

# 6090 FS

Hydraulic Shovel



## Engine

Engine Model	2 × Cummins QSK60	
Gross Power – SAE J1995	3360 kW	4,500 hp
Net Power – SAE J1349	3360 kW	4,500 hp

## Bucket

Bucket Capacity – Front Shovel (heaped 2:1)	52.0 m <sup>3</sup>	68.0 yd <sup>3</sup>
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## Operating Specifications

Bucket Payload	93.6 tonnes	103 tons
Operating Weight – Front Shovel	1000 tonnes	1,102 tons

## 6090 FS Features

*Substantially larger than any other available hydraulic mining shovel, the 6090 FS is capable of selective digging in a variety of applications and demanding climates. It offers a versatile alternative to electric rope shovels.*

*Proving its long-term productivity and reliability, the 6090 FS fleet currently averages more than 33,000 operating hours per unit – with one machine already beyond the 100,000 hour benchmark. With its rated payload of more than 90 tonnes (100 tons), the 6090 FS is the only hydraulic mining shovel capable of loading 360 tonne (400 ton) ultra class trucks such as the Cat® 797 in just four passes.*

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# Every Day Matters, Every Load Counts



**We understand the challenges you face, the importance of reliability, and the relationship between uptime and productivity. That's why we continually strive to produce the safest, most reliable and productive hydraulic mining shovels possible. Offering the widest payload range of any manufacturer in the industry, the ability to optimally pair with our popular line of mining trucks, and the support of our world-class Cat dealer network, we are uniquely positioned to partner with you to help achieve your productivity targets. We understand what matters to you. Our hydraulic mining shovels are built with you in mind. Because in mining, every day matters and every load counts.**



# Drive System

Balanced Combination of Power and Efficiency

## Reliable Diesel Engines

Two 60 L (3,700 in<sup>3</sup>) diesel engines deliver reliable power and torque, making the 6090 FS both agile and productive. Developed for mining, these engines deliver high uptime in demanding applications. Combining their low fuel consumption with the sophisticated Cat hydraulic system, the outstanding fuel efficiency of the 6090 FS directly contributes to lowering the cost per tonne or cubic meter moved.



# Twin-engine Concept

## Stay Up and Running More Consistently

### Keep Producing and Ensure the Safety of Your Operators, Even During Single Engine Loss

You will realize enhanced safety, greater uptime, more productivity, and better serviceability as a result of our twin engine concept.

- **Enhanced Safety**

The ability to move your shovel to a safe area for repair, away from highwalls, blast zones, or other safety hazards, is still possible with the use of a single engine.

- **Greater Uptime and More Productivity**

65% of full production can still be achieved with the use of a single engine. This is due to the shovel's continued ability to exert maximum digging forces, to lower the front attachment without requiring engine power (i.e., pressure-free), and to recuperate energy via its closed-loop swing circuit.

- **Better Serviceability**

Troubleshooting is greatly simplified and expedited with the ability to compare one engine versus the other.

# TriPower System

Superior Digging Capability and Bucket Fill Factors





## **Dig More Effectively with Our Unique TriPower Front Shovel Design**

You will experience safer, easier and faster front shovel operation with TriPower, a system proven on over a thousand Cat hydraulic mining shovels worldwide. Generating superior mechanical leverage and control, our FS configured hydraulic mining shovels utilize a unique boom design that employs rotatable triangular rockers. This design facilitates quicker cycle times, increased effective lifting force, constant boom momentum, automatic constant bucket angle, and automatic roll-back limiter.

- **Quicker Cycle Times**

- Faster lifting speeds are achieved, because the design enables the use of smaller-diameter boom cylinders.

- **Increased Effective Lifting Force**

- Design transfers digging forces into the superstructure, creating supporting boom momentum in addition to momentum that is generated hydraulically.

- **Constant Boom Momentum**

- Allows smaller boom cylinders for higher lifting speed.
- Keeps lifting speed constant.
- Enables the shovel to lift a single load along the entire digging distance.
- No retracting of stick cylinders is required, ensuring that all hydraulic pumps are supplying the boom-up function.

- **Automatic Constant Bucket Angle**

- Material spillage is avoided during boom lifting, because the filled bucket automatically maintains a constant bucket angle.
- On conventional kinematics the operator has to control manually the bucket position during lifting which cut in half the available oil flow for the boom cylinders.

