
Comparison table of corrective actions
45 IADC dull bit grading



Kingdream Public Limited Company

Kingdream Public Limited Company is a state owned public company with the majority shares held by Jianghan Petroleum Administration of SINOPEC. The company was initially set up in 1973, reformed to a listed company in 1998, and now has become a National First Class Enterprise, National Keystone Hi–Tec. Enterprise, and a leading oil and gas drill bit manufacturer in China which ranks the largest one in Asia.

Market oriented, the company pushes forward the technical innovation and product improvement and has formed the world advanced technical system with its own intellectual properties. Kingdream has had technical cooperation with over 30 universities and research institutes both at home and abroad, and the researches done by the company regarding rock bit cutting element material, rock bit bearing structure and material, as well as rock bit hydraulic technologies are at the leading position in China. Performance of the new products such as high speed motor bit, hard formation drill bit and high efficiency steel body PDC bit series, etc. developed by Kingdream are at the leading level in the world, which represent the development trend of new type of drilling bits.

Kingdream's roller cone bit and PDC bit production lines are equipped with more than 300 sets of world advanced machineries such as 5–axis machining centers and FMS (flexible manufacturing systems) and can produce roller cone bits from 3–3/4″ to 26″ in diameter and matrix body and steel body PDC bits from 3–7/8″ to 17–1/2″ in diameter. Kingdream also owns many advanced testing and measuring devices including plasma spectrometer, TCI image apparatus, new type of composite drilling tester and 600kN rock bit drilling simulator, etc. and as a result, consistent quality of drill bit products are largely improved. Kingdream's products have been licensed under API specifications and the company's QMS has been certified to ISO9001 for many years. Kingdream also passed HSE certification for many years.

Kingdream regards technical innovation as the core, product quality as the life, and customer satisfaction as the standard. For years, the company is positively acknowledged by customers both at home and abroad because of the company's technical strength, good reputation, strict quality control and excellent customer service. Domestic market share of the company has been kept above 60% for many years, and Kingdream bits has also been sold to more than 30 countries and regions including USA and Russia. Many awards has been given to Kingdream which include ' China's Top 10 Brand (Petroleum Machinery) in World Market', 'National Advanced Enterprise for Quality and Benefit', 'Outstanding Company with Satisfactory Products and Customer Service', 'National Customer Satisfaction Enterprise', 'The Most Innovative Enterprise of China', 'China's Top 10 Petroleum Drilling & Production Equipment Manufacturers' (on top of the list), 'China National Supervision & Inspection Top 10 Satisfactory Brand', 'China Credit Brand for Superior Quality & Reliable Service', 'National 863 Program Advanced Enterprise on CIMS Application', 'Advanced Unit in National Patent System' and 'National Advanced Unit for Environmental Protection', etc. 'KINGDREAM' trademark is identified as Famous Trademark of China.

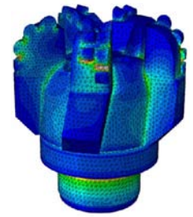
It is Kingdream's untiring pursue to keep producing high quality products and providing high standard service. Looking forward to the future, Kingdream shall strive to produce better bit products by taking continuous quality improvement as our main task, making our products better and suitable for the development of drilling process and satisfying customers' demands as our research direction, so as to provide our customers both at home and abroad with excellent quality products and service.

Research and development

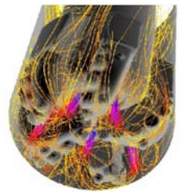
Along technical innovation path of combining independent research and open–up cooperation, Kingdream sets up provincial engineering technology center with complete systems. Software & hardware conditions for technical development and related research fruits are all at advanced level in the world. The company has 126 patents granted in China and 14 patents granted in other countries, 155 proprietary technologies and the right to use 25 US patents. Kingdream takes market demand as the direction, technical innovation as the support, and standing at the front of market and technology to continuously improve its product technologies and market service quality.

Product structure and function test & evaluation

Kingdream owns advanced rock bit structure and function test lab and computational lab and such tests & evaluations as bit's cutting structure, bearing, seal and hydraulic system, etc. can all be done within the company. The computational lab utilizes advanced non–linear FEA software and fluid dynamic software to simulate real drilling condition to evaluate and optimize bit structures. Specialized bit simulation software and full scale drilling simulator are used to are used to evaluate the bit's overall performance.



Hydraulic analysis



Hydraulies simulation

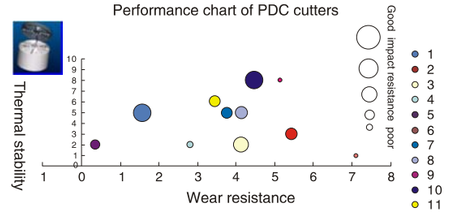
Product research and development

Kingdream has realized the benign cycle from basic technology research, new technology application & product development and manufacture research to product application service and improvement, so as to turn technical reserve as the backup for product development and market service. Advanced PLM (Product Life Management) system, which is built on the basis of 3–dimensional CAD and PDM (Product Data Management), can technically controls the whole life of products, so that the product development can be done in a fast and precise manner to maximally meet the time & function requirements of the market for product lifecycle management.

Material research and evaluation

In order to meet the development requirement of product structures and functions, Kingdream has set up an excellent team for material research, and the team is responsible for development and application researches on rock bit's structure material, function material and process material, etc.

Kingdream developed different performance series PDC cutters for PDC bit to meet different drilling applications and drilling requirements of different formations.





Product process research

Based on requirements of product technology advancement and market development, Kingdream insists on independent research and development of manufacture process technologies with its own characteristics and has formed integrated and very flexible fast reaction manufacturing process technologies of advanced level of the world.

Dull bit analysis and evaluation

Bit analysis engineers perform failure analysis on dull bit's cutting structure, bearing and seal, etc., conduct insight and systematic research on the causes to bit wear and failure, instruct customers to use bit properly and also provide design engineers with advices on how to improve the bit's performance and suggested research direction.

Product manufacture and quality control

From normal production to creating famous brand

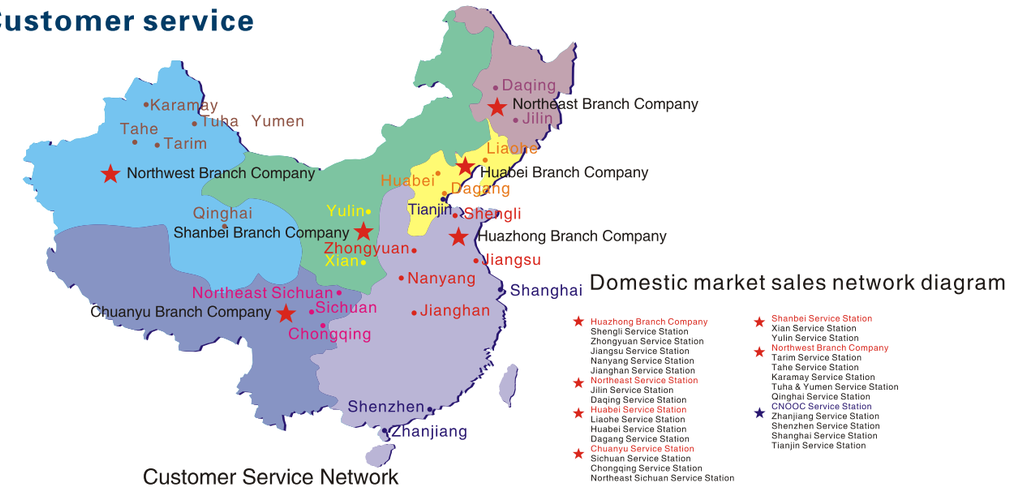
For 38 years and by insisting on the manufacturing principle of 'Flexibility, Precision & Zero–defect', Kingdream continuously improves its production line with technical reconstruction and application of new processes, precisely controls production management and advances its manufacturing technologies so as to create famous Kingdream brand.

In order to satisfy the market demand of 'small lot, multi–types, high product quality and short delivery time', Kingdream unceasingly carries out lean production and increases the investment on enlarging the production capacity. The number of production machines in Kingdream has increased from 12 sets when the company was just set up to 9 production lines for rock bit production with world advanced level at present, and various types of bits ranging from 3 3/4 to 26 inches in diameter can be produced.

Kingdream continually implements integrated machining and utilizes new machining processes to improve its manufacturing technology and guarantee manufacturing flexibility of the production lines and product quality. Ever since 1998, Kingdream's annual rock bit production batch and type has been increased sharply, by 670% and 900% respectively, while average production cycle was shortened by 2/3, rate of timely delivery has reached to 99.7% and rate of acceptable machining has been kept at 99.8%.

Kingdream has set up and keep improving its quality management system, and the system of quality inspection, monitoring and tracing is also established and being improved continuously. The company has been successively passed the ISO9001, API and HSE certifications.

Customer service





International marketing distribution

Technical exchange

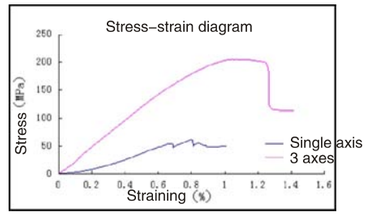
Kingdream holds a Rock Bit New Technology Forum once every two years to study the application of new technologies regarding rock bit and how to improve drilling efficiency together with our customers. All through the year, Kingdream regularly provides drilling customers with technical lectures and other technical exchange activities to help customers with proper bit selection and application so as to increase their overall drilling efficiency.

Bit selection software & bit performance database

In order to provide customers with excellent technical service, Kingdream has developed Bit Selection software based on logging data analysis and also set up a complete Bit Performance Database to help customers make most appropriate bit selection.

Formation tester

Formation lithology tester is specialized tester for providing technical service at drilling site. Real time testing of mechanical properties of the formation being drilled at normal and confined pressures can be realized with the tester, such as hardness, plastic coefficient, drillability, 3–axis compressive strength, elastic modulus and Poisson's ratio, etc. so that reliable formation data can be obtained for optimizing bit selection. Also, more suitable bits can be recommended for our customers through the use of formation tester.