- **Automatic Roll-Back Limiter**

- Preventing material spillage back on to the operator's cab and machine superstructure, our system ensures that the bucket is always in a safe position, without operator control/manipulation, when it is at maximum height.
- The boom cylinder continues to receive maximum oil flow, because the operator does not need to activate the bucket cylinder.



# Hydraulic System

## Easy Serviceability and Greater Productivity

### **Straightforward, Safe System Maintenance**

Ensuring neat organization for safe operation, easy inspection, and fast service, and reducing the number of hoses needed, the main valve block is located on top of the boom.

### **Faster Cycle Times**

Faster cycle times are realized, because float valves are used to lower the boom instead of engaging pumps. This facilitates faster boom movements and allows other operating functions to occur simultaneously, such as bucket curl and stick in/out.

### **Greater Control**

Your operators will experience greater control with our five circuit hydraulics, allowing for two cylinder motions, two travel motions, and swing to be controlled simultaneously.



## **Protect and Extend the Life of Your Hydraulic Components and Seals**

Providing a more efficient means of cooling, particularly in demanding applications, our unique independent oil cooling system will extend the life of your hydraulic mining shovel's components.

### **More Efficient Oil Cooling**

Our system is independent of return oil, achieving efficiency through the utilization of dedicated pumps that provide cooling capacity as needed, whether the engine is idling or under load. That means optimum oil temperature is being maintained, even while your operator waits for the next truck to load. Competitive hydraulic mining shovels only provide cooling when the machine is working and the engine is under load.

Additional efficiency is achieved via our thermostatically controlled radiator fan speed. The fans do not run until oil temperature exceeds a temperature of 50° C (122° F), saving energy.

### **Optimal Oil Temperature Maintained**

The highly efficient oil cooling system ensures that the oil temperature is only 25° C to 30° C (45° F to 54° F) higher than the ambient temperature. Thus the hydraulic oil working temperature remains within the optimal operating viscosity range of 50° C to 70° C (122° F to 158° F).



## **Experience Improved Machine Control and Component Life, while Reducing Fuel Consumption and Noise Emission, with Our Intelligent Pump Managing System**

Delivering optimal performance, our pump managing system continuously evaluates actual engine and hydraulic operating values against set values, and adjusts pump output accordingly. This results in efficient use of the engine for greater productivity.

Pump managing system advantages include:

- Best possible utilization of engine output and engine overload avoidance via electronic load limit regulation
- Less energy consumption and less thermal load on hydraulic oil with zero oil flow regulation for main pumps
- Less fuel consumption and lower noise emission via automatic RPM reduction
- Reduced component wear and lower noise emission with automatic oil flow reduction for closing/opening of bucket clam
- Protection of components with automatic oil flow reduction if hydraulic and/or engine coolant temperature exceed set maximum
- Improved operator control response via on-demand pump flow

## **Pump Managing System**

Enhanced Efficiency, Component Life,  
and Control Response





## **Closed-loop Swing Circuit**

More Efficient Energy Use and  
Faster Boom Lift Motion During Swing

### **Load More Material, at Lower Cost, with the Energy Recovery Capability of Our Closed-Loop Swing System**

Delivering faster cycle times and improved energy efficiency, while also generating less heat, our closed-loop swing circuit provides distinct advantages over competitive machines utilizing open-circuit swing systems.

### **Greater Efficiency Via Energy Recovery**

Kinetic energy captured during the swing motion is fed back into the system during deceleration, providing more power to drive the main and auxiliary pumps. Energy is saved during deceleration, because braking occurs via counteracting controls, as opposed to throttles used in open circuit swing systems.

### **Energy Savings During Acceleration**

Energy is saved during acceleration via torque control, providing a pressure balance valve that controls the swing pump against pressure in the closed-loop swing circuit, ensuring that only the minimum necessary oil flow is utilized at any given time.

### **Faster Cycle Times**

Faster boom lift motion during swing is achieved with our closed-loop swing system, increasing overall productivity.

# Operator's Cab

Ensuring the Safety and Comfort of Your Operators



## Get Peak Operator Performance with Our Safe and Comfortable Operator's Cab

We understand that the most important factor in your hydraulic mining shovel's effectiveness is the performance of its operator. To help make their workday as productive as possible, we've incorporated safety and comfort features into the 6090 FS operator's cab.

### Protection for Your Operator; Every Day, Every Shift

- Safety glass is used for all cab windows, and armored glass for the windshield.
- Operator's seat is equipped with integrated safety switch that automatically neutralizes the hydraulic controls when the operator leaves the seat.
- The height of the cab module ensures an eye level of approximately 8.8 m (28 ft 10 in), providing excellent visibility of the digging and loading areas.
- Cab meets Falling Object Protection System (FOPS) as per ISO 10262:1998.