Bit application summary & analysis

When summarizing and analyzing the bit applications, real drilling time, footage, ROP, hydraulic parameters, drilling cost and other factors which affect drilling efficiency are compared with predicted designing targets, and dull bits are also evaluated and graded. This summary and analysis process is helpful to record the success or failure of bit applications and improve bit design and bit selection.


MD
Series
MINI-MD
Series
SMD
Series
HF
Series
SWT
Series


A
Series
HJ/HJT
GJ/GJT
Series
HA/HAT
GA/GAT
Series
YC
Series
SKF/SKH
SKG/SKW
Series

Nomenclature of Kingdream Roller Cone Bits

Based on the development of drilling technology and process and changes of the market in China and worldwide, Kingdream recently introduced 6 new product series, which are easy to be selected by customers and specific to normal drilling problems. These products are named based on specific functions of the bit. Original nomenclature are still used for original product series such as HJ and HA series bits.

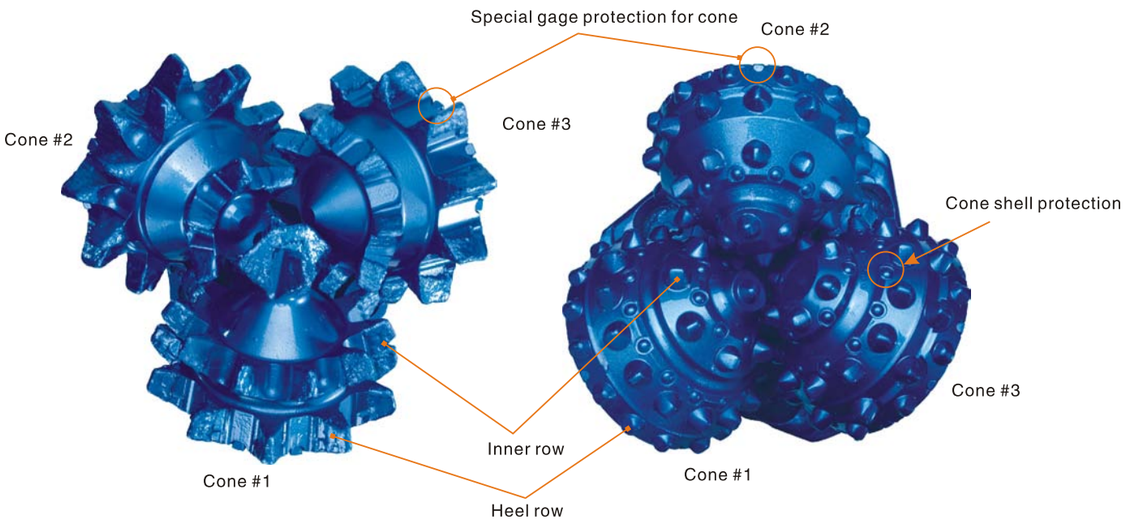
Kingdream's High speed MD bit series is specifically designed for directional, horizontal and horizontal multilateral well drilling applications. MiniMD slim hole bit series is especially for improving the drilling time and safety of the bit when drilling lower and small diameter section of the deep and ultra–deep wells. SMD ultra–speed motor bit series is specially developed for using with high speed down hole drilling tools such as turbo or screw drills. HardFighter bit (HF hard formation drilling bit) series is introduced to the market for meet the requirement of drilling deeper formations. In order to achieve longer life and higher ROP of the steel tooth bit for drilling upper formations, Swifturn bit (SWT high efficiency steel tooth bit) is developed. Air bit (A series bit for air drilling applications) series is designed for air drilling applications.

Type of Kingdream roller cone bit is indicated by diameter code, series code, IADC classification code and optional feature code.

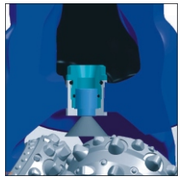
For example: 8 1/2MD517X

8 1/2 is bit diameter, indicating the bit diameter is 8.5 inches (215.9mm),
MD is series code, indicating the bit is a high speed motor bit,
517 is classification code, indicating IADC code,
X is optional feature code, indicating the main cutters are convex crested wedge insert.

Illustration of roller cone bit's cutting structure



Additional Features



C Center nozzle

Center jet can avoid bit balling, eliminate resorting area of fluid at bottom hole, expedite upward flow of cuttings and improve ROP. It is suitable for drilling in soft to medium soft formations with low compressive strength and high drillability.



D Diamond inserts on gage protection area

Better drilling performance can be achieved when drilling in the more abrasive directional well and horizontal well by arranging diamond enhanced inserts in head OD.



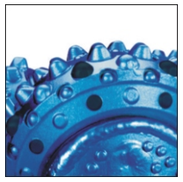
E Extended double nozzle

Extended double nozzle can expedite upward flow of cuttings and eliminate resorting area of fluid at bottom hole to realize safety and high efficient drilling.



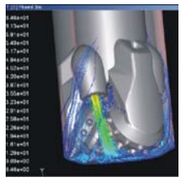
G Head OD protection

Special inserts are strategically arranged on head OD to effectively reduce head wear in abrasive formation and directional and horizontal wells and extend bit life.



H Diamond enhanced inserts

Better drilling performance can be achieved when drilling in more abrasive, hard and extreme hard formations by arranging diamond enhanced inserts in heel, gage rows and head OD.



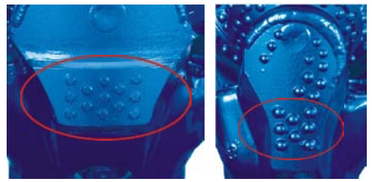
J Directional jet

Directional jet feature (J) enlarges lateral flow area on bottom hole and is helpful to bottomhole cleaning and increase of ROP. Suitable for soft to medium soft formations of low compressive strength and high drillability.



K Hard plastic formation cutting structure

Unique designing parameters and wider insert crest enlarge rock–breaking volume on bottom hole and increase bottom hole coverage. At the same time, shear sliding distance of inserts at bottom hole is made larger and ROP of the bit in hard plastic formation is increased.



L Bit head OD stabilization

The function of bit head OD stabilization is good for improving working situation of bit, which can effectively protect head and compensator recess in directional well and horizontal well.

There are two kinds of form for this structure:

1) weld stabilization pad on head OD and insert compacts;

2) insert ovoid compacts on head OD where near to compensator recess.



X Convex crested wedge compact

Convex crested wedge compact is with the features of high effectively cutting ability and strong anti–breaking ability, which can increase ROP and improve service life of bit effectively. It's suitable for formations from medium soft to medium hard.



Y Conical spherical compact

Main cutters of bit are conical spherical compacts, which are suitable for drilling in hard brittle formations.

Bit application chart

Bit applications	SMD	MD	MiniMD	HF	SWT	A	YC	HJ/HJT	GJ/GJT	HA/HAT	GA/GAT	SKF	SKH	SKG	SKW
Ultra–high RPM	●														
High RPM	●	●	●						●						
High temperature	●	●	●	●				●	●						
High WOB				●				●							
Highly abrasive	●	●	●	●				●							
Slim hole			●				●			●					
Hard formation–medium & low RPM				●				●							
Hard formation–high RPM		●	●												
Common formation	●	●	●		●		●	●	●	●	●	●	●	●	●
Air/foam drilling						●									

Bit structure features

Bit structure features	SMD	MD	MiniMD	HF	SWT	A	YC	HJ/HJT	GJ/GJT	HA/HAT	GA/GAT	SKF	SKH	SKG	SKW
Journal bearing				●	●	●	●	●		●			●		
Roller bearing					●				●		●			●	●
Floating bearing		●										●			
Bushing bearing			●			●									
Roller–journal bearing	●														
Metal face sealed	●	●	●	●	●	●		●	●						
Rubber O–ring sealed					●		●			●	●	●	●	●	
Enhanced gage protection	●	●	●	●	●										

Bit shank thread and recommended make up torque

Bit size		API regular pin	recommended make up torque
Inch	Millimeter	Inch	KN・M
3 3/4	95.3	2 3/8	4.1 ~ 4.7
3 7/8	98.4	2 3/8	4.1 ~ 4.7
4 1/8	104.8	2 3/8	4.1 ~ 4.7
4 1/4	108.0	2 3/8	4.1 ~ 4.7
4 1/2	114.3	2 3/8	4.1 ~ 4.7
4 5/8	117.5	2 7/8	6.1 ~ 7.5
4 3/4	120.7	2 7/8	6.1 ~ 7.5
4 7/8	123.8	2 7/8	6.1 ~ 7.5
5 1/2	139.7	3 1/2	9.5 ~ 12.2
5 5/8	142.9	3 1/2	9.5 ~ 12.2
5 2/3	143.9	3 1/2	9.5 ~ 12.2
5 3/4	146.1	3 1/2	9.5 ~ 12.2
5 7/8	149.2	3 1/2	9.5 ~ 12.2
6	152.4	3 1/2	9.5 ~ 12.2
6 1/8	155.6	3 1/2	9.5 ~ 12.2
6 1/4	158.8	3 1/2	9.5 ~ 12.2
6 1/2	165.1	3 1/2	9.5 ~ 12.2
6 5/8	168.3	3 1/2	9.5 ~ 12.2
6 3/4	171.5	3 1/2	9.5 ~ 12.2
7 1/2	190.5	4 1/2	16.3 ~ 21.7
7 5/8	193.7	4 1/2	16.3 ~ 21.7
7 7/8	200.0	4 1/2	16.3 ~ 21.7
8 3/8	212.7	4 1/2	16.3 ~ 21.7
8 1/2	215.9	4 1/2	16.3 ~ 21.7
8 5/8	219.1	4 1/2	16.3 ~ 21.7
8 3/4	222.3	4 1/2	16.3 ~ 21.7
9 1/2	241.3	6 5/8	38 ~ 43.4
9 5/8	244.5	6 5/8	38 ~ 43.4
9 7/8	250.8	6 5/8	38 ~ 43.4
10 1/2	266.7	6 5/8	38 ~ 43.4
10 5/8	269.9	6 5/8	38 ~ 43.4
11	279.4	6 5/8	38 ~ 43.4
11 5/8	295.3	6 5/8	38 ~ 43.4
12	304.8	6 5/8	38 ~ 43.4
12 1/4	311.2	6 5/8	38 ~ 43.4
12 5/16	312.7	6 5/8	38 ~ 43.4
12 3/8	314.3	6 5/8	38 ~ 43.4
12 7/16	315.9	6 5/8	38 ~ 43.4
12 5/8	320.7	6 5/8	38 ~ 43.4
13 1/8	333.4	6 5/8	38 ~ 43.4
13 1/2	342.9	6 5/8	38 ~ 43.4
13 5/8	346.1	6 5/8	38 ~ 43.4
13 3/4	349.3	6 5/8	38 ~ 43.4
14 1/2	368.3	7 5/8	46.1 ~ 54.2
14 3/4	374.7	7 5/8	46.1 ~ 54.2
15 1/2	393.7	7 5/8	46.1 ~ 54.2
16	406.4	7 5/8	46.1 ~ 54.2
17 1/2	444.5	7 5/8	46.1 ~ 54.2
18 7/8	479.4	7 5/8	46.1 ~ 54.2
20	508.0	7 5/8	46.1 ~ 54.2
22	558.8	7 5/8	46.1 ~ 54.2
24	609.6	7 5/8	46.1 ~ 54.2
26	660.4	7 5/8	46.1 ~ 54.2

API roller cone bit tolerances

API roller cone bit tolerances		
Out side diameter of bit	O.D. tolerances	
Inch	Inch	Millimeter
3 3/8 ~ 13 3/4	0 ~ 0.0313(1/32)	0 ~ 0.79
14 ~ 17 1/2	0 ~ 0.0625(1/16)	0 ~ 1.57
17 5/8 ~ 26	0 ~ 0.0938(3/32)	0 ~ 2.38

Kingdream Nozzles

Size of Kingdream nozzles				
Nozzle size code	Size of tri–cone bit		Nozzle O.D.	Assembly Length of nozzles
	Inch	Millimeter	Millimeter	Millimeter
S0	3 3/4 ~ 3 7/8	95.3 ~ 98.4	18.12	15.96
S1	4 1/8 ~ 5 1/2	104.78 ~ 139.7	20.30	17.48
S2	5 5/8 ~ 7 3/8	142.9 ~ 187.3	23.50	19.05
S3	7 1/2 ~ 8 1/4	190.5 ~ 209.6	29.74	20.62
S4	8 3/8 ~ 14 5/8	212.7 ~ 371.5	32.89	26.97
S5	14 3/4 ~ 26	374.6 ~ 660.4	40.84	26.97
SC2	8 3/8 ~ 11	212.7 ~ 279.4	23.50	26.0
SC4	11 5/8 ~ 17 1/2	295.3 ~ 444.5	32.89	35.32

Diameter of nozzle orifice

Diameter of nozzle orifice(mm)												
Nozzle size code	6	7	8	9	10	11	12	13	14	16	19	22
S0	•	•	•	•	•	•	•	•	•			
S1	•	•	•	•	•	•	•	•	•			
S2	•	•	•	•	•	•	•	•	•	•		
S3	•	•	•	•	•	•	•	•	•	•	•	•
S4	•	•	•	•	•	•	•	•	•	•	•	•
S5	•	•	•	•	•	•	•	•	•	•	•	•
SC2	•	•	•	•	•	•	•	•	•			
SC4	•	•	•	•	•	•	•	•	•	•	•	•

(Note: Extended, mini–extended and special nozzles can be customized.)

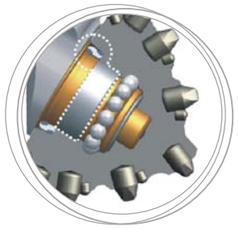
Example: S2–10
S: Standard nozzle C: Center nozzle 2: For using on 5 5/8″ ~ 7 3/8″ bits 10: Diameter of nozzle orifice is 10mm

MD High speed motor bit

Working condition of the bit in directional and horizontal drilling applications is quite different than in vertical well drilling. Kingdream's MD series motor bit has structure features of metal face sealed, special cone shell protection, enhanced head O.D. protection and enhanced gage protection, so that MD bit is suitable for drilling in directional and horizontal well drilling applications.

- **MD series motor bit features high RPM, better gage protection and stability, higher reliability, excellent hydraulic effect and longer working life, etc.**
- **MD bit is suitable for drilling at 300 ~ 90 RPM and is the ideal choice for directional, horizontal and horizontal multilateral well drilling applications.**
- **The size range of MD series bit is 7 7/8 – 12 1/4 inches and its IADC code is 437 – 647.**





Floating bearing and metal face seal

MD bit is designed with floating bearing and metal face seal structure suitable for high RPM. At the same time, it utilizes new type of synthetic lubricating grease to improve working condition of the bit's bearing, so that the bit can achieve longer service life and higher reliability when used on screw drilling tools.



Higher ROP and longer working life

Highly efficient cutter shape and optimized cutting structure



The bit's ROP is greatly improved by using Kingdream's patented convex crested cutter shape and other highly efficient cutters.

Special cone shell protection

Because movement of the bit is very complex during directional and horizontal drilling operations, especially several rotational movements are compounded during composite drilling operations, resulting irregular bottom hole shape and unbroken rock ridges. MD bit is designed and manufactured with special cone shell protection technology so that the cone shell is protected from being excessively worn by drilling cuttings and unbroken rock ridges and consequently, working life of the bit is effectively prolonged when the bit is used for directional and horizontal drilling applications.



To improve the bit's stability, prevent bit diameter shrinkage, and extend the bit's working life

Spiral double–stable head O.D.

Spiral double–stable structure can improve the bit's working stability, effectively mitigate vibration of the bit at the bottom hole and improve outer flow field. This structure can facilitate the removal of drilling cuttings at the bottom hole and wall of the borehole and therefore improve drilling efficiency.

Enhanced gage protection

To meet specific requirement of directional and horizontal drilling applications, MD bit is designed with high density cutter placement that covers the whole head O.D. Area and the cutter exposure changes in a ladder pattern so as to effectively protect the shirttail and seal and greatly improve the bit's ability against diameter shrinkage.

(Optional features: C, D, H, K, X, Y)

Bit size		Bit type
Inch	mm	
7 7/8	200.0	MD437、MD447、MD517、MD527、MD537、MD617、MD637、MD647
8 3/8	212.7	MD437、MD447、MD517、MD527、MD537、MD617、MD637、MD647
8 1/2	215.9	MD437、MD447、MD517、MD527、MD537、MD617、MD637、MD647
8 3/4	222.3	MD437、MD447、MD517、MD527、MD537、MD617、MD637、MD647
9 1/2	241.3	MD437、MD447、MD517、MD527、MD537、MD617、MD637、MD647
9 7/8	250.8	MD437、MD447、MD517、MD527、MD537、MD617、MD637、MD647
12 1/4	311.2	MD437、MD447、MD517、MD527、MD537、MD617

SUPER–MD

Ultra–high speed motor bit

In consideration of this high speed drilling condition, Kingdream specially developed the SUPER–MD ultra–high speed motor bit that is designed with roller–journal composite bearing and metal face seal. The bit is also equipped with advanced cutting structure and special hydraulic system with double extended nozzles that are suitable for high RPM drilling operations. This new Super–MD bit features high bearing reliability and long working life under high speed drilling conditions. SUPER–MD Ultra–high speed motor bit has structure features of metal face sealed, special cone shell protection, enhanced head O.D. Protection and enhanced gage protection, so that the bit is suitable for drilling at ultra–high RPM drilling applications.

- **It is recommended that SMD bits should be run within the range of 250 to 600 RPM in order to get better and economic drilling result.**
- **The size range of SMD series bit is 8 3/4 – 11 5/8 inch and its IADC code is 417 – 617.**



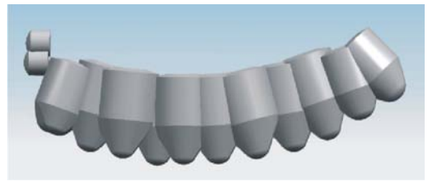
SMD bit features long service life, high reliability and high ROP under ultra–high rotary speed conditions



Roller–journal composite bearing with metal face seal

Patented roller–journal composite bearing technology is used on SMD bit. This new bearing package combines the advantages of both roller bearing and journal bearing, together with metal face seal, insures higher reliability of the bit under high RPM and high WOB.

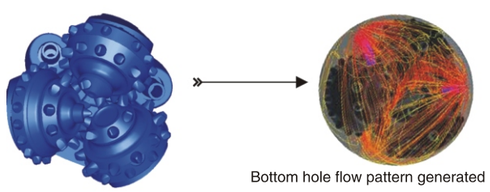
Advanced cutting structure suitable for ultra–high RPM drilling



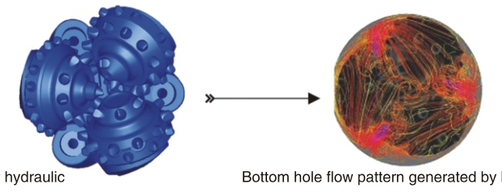
Working environment of the bit's cutting structure becomes more severe under ultra–high RPM conditions. SMD bits uses selected carbide inserts with the strength and hardness of the inserts are matched properly. Cutter layout is optimized and new machining process for drilling insert hole is used to reduce or even eliminate insert breakage and loss during drilling.

Highly efficient hydraulic system

Special hydraulic system with double extended nozzles can remove large amount of drilling cuttings generated from fast drilling operations and eliminate drilling cutting logjamming area at the bottom hole and therefore facilitate up removal of the drilling cuttings.