### Supporting Peak Operator Performance with Comfort Features

- Pneumatically cushioned, multi-adjustable operator's seat.
- Large, transfective color touch-screen display provides vital machine monitoring and diagnostic data for convenient troubleshooting and service assistance.
- Enhanced control response and servo adjustment capability via electro-hydraulic servo control.



# Electronic Control System

## Operate with Confidence

### Enhanced Control Response and Optimized Hydraulic Engine Load Management

Help your team meet productivity and performance standards with our intuitive, informative on-board electronics.

### Electro-Hydraulic Servo Control

#### • Enhanced Control Response

The system relays actuating signals from the joysticks, delivering fast and precise machine reactions that reduce operator fatigue.

#### • Increased Uptime

Uptime is increased as a result of simplified troubleshooting and advanced diagnostic capabilities.

#### • Greater Operator Comfort

Easier setting of servo control characteristics allow operators to adjust to their preference.

#### • Clean and Quiet Cab Environment

No hydraulic lines are present in the cab or the cab module, ensuring a clean arrangement with less noise emission.

### Control and Monitoring Platform (CAMP)

#### • Reduced Control System Inventory

Streamlined system requires only one type of controller for each function (i.e., left side drive train, right side drive train, servo, and auxiliary) reducing the number of required controllers in the system and associated replacement stock.

#### • Less Fuel Consumption

Engine works in optimal range of performance during the entire digging cycle, reducing fuel burn.

#### • Increased Component Life

Reduced hydraulic pulsation lessens stress imposed on the engine and hydraulic components.

#### • Enhanced Operator Comfort

Less vibration and more even machine movement via reduced pressure peaks.

#### • On-screen Documentation

The Parts book, Technical handbook, and Operating handbook, as well as hydraulic and electric schematics, are available in electronic format.

# Cat MineStar System and Technology Solutions

Evolving Your Mine for Greater Safety and Productivity



## Helping You Enhance Safety and Productivity Through Technology

Aimed at enhancing the productivity and profitability of your hydraulic mining shovel, we currently offer a combination of Cat MineStar System offerings and Cat hydraulic mining shovel technology solutions.

## Cat MineStar System

Helping you achieve your goals for enhanced mine site safety, improved efficiency, reduced operating costs, and greater profitability, the Cat MineStar System provides the most comprehensive suite of mining technology products in the industry. It consists of a number of configurable capability sets – Fleet, Terrain, Detect, Health, and Command – that allow you to scale the system to your mine site needs. Cat MineStar System helps you manage everything from material tracking to sophisticated real-time fleet management, machine health systems, autonomous equipment, and more.

The Cat 6090 FS is able to utilize the following Cat MineStar System capability sets:

- **Fleet**

Fleet provides real-time machine tracking, assignment and productivity management, providing a comprehensive overview of all your asset operations from anywhere in the world.

- **Terrain**

Terrain enables high-precision management of drilling, dragline, grading and loading operations through the use of guidance technology. It increases machine productivity and provides you real-time feedback for improved efficiency.

- **Detect**

Detect helps increase operator awareness, enhancing safety at your operation. It includes a range of capabilities designed to assist the operator, including blind spot and proximity detection of fixed and mobile equipment.

- **Health**

Health delivers critical event-based machine condition and operating data for your entire fleet. It includes comprehensive equipment health and asset monitoring capabilities, with a wide range of diagnostic, analytic and reporting tools.

## Hydraulic Mining Shovel Technology Solutions

- **Monitoring and Diagnostic System**

Enhancing diagnostic capabilities and providing detailed troubleshooting functions, our Board Control System uses sensors throughout the machine to monitor operating data, record faults, and notify the operator audibly and visually. This promotes the earliest possible detection of faults and allows for timely maintenance planning and assistance for speedy repair.





# Loading/Hauling Efficiency

Move More Material with Optimal Pass Match Pairings

**Achieve Targeted Loading/Hauling Production with Perfectly Paired Cat Hydraulic Mining Shovels and Mining Trucks**

For full truck payloads with minimum loading time, an efficient loading/hauling system begins with an optimized equipment match. Cat hydraulic mining shovels are matched with Cat mining trucks to maximize volume of material moved at the lowest operating cost per ton.