Bottom hole flow pattern generated by hydraulic system of double extended nozzles



Bottom hole flow pattern generated by hydraulic system of three nozzles

(Optional features: C, D, E, H, K, X, Y)

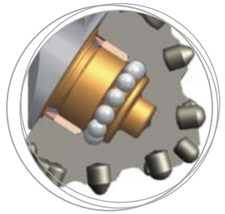
Bit size		Bit type
Inch	mm	
8 3/8	212.7	SMD417、SMD437、SMD447、SMD517、SMD537、SMD617
8 1/2	215.9	SMD417、SMD437、SMD447、SMD517、SMD537、SMD617
8 3/4	222.3	SMD417、SMD437、SMD447、SMD517、SMD537、SMD617
10 5/8	269.9	SMD417、SMD437、SMD447、SMD517、SMD537、SMD617
11 5/8	295.3	SMD417、SMD437、SMD447、SMD517、SMD537、SMD617

MINI–MD roller cone bit for slim hole drilling applications

In addition to the features of MD motor bit, MiniMD slim hole bit is also designed with special bearing & seal structure and lubrication system. MiniMD bit's cutter material and cutting structure are reasonably matches with rock properties of the formation and this eliminated the specific problems such as low drilling efficiency and cutter breakage and loss, etc.
MiniMD slim hole bit has structure features of metal face sealed and enhanced head O.D. protection, so that the bit is suitable for drilling slim hole and ultra–deep well drilling applications.

- **MiniMD slim hole bit is the ideal choice for drilling slim hole sections in deep and ultra–deep well drilling applications.**
- **The size range of MiniMD series bit is 5 3/4 – 6 1/2 inch and its IADC code is 437 – 647.**

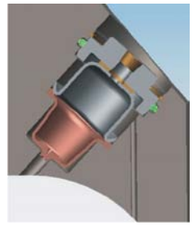




High reliability and long working life

Bushing bearing with metal face seal

The series bit adopts advanced bushing bearing pair and reliable metal face seals to enhance reliability of the bit.



New type of lubrication system

Precisely designed and processed lubrication system and the use of new type of synthetic grease can improve balancing speed of the pressures inside and outside of the bearing package and achieve better protection of the bearing and seal system of the bit.



Improve bit stability, prevent bit diameter shrinkage and extend the bit's working life

Inclined double–stable head O.D.

Improved stability of small size head O.D. and reduced bit vibration at the bottom hole are achieved by using specially designed inclined double–stable head body. Hydraulic system of the bit is also optimized on the basis of the special head O.D. design an as a result, bottom flow field under the condition of insufficient hydraulic power in lower section in deep well is largely improved, removal of drilling cuttings is also improved and wear of the bit and other drilling tools by drilling cuttings is reduced and therefore, ROP is further improved.

(Optional features: D, H, X, Y)

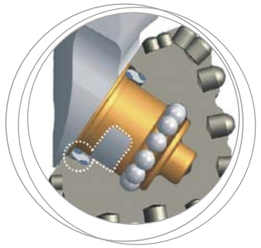
Bit size		Bit type
Inch	mm	
5 3/4	146.1	MD437、MD517、MD537、MD547、MD617、MD637
5 7/8	149.2	MD437、MD517、 MD537 、MD547、MD617、MD637、MD647
6	152.4	MD437、MD517、 MD537 、MD547、MD617、MD637、MD647
6 1/8	155.6	MD437、MD517、MD537、MD547、MD617、MD637、MD647
6 1/4	158.8	MD437、MD517、MD537、MD547、MD617、MD637、MD647
6 1/2	165.1	MD437、MD517、MD537、MD547、MD617、MD637、MD647

HF series bit for hard formation drilling

Failure types, such as tooth break, tooth wear, cone tip wear and bit diameter shrink etc., usually appear when conventional cone bits drill in hard formations. So we have developed HF series bit for hard formations. HFseries bit has structure features of metal face sealed and enhanced head O.D., so that the bit is suitable for drilling in hard formations.

- **HF series bit has the advantages of long service life, high reliability, fast ROP and strong gage protection ability etc..**
- **HF series bit is the ideal choice for drilling in hard formations and high abrasive formations effectively and safely.**
- **The size range of HF series bit is 7 7/8 – 12 1/4 inch and its IADC code is 537 – 737.**



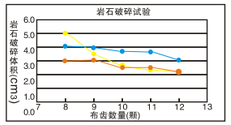


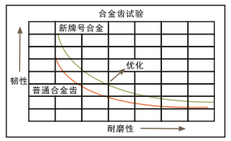
Long working life and high reliability

Head bearing of HF series bit is adopted advanced automatic welding technology with wear–resistant alloy on surface hardfaced and cone bearing surface is plated by using third–generation high–performance composite solid lubricating materials to increase bearing's capacity.Composite solid lubricating material and new type of grease are applied to improve bearing's working environment. The bearing can receive higher WOB under using those bearing technology.

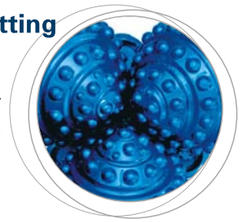
Cutter crest enhancement

Wear between cones of HF series bit is reduced to prolong service life by utilizing top inserts enhancing technique.





Numerical experiment and optimized cutter material & shape ensure high efficiency of cutting



Numerical experiment

Actual bit performance is simulated by advanced computer 3D simulation technology. The cutting structure applied in hard formation is designed under combination of physical experiments.

Optimized cutter material and shape

Cutter materials and shapes are scientifically matched with each other according to drillable difference of formation so as to reduce cutter breakage and increase cutter aggressiveness and wear resistance.



Applying super–hard material and enhanced heel row & gage design to prevent bit from diameter shrinkage

Enhanced heel row and gage design

High dense heel row and double gage rows arranged on HF series bit which prevent bit from diameter shrinkage effectively.

Super–hard material diamond–enhanced inserts

Adopting predominant diamond enhanced inserts developed by Kingdream in heel row and gage row to increase gage protection capability and service life. The cutters are used for drilling in hard formations with high abrasive and super–hard formations.
(Optional features: D, H, K, L, X, Y)

Bit size		Bit type
Inch	mm	
7 7/8	200.0	HF537、HF547、HF617、HF627、HF637、HF647、HF737
8 1/2	215.9	HF537、HF547、HF617、HF627、HF637、HF647、HF737
8 3/4	222.3	HF537、HF547、HF617、HF627、HF637、HF647、HF737
9 1/2	241.3	HF537、HF547、HF617、HF627
9 7/8	250.8	HF537、HF547、HF617、HF627
12 1/4	311.2	HF537、HF547、HF617、HF627、HF637

SWT

steel tooth bit with high efficiency

SWT series steel tooth bit with high efficiency has strong wear resistant teeth and fast ROP, bit can work more stably, which is more suitable for drilling in soft or middle soft formations.

- **The size range of SWT series bit is 8 1/2 – 17 1/2 inch and its IADC code is 117 – 127 (or 115 – 125).**





Seal system

Seal types of this series bit are selected based on drilling applications. Default type of the bearing is rubber O ring seal. If PDM or other drilling method with high RPM is used, metal face seal is selected.
Additional feature M can be used for SWT bit; it means structure feature with metal face sealed.



Higher wear–resistance cutter

Enhanced structure of cutter shape

Optimized structure design of cutter shape is thickened hardfacing on surface and crest of cutters to enhance aggressiveness for cutters. Enhanced hardfacing on leading edge and trailing edge of cutters improve wear–resistance of cutters.

Optimized hardfacing technology

New welding material is used to enhance further wear resistance of cutters.





High ROP

Optimized cutting structure

Based on rock mechanics features adopt calculation and analysis tools to optimize cutter row arrangement and number of cutter. Then the cutting efficiency and direction of movement for cutters of each row are calculated accurately to maximize breakage volume of bottom hole. Finally, ROP of the bit is also improved.
(Optional features: C, G, M)

Bit size		Bit type
Inch	mm	
8 1/2	215.9	SWT117、SWT127
8 3/4	222.3	SWT117、SWT127
9 1/2	241.3	SWT117、SWT127
12 1/4	311.2	SWT117、SWT127
13 1/2	342.9	SWT115、SWT125
13 3/4	349.3	SWT115、SWT125
15 1/2	393.7	SWT115、SWT125
16	406.4	SWT115、SWT125
17 1/2	444.5	SWT115、SWT125

A series bit for air drilling

In hard formation with less water content, formations with serious leakage or with low pressure, in order to achieve higher drilling speed, air drilling process is usually adopted. Problems such as short service life, low ROP, weak gage protection ability etc. appear frequently for conventional cone bit in air drilling conditions.
Aim at air drilling condition, Kingdream has developed A series bit for air drilling which has structure features of center jet hole and enhanced head O.D.. The bit with these features is suitable for drilling at air drilling application to increase observably ROP and life of the bit.

· The size range of A series bit is 5 7/8 – 12 3/8 inch and its IADC code is 537 – 627.

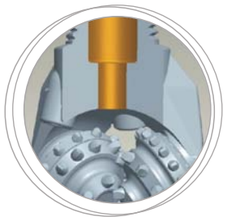




Long service life

Metal face seal journal bearing

High stress spots are eliminated by new bearing enhancement process and the design requirements of high accuracy is obtained with high precision mach ineries to ensure good impact resistance load capability and high–temperature resistant property.



High ROP

High effective cutting capability can be obtained by optimized cutting structure.

According to characteristics of air drilling, inserts of highly wear resistant and high toughness as well as optimized cutter shape are utilized. The wear–resistance and anti–breakage ability of inserts can help to keep constant aggressiveness and increase ROP.
Fine cuttings is suitable for upward flow of cuttings in air drilling to reduce repeated breakage and improve drilling efficiency by optimized arrangement density and height of cutters.



Jet system with high efficiency

Three side jet holes and one center jet hole are made up of a jet structure. Unique center hole will spurt air flow into bottom hole center directly, so that increase capacity of cleaning well bore, expedite upward flow of cuttings and cool cone and bearing.



Strong gage protection

Appropriately added cutters number of heel row and adopted inserts with good wear–resistance to enhance gage protection. Widened & thickened hardfacing on shirttail to protect the seal.
Full head OD protection to improve further capability of gage protection.

(Optional features: D、H、K、X、Y)

Bit size		Bit type
Inch	mm	
5 7/8	149.2	A537、A547、A617、A627
6	152.4	A537、A547、A617、A627
6 1/8	155.6	A537、A547、A617、A627
7 7/8	200.0	A537、A547、A617、A627
8 1/2	215.9	A537、A547、A617、A627
8 3/4	222.3	A537、A547、A617、A627
9 1/2	241.3	A537、A547、A617、A627
9 7/8	250.8	A537、A547、A617、A627
12 1/4	311.2	A537、A547、A617、A627
12 3/8	314.3	A537、A547、A617、A627

HJ/HJT metal sealed bit with journal bearing

HJ/HJT series bit adopts metal seal with journal bearing, which can drill stably with higher rotary speed.

- **The size range of HJ/HJT series bit is 7 1/2 – 18 7/8 inch and its IADC code is 437 – 547.**

Main structure features:

- Metal face seal journal bearing. New processes of head bearing hardfacing and cone bearing silver plating are used to improve the load capacity, anti–galling ability and stability of the bearing.
- Various shapes of inserts can be equipped on this series of bits, including scoop inserts, wedge inserts, conical–spherical inserts and double spherical inserts, etc. Drilling process & formation and bit are efficient integrated by scientific insert shape selection to realize safety and high efficient drilling.
- A row of inserts is added between gage row and heel row of HJ bit to trim borehole wall and protect cone shell, and as a result, HJT series bit is formed.



Bit size		Bit type
Inch	mm	
7 7/8	200.0	HJ437G、HJ447G、HJ517G、HJT537G
8 1/2	215.9	HJT417G、HJT437G、HJT447G、HJ517G、HJT517G、HJ527G、HJT527G、HJ537G、HJT537G、HJ547G、HJT547GY
8 3/4	222.3	HJ437G、HJ447G、HJT517G、HJ527G
9 1/2	241.3	HJ437G、HJ447G、HJ517G、HJT517G、HJ537G、HJT537G、HJ547G、HJT547G
9 7/8	250.8	HJ437G、HJT437G、HJ517G
10 1/2	266.7	HJT517GK、HJT537GK、HJT547GK
10 5/8	269.9	HJT517G
12	304.8	HJT517GK、HJT537GK、HJT547GK
12 1/4	311.2	HJT417G、HJ437G、HJT437G、HJ447G、HJT447G、HJ517G、HJT517G、HJ537G、HJT537G
13 1/2	342.9	HJT517GK、HJT537GK、HJT547G
14 3/4	374.7	HJT517GK、HJT537GK、HJT547G
17 1/2	444.5	HJ517G、HJT517G、HJ527G
18 7/8	479.4	HJT517G、HJT537G

GJ/GJT metal sealed bit with roller bearing

GJ/GJT series bit adopts metal seal with roller bearing, which can drill stably with middle to low WOB and middle to high RPM, it's the ideal choice for higher part of well section.

- **The size range of GJ/GJT series bit is 12 1/4 – 17 1/2 inch and its IADC code is 114 – 545.**

Main structure features:

- Sizes of bearing journal and rollers are made larger by arranging the rollers in recesses in cone body.
- All rubber compensator is used which can limit pressure differential and prevent drilling fluid from entering the lubrication system and this provides the bearing system with good assurance of lubrication.
- Shirttail and head OD are hardfaced for enhanced gage protection. Center nozzle is equipped for bits of larger sizes.
- A row of inserts is added between gage row and heel row to trim borehole wall and protect cone shell to form the special GJT series bit.



Bit size		Bit type
Inch	mm	
12 1/4	311.2	GJ115C、GJT115C、GJT125C、GJ135G、GJT415G、GJT435G、GJT445G
16	406.4	GJT435G、GJ515G、GJ515G、GJT515GC、GJ535G、GJ535G
17 1/2	444.5	GJ115G、GJ115G、GJT115G、GJ135G、GJT135G、GJ415G、GJT415G、GJ435G、GJT435G、GJT445G、GJ515G、GJT515G、GJT525G、GJ535G

HA/HAT rubber sealed bit with journal bearing

HA/HAT series bit adopts rubber seal with journal bearing, which can sustain higher WOB under normal rotary speed and is suitable for drilling in formations from very soft to middle hard by properly selecting different cutting structure.

- **The size range of HA/HAT series bit is 3 3/4 – 12 1/4 inch and its IADC code is 116 – 547.**

Main structure features:

- Journal bearing. Hardfaced head bearing surface. Inner hole of cone is silver–plated. The load capacity and seizure resistance of the bearing is greatly improved.
- O ring seal is made of the more wear resistance high saturated buna –N with the increased seal section and precisely designed sealing flange in the cone sealing area increased the reliability of the seal.
- All rubber compensator is used which can limit pressure differential and prevent drilling fluid from entering the lubrication system and this provides the bearing system with good assurance of lubrication.
- High wear resistance and excellent cutting ability of the insert bit are given full play by using carbide compacts of high strength and high toughness in combination with optimized compact numbers and rows, the exposure height and special shaped compacts. For steel tooth bit, the tooth surface is hardfaced with new type of wear resistant material and thus extended working life of the cutting structure while still maintaining high ROP.
- A row of inserts is added between gage row and heel row of HA bit to trim borehole wall and protect cone shell and consequently, the special HAT series bit is formed.



Bit size		Bit type
Inch	mm	
3 3/4	95.3	HA137G、HA217G、HA517G、HA527G、HA537G
3 7/8	98.4	HA137G、HA217G、HA517G、HA527G、HA537G
4	101.6	HA137G、HA217G、HA517G、HA527G、HA537G
4 1/8	104.8	HA137G、HA217G、HA517G、HA527G、HA537G
4 1/2	114.3	HA117G、HA127G、HAT517G、HA537GL、HA547GL
4 5/8	117.5	HA117G、HA127G、HAT517G、HA537GL、HA547GL
4 3/4	120.7	HA117G、HA127G、HAT517G、HA537GL、HA547GL
4 7/8	123.8	HA117G、HA127G、HAT517G、HA537GL、HA547GL
5 1/2	139.7	HA117G、HA127G、HAT517G、HA537GL、HA547GL
5 5/8	142.9	HA117G、HA127G、HA137G、HA217G
5 7/8	149.2	HA117G、HA127G、HA137G、HA217G
6	152.4	HA117G、HA127G、HA137G、HA217G
6 1/8	155.6	HA117G、HA127G、HA137G、HA217G
6 1/2	165.1	HA117G、HA127G、HA137G、HA217G
8 3/8	212.7	HA117G、HA127G、HA137G、HA217G
8 1/2	215.9	HAT117G、HAT127G、HAT137G、HAT217G
9 1/2	241.3	HA117G、HAT12
9 7/8	250.8	HA117G、HAT127G、HA217G
10 5/8	269.9	HAT117G、HAT127G、HA137G、HAT217G
11	279.4	HAT117G、HAT127G、HA137G、HAT217G
12 1/4	311.2	HAT117G、HAT127G、HAT137G、HA217G

GA/GAT rubber sealed bit with roller bearing

GA/GAT series bit adopts rubber seal with roller bearing, which is the ideal and economical tool for drilling applications where middle to low WOB and high RPM are required.

- **The size range of HGA/GAT series bit is 12 1/4 – 17 1/2 inch and its IADC code is 114 – 545.**

Main structure features:

- Sealed roller bearing structure. With rollers arranged in grooves recessed in the cone body, the size of the bearing journal is increased, therefore, with the ability of enduring high WOB and applying for high RPM.
- Thrust bearing surfaces are hardfaced and treated with friction reducing technology.
- All rubber compensator is used which can limit pressure differential and prevent drilling fluid from entering the lubrication system and this provides the bearing system with good assurance of lubrication.



Bit size		Bit type
Inch	mm	
12 1/4	311.2	GA114G、GAT115、GA124、GA135G、GAT215G、GA415G、GA425、GA435G、GA535G、GA545GY
13 1/2	342.9	GA114G、GA115G、GA135、GAT415G、GAT535G
13 3/4	349.3	GA114、GA115G、GAT115G、GAT125G、AT415G、GAT435G、GA515G、GAT515G
14 3/4	374.7	GA114G、GA115G、GAT115、GA124、GAT125G、GAT435GC、GAT515G、GA535G、GA545C
16	406.4	GA114、GA115、GAT115、GA134G、GAT415GC、GAT435G、GA515G、GAT535G
17 1/2	444.5	GA114G、GA115G、GAT115G、GAT125G、GA135G、GA215G、GAT415G、GAT435G、GAT445G、GAT515G、GA525G、GAT535G、GA545GY

YC Series single cone bit

This series of bit is suitable for slim hole drilling operations such as sidetracking and reentry operations.

- **The size range of YC series bit is 3 1/2 – 6 1/2 inch and its IADC code is 437 – 637.**



Main structure features:

- With particular structure of the cone, equal worn of the compacts in permanent contact area and alternative contact area of the bit is realized.
- Wear resistance of the cutting structure is enhanced by setting PDC cutters in the permanent contact area of the cone where compacts are most severely worn.
- Optimized hydraulics structure improved the cleaning ability of hydraulic system on cone and bottom hole, and assure higher ROP.
- The bit has excellent gage protection and up reaming abilities by setting active cutting conical spherical gage compacts on head body.

Bit size		Bit type
Inch	mm	
3 3/4	95.3	YC537、YC617
4 1/8	104.8	YC517、YC527、YC537、YC617
4 1/2	114.3	YC517、YC527、YC537
4 5/8	117.5	YC427、YC437、YC517、YC527、YC537
4 3/4	120.7	YC437、YC517、YC537
5 1/2	139.7	YC517、YC537、YC617、YC637
5 7/8	149.2	YC517、YC537、YC617、YC637
6	152.4	YC517、YC537、YC617、YC637
6 1/8	155.6	YC517、YC537、YC617、YC637
6 1/2	165.1	YC517、YC537、YC617、YC637

SKF rubber sealed bit with floating bearing

SKF series bit is a kind of high efficiency bit for vertical and directional drilling applications, especially suitable for these kinds of drilling applications in relatively homogenous formation with good drillability.
This bit is designed with floating bearing and rubber 'O' ring seal, and also utilizes optimized cutting structure and enhanced gage protection technology and therefore, it can achieve longer footage and higher ROP.