**6090 FS Pass Match with Cat Mining Trucks**

	<b>793F/793D</b>	<b>794 AC</b>	<b>795F AC</b>	<b>797F</b>
	226 tonne (250 ton)	290 tonne (320 ton)	313 tonne (345 ton)	363 tonne (400 ton)
<b>6090 FS</b>	3	3	3-4	4



## **Rugged Front Shovel Attachment Designed and Fabricated to Withstand Your Extreme Mining Conditions**

To extend service life and ensure that your shovel keeps producing, our front shovel attachment structures are designed for durability and dependability. Extended performance in the harsh mining conditions you face daily is accomplished through selection of high-strength steels and rugged castings, joined and thermally stress-relieved, to help you achieve your productivity targets.

### **Front Shovel Attachment Structures Include:**

- Heavy castings at all pivot points
- Better flow of forces and less welding seams, as top chords are made of one bend plate
- Entire boom and stick are stress relieved after welding
- Welding procedures allow for internal welding (double prep weld)

# **Front Shovel Attachment Structures**

## **Bolstering Your Investment with Robust and Durable Structures**





# Swing System

Longer Component Life for Better  
Swing System Reliability

### More Reliable Swing Component Life

Extending component life and ultimately improving machine uptime, our swing system includes a triple-race swing roller bearing with internal gearing connected to an automatic lubrication system.

For added reliability, all lube lines are located inside the roller bearing for maximum protection.

### Service Friendly

Easier maintenance is afforded by the free accessibility of swing gears and rotary distributor.

### **Less Wear and Tear on Crawler Components**

Extending track life and improving overall machine reliability, our undercarriages are engineered with extensive use of finite element analysis, steel structures are optimized, travel motors are well-protected by strong cover plates and hinged door covers, and a unique robust track chain incorporates a combined pad/link design. Further extending track life, a state-of-the-art track tensioning system with membrane accumulator automatically adapts the tensioning of the tracks, depending upon operating conditions.



# Safety

Designed with Your Safety as Our Top Priority



Sharing your commitment to safety, and driven by our commitment to Zero Harm, we work tirelessly to design the safest machines possible to protect your most important asset; your employees. That is why we updated the design of the 6090 FS in accordance with the principles of MDG 41 and 15, and offer this standard, not as an option or upgrade.

Some examples of the safety-enhancing features of the Cat 6090 FS hydraulic mining shovel includes the following:

## Machine Access

- All stairways have 45° angle for safe and comfortable access and movement about the machine.
- Slide down emergency egress ladder directly adjacent to the operator's cab.
- Hydraulically operated boarding ladder with emergency lowering via nitrogen accumulator ensures that ladder remains operational even when engines shut off.
- Machine swing and propel capability is switched-off when ladder is in down position.

## Service and Maintenance

- Improved routing and clamping of hydraulic hoses.
- Hydraulic hoses and electric wiring are separated from each other for fire prevention.
- All service areas are accessible via anti-slip walkways, and trip hazards eliminated.
- Hot surfaces covered near service and maintenance areas to prevent burns.