- **The size range of SKF series bit is 8 1/2 – 12 1/4 inch and its IADC code is 117 – 537.**



Main structure features:

- This series bit adopt the bearing and seal system with the feature of low relative linear velocity of bearing couple and low temperature of friction surface. Applying of new type of synthetic grease enhance the ability of resisting high temperature, wear and extreme pressure of bearing, which can get longer service lift and higher reliability in vertical well and directional well.
- Optimize cutting structure of insert bits, choose offset crested scoop compacts with strong attacking ability as main cutting compacts, so as to make the bit with the feature of longer footage and higher ROP.
- Properly arrange compacts on Head OD to enhance the security of bit in directional well. As well as improve the drilling operation in reducing well section or under the situation of up–reaming.

Bit size		Bit type
Inch	mm	
8 1/2	215.9	SKF117G、SKF127G、SKF137G、SKF437G、SKF447G、SKF517G、SKF537G
9 1/2	241.3	SKF117G、SKF127G、SKF137G、SKF437G、SKF447G、SKF517G、SKF537G
12 1/4	311.2	SKF117G、SKF127G、SKF137G、SKF437G、SKF447G、SKF517G、SKF537G

SKH rubber sealed bit with journal bearing

SKH series bit adopts journal bearing rubber O–ring seal along with more aggressive cutting structure. This bit is with the features of longer footage and higher ROP and is the ideal choice for drilling applications in upper homogenous formations.

- **The size range of SKH series bit is 8 1/2 – 17 1/2 inch and its IADC code is 116 – 537.**

Main structure features:

- Hardfaced head bearing surface. Inner hole of cone is silver–plated. The load capacity and seizure resistance of the bearing is greatly improved.
- O ring seal is made of the more wear resistance high saturated buna–N with the increased seal section and precisely designed sealing flange in the cone sealing area increased the reliability of the seal.
- High wear resistance and excellent cutting ability of the insert bit are given full play by using carbide compacts of high strength and high toughness in combination with optimized compact numbers and rows, the exposure height and special shaped compacts. For steel tooth bit, the tooth surface is hardfaced with new type of wear resistant material and thus extended working life of the cutting structure while still maintaining high ROP.



Bit size		Bit type
Inch	mm	
8 1/2	215.9	SKH116、SKH126、SKH136、SKH216G、SKH137、SKH217G、SKH437G、SKH447G、SKH517G、SKH537G、SKH547G
8 3/4	222.2	SKH116、SKH126、SKH136、SKH216G、SKH137、SKH217G、SKH437G、SKH447G、SKH517G、SKH537G、SKH547G
9 1/2	241.3	SKH116、SKH126、SKH136、SKH216G、SKH137、SKH217G、SKH437G、SKH447G、SKH517G、SKH537G、SKH547G
9 5/8	244.5	SKH116、SKH126、SKH136、SKH216G、SKH137、SKH217G、SKH437G、SKH447G、SKH517G、SKH537G、SKH547G
9 7/8	250.8	SKH116、SKH126、SKH136、SKH216G、SKH437G、SKH517G、SKH537G
10 5/8	269.9	SKH437G、SKH517G、SKH537G
11 5/8	295.3	SKH116、SKH117、SKH127、SKH137、SKH217G、SKH227G、SKH237G、SKH317G、SKH417G、SKH437G、SKH517G、SKH537G、SKH547G、SKH617G、SKH627G、SKH637G
12 1/4	311.2	SKH116、SKH126、SKH136、SKH216、SKH437G、SKH517G、SKH537G
13 5/8	346.1	SKH117、SKH127、SKH437G、SKH517G、SKH537G
14 3/4	374.7	SKH117、SKH127、SKH437G、SKH517G、SKH537G
15 1/2	393.7	SKH117、SKH127、SKH437G、SKH517G、SKH537G
16	406.4	SKH117、SKH127、SKH437G、SKH517G、SKH537G
17 1/2	444.5	SKH117、SKH127、SKH437G、SKH517G、SKH537G

SKG rubber sealed bit with roller bearing

SKG series bit is designed with roller bearing and rubber O–ring seal. This bit can achieve longer footage and higher ROP when drilling under medium to low WOB and high RPM.

- **The size range of SKG series bit is 10 5/8 – 26 inch and its IADC code is 114 – 535.**

Main structure features:

- Roller bearing structure. With rollers arranged in grooves recessed in the cone body, the size of the bearing journal is increased, therefore, with the ability of enduring high WOB and applying for high RPM.
- All rubber compensator is used which can limit pressure differential and prevent drilling fluid from entering the lubrication system and this provides the bearing system with good assurance of lubrication.



Bit size		Bit type
Inch	mm	
10 5/8	269.9	SKG124、SKG135、SKG425G、SKG535G、SKG545G
11 5/8	295.3	SKG114、SLG115、SKG125、SKG135、SKG124、SKG134、SKG214、SKG215、SKG225
12 1/4	311.2	SKG114、SKG115、SKG124、SKG134、SKG214、SKG225、SKG415G、SKG435G、SKG515G、SKG545G
13 5/8	346.1	SKG114、SKG124、SKG125、SKG134、SKG214
13 3/4	349.3	SKG115、SKG125、SKG435
14 3/4	374.7	SKG114、SKG124、SKG134、SKG435、SKG515G、SKG535G
15 1/2	393.7	SKG115、SKG124、SKG134、SKG135、SKG215
16	406.4	SKG114、SKG124、SKG134、SKG435G、SKG515G、SKG535G
17 1/2	444.5	SKG114、SKG115、SKG124、SKG125、SKG134、SKG135、SKG215、SKG235、SKG435G、SKG515G、SKG535G
18 7/8	479.4	SKG114、SKG124、SKG134、SKG435G、SKG515G、SKG535G
20	508.0	SKG114、SKG124、SKG134、SKG435G、SKG515G、SKG535G
22	558.8	SKG114、SKG124、SKG134、SKG435G、SKG515G、SKG535G
24	609.6	SKG114、SKG124、SKG134、SKG435G、SKG515G、SKG535G
26	660.4	SKG114、SKG124、SKG134、SKG435G、SKG515G、SKG535G

SKW Non–sealed Bits

SKW series bit is non–sealed roller bearing bit. This bit is suitable for surface hole drilling for every kind of wells and upper sections with good drillability. It's advantages including low cost and high ROP, etc.

- **The size range of SKW series bit is 14 3/4 – 26 inch and its IADC code is 111 – 241.**

Main structure feature:

- The drilling fluid can flow into bearing cavity directly to cool due to no seal.
- For the bit, bearing structure of roller–ball– roller–thrust is utilized.



Bit size		Bit type
Inch	mm	
14 3/4	374.7	SKW111、SKW121、SKW131、SKW211、SKW241
15	381.0	SKW121
15 1/2	393.7	SKW111、SKW121、SKW131、SKW211、SKW241
16	406.4	SKW111、SKW121、SKW131、SKW211、SKW241
17 1/2	444.5	SKW111、SKW121、SKW131、SKW211、SKW241
20	508.0	SKW111、SKW121、SKW131、SKW211、SKW241
22	558.8	SKW111、SKW121、SKW131、SKW211、SKW241
24	609.6	SKW111、SKW121、SKW131、SKW211、SKW241
26	660.4	SKW111、SKW121、SKW131、SKW211、SKW241

Dimond Bits for Oil Well Drilling



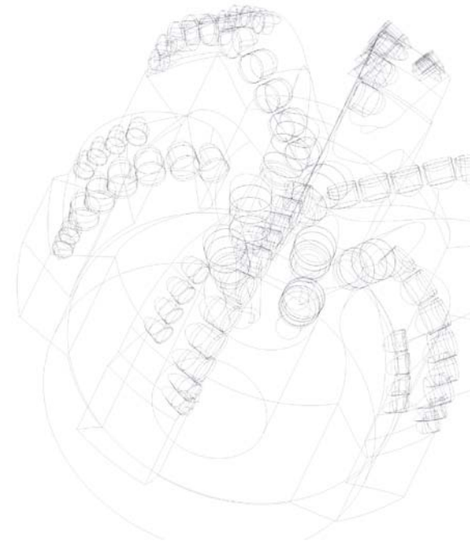
KS series



KM series



KMD/KSD series





KMH series



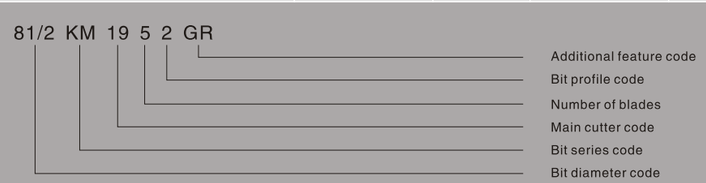
KMC series

Nomenclature of products



Bit diameter code	Bit series code	Main cutter code	Number of blades	Bit profile code	Additional feature code
3 1/2 ~ 17 1/2	· KM–Matrix body PDC bit · KS–Steel body PDC bit · KMH–Matrix body PDC bit for hard formation · KMD–Matrix body PDC bit for directional drilling application · KSD– Steel body PDC bit for directional drilling application · KMC–Matrix body PDC core bit	25 ~ Φ25.40mm 22 ~ Φ22mm 19 ~ Φ19.05mm 16 ~ Φ16mm 13 ~ Φ13.44mm 10 ~ Φ10mm 08 ~ Φ8mm	3 ~ 12	1 ~ 9	A Vibration absorber D Double row cutters G Spiral gage protection R Back–reaming S Spiral blade T Special gage protection

Example



Optional feature



A vibration absorber

Enhancing the ability of the bit to drill through soft and hard interbeded formations in order to protect PDC cutters.



D double row cutters

Penetration ability and wear resistance of the bit in medium hard formation can be improved.



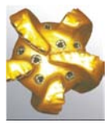
G Spiral gage protection

Bit is force–balanced that resulting better stability of the bit.



R Back–reaming Making

the bit more suitable for various drilling processes to prevent sticking.



S spiral blade Cutter layout

densities are increased and adaptive abilities of the bit in hard formations are improved.



T special gage protection

Enhancing gage protection ability of the bit.

Bit shank thread and recommended make up torque

Bit size (in)	API regular pin (in)	Recommended make up torque (KN.m)
3 7/8 ~ 4 1/2	2 3/8	4~4.8
4 5/8~5	2 7/8	6~7.5
5 1/8 ~ 7 3/8	3 1/8	9.5~12
7 1/2 ~ 9 3/8	4 1/2	16~22
9 1/2 ~ 14 1/2	6 5/8	38~43
14 5/8 ~ 17 1/2	7 5/8	46~54

API diamond (PDC) bit tolerances

Bit diameter (inch)	Diameter tolerance (mm)
3 7/8 ~ 6 3/4	–0.38 ~ 0
7 1/2 ~ 8 3/4	–0.51 ~ 0
9 1/2 ~ 12 1/4	–0.76 ~ 0
14 3/4 ~ 17 1/2	–1.11 ~ 0

Table of classification of formation hardness and bit selection

Roller cone bit IADC code	Formation description	Rock type	Compres–sive strength (Mpa)	ROP m/h	IADC code of diamond bit	Recommended type of diamond bit
111/124	Very soft: sticky soft formation with low compressive strength.	Clay Siltstone Sandstone	< 25	> 20	M/S112 ~ M/S223	KS1952 KM1952 KS1942 KM/SD1952 KM1942 KM/SD1942
116/137	Soft: soft formation with low compressive strength and high drillability.	Clay rock Marl Lignite Sandstone	25 ~ 50	10 ~ 20	M/S222 ~ M/S323	KS1963 KM1952 KS1952 KM/SD1952 KS1652 KM1652 KS1642 KM/SD1652 KM1642
417/527	Medium soft: soft to medium formation with low compressive strength and streak.	Clay rock Marl Lignite Sandstone Siltstone Anhydrite Tuff	50 ~ 75	5 ~ 15	M/S323 ~ M/S433	KS1963 KM1953 KS1652 KM/SD1953 KS1362 KM1662 KM/SD1653 KM1375 KM/SD1375 KM/SD1363 KM1363
517/537	Medium: medium to hard formation with high compressive strength and thin abrasive streak.	Mudstone Dark rock Shale	75 ~ 100	2 ~ 6	M322 ~ M443	KS1652 KM1662 KS1362 KM/SD1662 KM1375 KM/SD1375 KM1363 KM/SD1363
537/617	Medium hard: hard and dense formation with high compressive strength and medium abrasiveness.	Dark rock Hard shale Anhydrite Sandstone Dolomite	100 ~ 200	1.5 ~ 3	M422 ~ M444	KSH1382 KMH1673 KMH1662 KMH1653 KMH1375

Nozzle data for diamond drill bit

TFA values of standard nozzle (mm^2)

Size number	Diameter of nozzle (mm)	Number of nozzles								
		1	2	3	4	5	6	7	8	9
06	4.76	17.81	35.63	53.44	71.26	89.07	106.88	124.70	142.51	160.33
07	5.56	24.25	48.49	72.74	96.99	121.23	145.48	169.73	193.97	218.22
08	6.35	31.67	63.34	95.01	126.68	158.35	190.02	221.68	253.35	285.02
09	7.14	40.08	80.16	120.24	160.33	200.41	240.49	280.57	320.65	360.73
10	7.94	49.48	98.97	148.45	197.93	247.42	296.90	346.38	395.87	445.35
11	8.73	59.87	119.75	179.62	239.50	299.37	359.25	419.12	479.00	538.87
12	9.53	71.26	142.51	213.77	285.02	356.28	427.53	498.79	570.05	641.30
13	10.32	83.63	167.25	250.88	334.51	418.13	501.76	585.39	669.01	752.64
14	11.11	96.99	193.97	290.96	387.95	484.93	581.92	678.91	775.90	872.88
15	11.91	111.34	222.67	334.01	445.35	556.69	668.02	779.36	890.70	1002.03
16	12.70	126.68	253.35	380.03	506.71	633.38	760.06	886.74	1013.41	1140.09
17	13.49	143.01	286.01	429.02	572.03	715.03	858.04	1001.04	1144.05	1287.06
18	14.29	160.33	320.65	480.98	641.30	801.63	961.95	1122.28	1282.60	1442.93
19	15.08	178.63	357.27	535.90	714.54	893.17	1071.81	1250.44	1429.07	1607.71
20	15.88	197.93	395.87	593.80	791.73	989.66	1187.60	1385.53	1583.46	1781.39
21	16.67	218.22	436.44	654.66	872.88	1091.10	1309.32	1527.54	1745.77	1963.99
22	17.46	239.50	479.00	718.50	957.99	1197.49	1436.99	1676.49	1915.99	2155.49

KM series

Matrix body PDC bit

Characteristics of KM series bits:

- PDC cutters of different features are selected and bit profile design is optimized to suit different drilling applications in different formations to satisfy different requirements when drilling soft to medium hard formations.
- Cutting structure is force balanced, non–symmetrical blade and wide gage are designed so that the bit drills more stable and resulting longer working life of the bit.
- Better wear resistance and higher strength of the bit are guaranteed in regard to material and structure by using matrix body material with self–owned intellectual property rights and combining FEA analysis technology.
- Hydraulic system of the bit is optimized using dynamic flow pattern simulation technology to enhance cleaning and cooling effects of the bit to effectively prevent bit from balling.
- CNC sintering process uses full automatic control. Inside and outside temperature of the bit is monitored during all procedures to fully **embody material** properties as well as ensure uniformity and stability of product **quality.**



KM series bit selection guide				
No.	Formation	IADC code	Lithology	Appropriate PDC bit type
1	Very soft	M123	Clay Mudstone Marlite	KM1944R、KM1952R
2	Soft	M223	Marlite Saline rock Shale	KM1952R、KM1952GR、KM1952AR、KM1952AGR、KM1652AR、KM1652R、KM1652AGR
3	Medium soft	M323 M324	Shale Sandstone Chalk	KM1652DR、KM1662、KM1662GR、KM1953DGR
4	Medium	M423 M433	Sandstone Limestone Shale	KM1665GR、KM1665ADR、KM1362、KM1365D、KM1375D

KS series

Steel body PDC bit for fast drilling applications

Characteristics of KS series bits:

- PDC cutters of different features are selected and bit profile design is optimized to suit different drilling applications in different formations to satisfy different requirements when drilling soft to medium hard formations without sulfureted hydrogen well section.
- Cutting structure is force balanced, non–symmetrical blade and the deep junk slots are designed to dramatically improve ROP of the bit.
- Matrix material of the bit adopts high quality steel and wear–resistance material with high performance is built–up welded on the surface of blades to prevent matrix material from eroding.
- Hydraulic system of the bit is optimized using dynamic flow pattern simulation technology to enhance cleaning and cooling effects of the bit to effectively prevent bit from balling.
- Machining precision and retention of cutters are ensured by using milling center with high performance five axes and high speed milling technology.



KS series bit selection guide				
No.	Formation	IADC code	Lithology	Appropriate PDC bit type
1	Very soft	S123	Clay Mudstone Marlite	KS1944S、KS1952
2	Soft	S223 S233	Marlite Saline rock Shale	KS1942D、KS1952GS、KS1952AGS、KS1952A、KS1652、KS1362GR
3	Medium soft	S323 S324 S334	Shale Sandstone Chalk	KS1952GRS、KS1952AGRS、KS1963AGS、KS1652S、KS1653S、KS1363AGRS、KS1362GR、KS1652DGS

KMD/KSD Series

Matrix / steel body PDC bits suitable for directional drilling

Characteristics of KMD/KSD series bits:

- Shallow cone and short gage design make the bit having better steerability to satisfy any demand of directional drilling applications.
- Optimized profile design and denser cutter layout at shoulder area can guarantee higher side cutting ability of the bit.
- Inclined gage design to increase the bit's stability and gage protection in directional drilling applications.
- Enhanced gage design to improve the bit's ability of gage protection.
- Optimized hydraulic design for increased cooling and cleaning effects of the bit in horizontal and directional sections and therefore, to prevent bit balling and improve ROP to the bit.



KMD/KSD series bits selection guide

No.	Formation	IADC code	Lithology	Suitable PDC bit type
1	Very soft formation	M(S)123	clay mud stone marlite	KM(S)D1944GR
2	Soft formation	M(S)223 M(S)224	marlite salt rock shale	KM(S)D1952GR、KM(S)D1953GR、KM(S)D1652GR
3	Medium soft formation	M(S)323 M(S)324	shale sandstone chalk	KM(S)D1963GR、KM(S)D1653GR、KM(S)D1662GR
4	Medium formation	M(S)424 M(S)433	sandstone limestone shale	KM(S)D1663GR、KM(S)D1365GR、KM(S)D1375GR

KMH Series

High end matrix body PDC bit suitable for medium and medium hard formations

Characteristics of KMH series bit:

- Specific to characteristics of hard formation and interbeded formation, bit profile is optimized and cutting depth of the bit is controlled to satisfy requirements of drilling medium to medium hard formations.
- Overall performance of PDC cutters is improved by using high performance PDC cutters of better wear resistance, better impact strength and better thermal stability.
- Unique cutter layout and specific force balance analysis plus other related technologies, etc. improved the bit's working life and premature ring type wear of the bit is prevented.
- Optimized hydraulic design can improve the bit's cooling effect and therefore, prevent PDC cutter failure caused by high temperature.
- Bit diameter shrinkage is effectively prevented by enhanced gage protection design.