## Electrical System

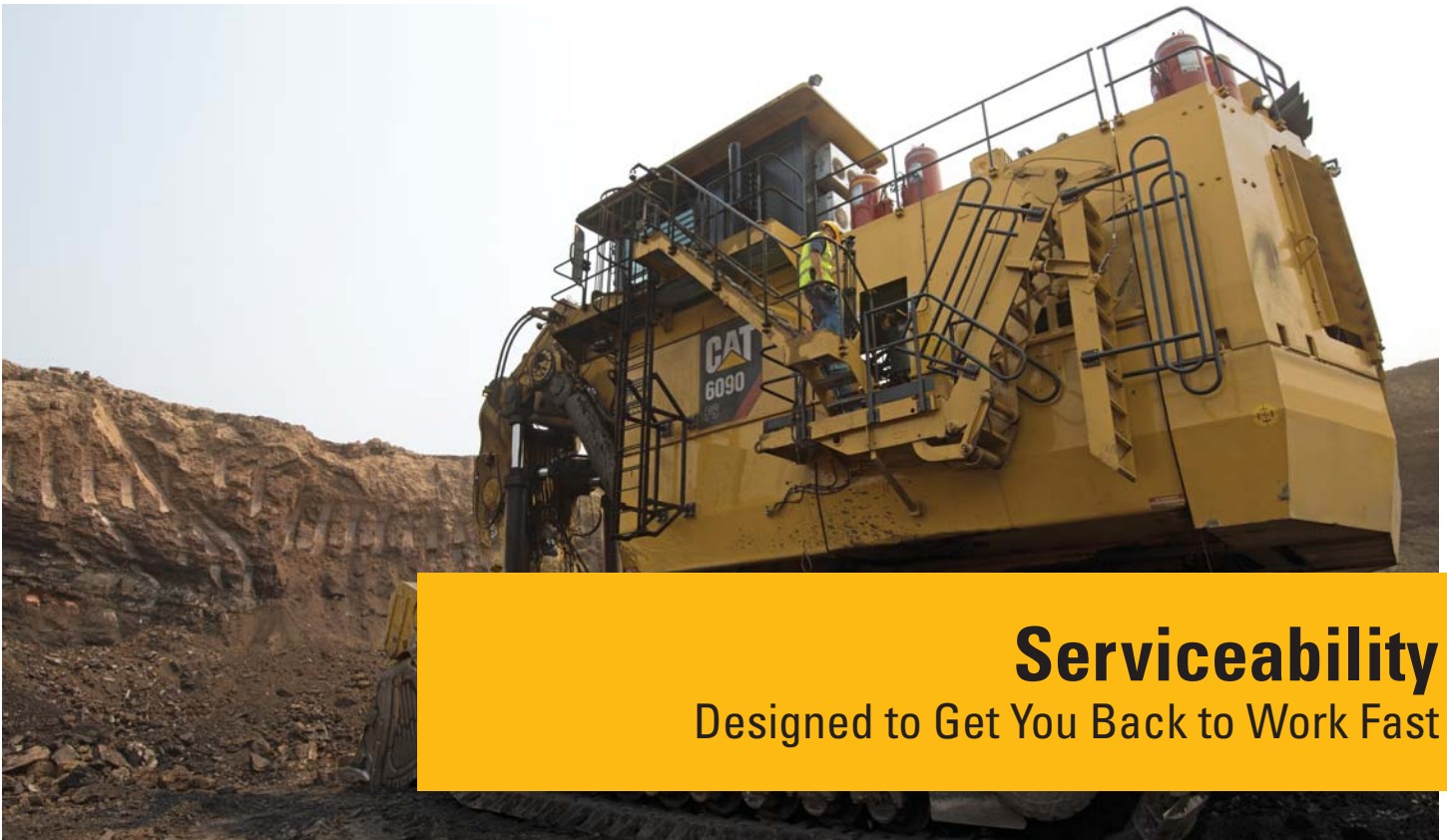
- Cabinet with battery isolation switch, mounted on top deck directly above the battery box, allows quick and easy shut-off of voltage on the entire shovel.
- Cabinet contains a starter isolator which allows on-board voltage, but prevents starting of engines.

## Emergency Shut-offs

- An easily accessible, standard shut-off switch located in the cab shuts down the electrical system in case of emergencies.
- Additional shut-off switches are located on the machine, in the machine house or accessible from the ground with pull ropes.

## Precise Bucket Control

- Minimizing the potential for material spill on to the attachment or cab, the TriPower automatic roll-back limiter prevents the bucket from being curled back too far.



# Serviceability

## Designed to Get You Back to Work Fast

Lowering your operating costs and maximizing your hydraulic mining shovel's uptime and productivity is of supreme importance to us. To that end, we've made vital components more accessible and designed simpler systems to make maintenance activities quicker and easier.

### **Open, Spacious Access to Components**

- Facilitating easier maintenance, exceptional accessibility is provided to systems like the swing motor, swing gearbox and rotary distributor in the well organized superstructure. The engine is accessible from three sides.
- Easily accessed by walkways on both sides, the boom-mounted main valve block, a feature unique to Cat hydraulic mining shovels, provides a clean layout and reduces the number of hoses leading from the superstructure to the attachment.

### **Simple Hydraulic System with Main Valve Block Positioned on Boom**

- Ensuring neat organization for safe operation, easy inspection and fast service, the design of our hydraulic system significantly reduces the total number of frequently moving hoses from the superstructure to the attachment.
- Longer hose life via improved routing in accordance with MDG design standards.

### **Easy Ground-level Fuel and Fluid Replenishment**

- Quick fuel and fluid replenishment is made easy with a retractable service station underneath the engine module, accessible at ground-level.

### **Improved Drive Train Troubleshooting**

- Twin-engine design facilitates troubleshooting of drive trains, as one engine can be compared to the other.



# Customer Support

## Stay Up and Running with Service and Support from Our Unmatched Global Network

### Commitment Makes the Difference

Cat dealers offer a wide range of solutions, services and products that help you lower costs, enhance productivity and manage your operation more efficiently. From the time you select a piece of Cat equipment until the day you trade or sell it, the support you get from your Cat dealer makes the difference.