KMH/KSH bit selection guide

No.	Formation	IADC code	Lithology	Suitable PDC bit type
1	Medium hard formation	M423 M424 M433	Shale sandstone limestone anhydrite dolomite	KMH1363AR、KMH1363ADR、KMH1385、KMH1662ADR、KMH1653ADR、KMH1673ADR、KMH1375AR、KMH1063、KMH1073、KMH1083、

KMC Series

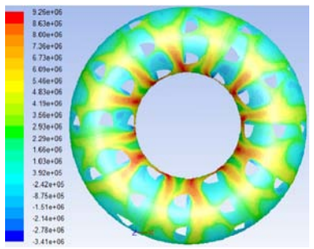
High performance PDC core bits

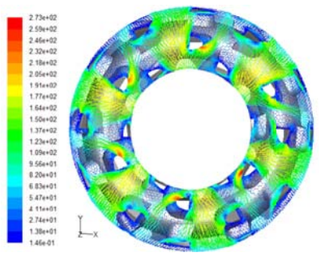




Characteristics of KMC series bit:

- Arc type crown design and blade type cutter layout result in high ROP, high core recovery rate and long working life of bit, etc.
- Use both PDC cutters and diamonds for gage protection for extended bit life.
- Dynamic flow simulation technology is employed to optimize hydraulic design of the bit and enhance the bit's cleaning and cooling abilities.
- Inner and outer diamond gage protection. The water course is located at inner gage protection and consequently, cutting elements can receive sufficient cooling and cleaning.
- Force–balance technology is used to improve stability of the bit and prevent the bit from balling up.





Drill bit application instructions (Appendix)

1 Bit selection

1. Please reading lithology description and bit records of adjacent wells carefully, and analyzing formation characteristics.
2. Selecting appropriate PDC type in accordance with lithology.

2 Preparation before drilling

1. Inspect previous bit for body damage, lost cutters or inserts etc. Make sure there are no any junk on bottom hole, and clean the bottom hole if necessary.
2. Bit must be handled with care in order not to damage cutters and hard substances.
3. Check if there is any damage on bit cutters and if there is any foreign matter inside the bit.
4. Check if installing nozzle is meet requirements, and replace nozzles if necessary.

3 Marking up the bit

1. Clean bit threads and apply grease on threads.
2. Fit the breaker to the bit, lower the drill string onto the pin and engage the threads.
3. Locate the bit and breaker in the rotary bushing, and make–up the bit to the recommended torque.

4 Tripping in

1. Remove the breaker and carefully lower the bit through the wellhead device in order not to damage it.
2. Shrinkage, shoulder, dogleg and key seat of borehole should be cautious when bit through blank hole.
3. Start pump and cycle drilling fluid to wash bottom hole when drill to a point about 30 meters to bottom of the hole, and rotate drill string at the low speed not more than 60rpm.
4. Approach the bottom cautiously by observing the weight and rotary torque indicators. Tag bottom hole gently and pick up off bottom approximately half meter. Circulate for 5 to 10 minutes with full flow.

5 Reaming

1. Reaming long sections of undergauge hole is not recommended.
2. If reaming operation is necessary, it is strongly recommended that the reaming operation should be done with maximum flow rate circulation, specific weight on bit not exceed 90N/mm (diameter), rotary speed not exceed 60 rpm where stuck was encountered when tripping in.

6 Bit break–in

1. Overusing display instruments when bit approach bottomhole. If the WOB and torque increase, that shows bit have arrived at bottomhole. Use not more than 90N/mm, weight–on=bit and 40 to 60rpm to establish the bottomhole pattern at least half meter.
2. Bit break–in is finished and should be adjusted RPM to obtain optimal drilling parameter combination.
3. Drilling parameters adjustment should be selected within the limits of the recommended parameters refer to recommended drilling parameters optimization method.

7 Normal drilling

1. Drilling situations should be monitored and analyzed during normal drilling, so that we can judge complex condition and take corresponding measures.
2. See the table of complex circumstance in this manual for any conditions and treatment action.

Optimal test method for drilling parameters:

1. Drill for 5 minutes with initially selected proper WOB and moderate RPM（60～100r/min）and record the ROP (as shown in the table below).
2. Moderately increase WOB and keep the same RPM and drill under this WOB for 5 minutes and again record the ROP (as shown in the table below).
   Repeat above steps
3. Decrease WOB by the same extent and repeat step 2.
4. Find the WOB in the two groups of test that can yield highest ROP.
5. Properly change RPM under optimal WOB and record the ROP (as shown in the table below).
6. Select the RPM at the highest ROP.
7. Set the drilling parameter at the best combination: WOB: 60KN　RPM：120r/min

Times	RPM：100r/min		WOB：60KN	
	WOB (KN)	Drilling hour (Min/m)	RPM (r/min)	Drilling hour (Min/m)
1	80	8	100	7
2	100	9	120	5.5
3	60	7	80	8
Select	60	7	120	5.5

Comparison of downhole situation and related measures

Item no.	Surface behavior of downhole problem	Possible cause	Corrective measure
1	Torque increase	Formation becomes harder Not optimum WOB & RPM Gage wear Well inclination increase Filter cake increase Drill stem washout	**Corrective actions for bit balling are:** 1. Pick up off approximately half meter, and circulate for 10 to 15 minutes with full flow; 2. The bit was swiveled by using different means according to drill rig. Waste matters adhered on the surface of a bit threw off by using centrifugation. **Corrective actions for bit bouncing are:** 1. Drilling parameters can be changed to stop the bit bouncing caused by formations. If the problem is not resolved and ROP still decreased after drilling parameters are changed, trip out can be considered; 2. Following measures can be taken to stop the bit bouncing caused by fallen matters, broken tooth or lost tooth, etc.: (a) The bit is put up to 0.5 meter from bottomhole, the high–duty mud circulated and the bit ran about 5 minutes under low RPM (40~60 r/min); (b) The high–duty mud circulated continuously and the bit with low RPM is slow put down the bottomhole; (c) Above steps are repeated after the bit is put up again. Then the bit drilled 0.5 meter under low RPM (40~60 r/min) and low WOB (5~10KN), so that fallen matters are crushed to sidewall; (d) The bit can drill continuously after the bit bouncing is resolved. Please consider trip out and fishing. **Corrective actions when drill to hard stringers, hard abrasive or hard muddy sandstone formations:** 1. If it is forecasted that the stringer is not thick, then lower RPM and drill through the stringer in order to extend the bit's service life. 2. If it is forecasted that the stringer is thick, then it is better to reselect the best suitable drilling parameters after the bottom hole pattern is formed in the stringer or hard abrasive formation.
2	Torque decrease	Formation becomes softer Not optimum WOB & RPM Well inclination decrease Filter cake decrease Bit balling	
3	Standpipe pressure increase	Flow rate increase Well plugging Bit wear or cored Mud density or viscosity increase Bit balling	
4	Standpipe pressure decrease	Drill stem washout Flow rate decrease Mud density or viscosity decrease Air fill into mud Gas kick Mud lost in broken formation	
5	ROP decrease	Formation becomes harder Mud density increase or performance dete–rioration Bit wear Not optimum WOB & RPM Cleaning effect decrease Bit balling Drilling tool washout	
6	ROP is instability	Laminar formation Soft and hard interbed Broken formation Bit balling	
7	Bit bouncing	The bit can be resulted in an uneven oscillation due to large friction torque during drilling in plastic formation, cracked formation and broken formation and therefore, bit bouncing can occur. In addition, any lost subject in the hole, including bit's cutting elements broken or lost in the hole, can also lead to bit bouncing.	

Note: Complicated down hole events should be analyzed on the basis of actual down hole situation and then take most proper corrective actions.

IADC dull bit classification

Cutting structure				Bearing seal	Diameter	Note	
Inner row cutter	Heel row cutter	Dull feature	Location			Other dull characteristics	Reason for tripping out
I	O	D	L	B	G (mm)	O	R

0——Cutter structure is not worn
……
8——No usable cutting structure

BC——Cone broken
BF——Cutter fitting failure
BT——Cutter broken
BU——Bit balling
CC——Cone cracked
CD——Cone stuck
CI——Cone interference
CR——Bit cored out
CT——Cutter chipped
ER——Cutter base washout
FC——Cutter tip worn flat
HC——Heat check
JD——Damage by lost subject
LC——Lost cone
LN——Lost nozzle
LT——Lost cutting element
OC——Off center wear
PB——Bit diameter shrinkage
PN——Blocked nozzle
RG——Gage surface worn
RO——Ring out of bit
SD——Shirttail damage
SS——Self-sharpening wear
TR——Track wear
WO——Bit wash out
WT——Cutter wear
LM——Broken blade
DL——PDC delamination
NO——No main and other wear characteristics
NR——Can not be rerun
RR——Can be rerun
Indicate roller cone bit wear characteristics
Indicate PDC bit wear characteristics

Roller cone bit
1——No.1 cone
2——No.2 cone
3——No. 3 cone
N——Top row cutter
M——Mid row cutter
H——Heel row cutter
…
A——All

PDC bit
1——No.1 blade
…
C——Inner cone
N——Nose
T——Outer cone
S——Shoulder
G——Gage protection
…
A——All

Non-sealed bearing
0——New bearing
……
8——Bearing had been used
Sealed bearing
E——Bearing is effective
F——Bearing is not effective
N——No evaluation can be given
X——Fixed cutter bit

I—— Bit diameter not wear
1——Worn by 1/16″
2——Worn by 1/8″
3——Worn by 3/16″
4——Worn by 1/8″

BHA——Change bottom hole assembly
CM——Drilling fluid disposal
CP——Reach coring depth
DP——Drill cement plug
DMF——Down hole motor failure
DTF——Down hole tool failure
DSF——Drill string failure
DST——Drill stem test
HP——Hole problem
HR——Specified working life of bit is reached
FM——Formation change
LIH——Down hole fish
LOG——Logging
PP——Abnormal pump pressure
PR——Low ROP
RIG——Drilling rig repair
TD——Drill to TD/casing depth
TQ——Torque change
TW—Torsional damage to drilling tool
WC—Abnormal climate
Wo—Drill string washout

Roller cone bit illustrations

I	O	D	L	B	G	O	R
2	8	WT	H	E	I	ER	PR

Inner row cutter worn by 1/4 / Heel row cutter completely worn / Cutter wear is main dull feature and the location is in heel row / Seal is effective / Bit diameter not wear / Cone shell wash out / Tripped out because of low ROP

PDC bit illustrations

I	O	D	L	B	G	O	R
1	1	WT	A	X	I	NO	TD

Inner row cutter worn by 1/8 / Outer row cutter worn by 1/8 / Cutter wear is main dull feature and the location is all / Bit diameter not wear / No other dull characteristics / Pulled out after drilling to designed depth