### Dealer Capability

Cat dealers provide the level of support you need, on a global scale. Dealer expert technicians have the knowledge, experience, training and tooling necessary to handle your repair and maintenance needs, when and where you need them.

### Product Support

When Cat products reach the field, they are supported by a worldwide network of parts distribution facilities, dealer service centers and technical training facilities to keep your equipment up and running.

Cat customers rely on prompt, dependable parts availability through our global dealer network, ready to meet your needs 24/7.

### Service Support

Every piece of Cat equipment is designed and built to provide maximum productivity and operating economy throughout its working life. Cat dealers offer a wide range of service plans that will maximize uptime and return on your investment, including:

- Preventive Maintenance Programs
- Diagnostic Programs, such as Scheduled Oil Sampling and Technical Analysis
- Rebuild and Reman Option
- Customer Support Agreements

### Application Awareness

Operating and maintenance costs are influenced by many application and site-specific factors, such as: material density and fragmentation, payload, bench height, truck positioning, ground conditions, amount of traveling and maintenance. Your Cat dealer can provide you with an understanding of the effects application characteristics and operating techniques have on maintenance and operating costs.

### Operation

Your Cat dealer can arrange training programs to help operators improve productivity, decrease downtime, reduce operating costs and enhance safety.



## Sustainability

Higher Standards for a Better Tomorrow

Meeting the needs of today without compromising the needs of tomorrow is the goal for all Cat machinery. The commitment to helping you operate safely and sustainably is affirmed in the production of the 6090 FS hydraulic mining shovel.

### **Cat Hydraulic Mining Shovel Sustainability:**

- **Energy Recovery**

Emit less heat and improve energy efficiency via the energy recovery capability of the closed-loop swing circuit.

- **Rebuilds**

Decrease your energy use and material consumption with a machine that's designed to be rebuilt.

# 6090 FS Hydraulic Mining Shovel Specifications

## General Data

Operating weight		
Face Shovel	1000 tonnes	1,102 tons
Engine output		
SAE J1995	3360 kW	4,500 hp
Standard bucket capacity		
Face Shovel (heaped 2:1)	52.0 m <sup>3</sup>	68.0 yd <sup>3</sup>

## Features

- TriPower shovel attachment
- Independent oil-cooling system
- Spacious walk-through machine house
- Five-circuit hydraulic system
- On-board electronics system:  
Control and Monitoring Platform (CAMP)
- Board Control System (BCS)
- Torque control in closed-loop swing circuit
- Automatic central lubrication system
- LED working lights

## Operating Weight

Shovel		
Standard track pads	2000 mm	6 ft 7 in
Operating weight	1 000 000 kg	2,204,600 lb
Ground pressure	26.3 N/cm <sup>2</sup>	38.3 psi

- Other track pads available on request

## Diesel Engines

Make and model	2 × QSK60 two-stage	
Total rated net power ISO 3046/1	3360 kW	4,500 hp
	1,800 min <sup>-1</sup>	1,800 min <sup>-1</sup>
Total rated net power SAE J1349	3360 kW	4,500 hp
	1,800 min <sup>-1</sup>	1,800 min <sup>-1</sup>
Total rated net power SAE J1995	3360 kW	4,500 hp
	1,800 min <sup>-1</sup>	1,800 min <sup>-1</sup>
Number of cylinders (each engine)	16	
Bore	159 mm	6.25 in
Stroke	190 mm	7.48 in
Displacement	60.2 L	3,674 in <sup>3</sup>
Aspiration	Two-stage turbocharged; aftercooled and intercooled	
Maximum altitude without deration – above sea level	4880 m	16,000 ft
Fuel tank capacity	16 400 L	4,330 gal

- Emits equivalent to U.S. EPA Tier 2
- Hydraulically driven radiator fan with electronically controlled fan speed
- Micro processed engine control
- Heavy-duty air filters with automatic dust evacuation
- Two-stage fuel filter includes water separator
- Additional high-capacity water separator
- Pre-lube starting system
- Eliminator with centrifuge for engine oil filtration
- Engine-oil-change interval of 1,000 hours

## Electrical System (diesel drive)

System voltage	24V
Batteries in series/parallel installation	6 × 210 Ah – 12V each 630 Ah – 24V in total
Alternators	2 × 175A each
Working spot lights	12 × high brightness LED lights

- Battery isolation relays
- Emergency stop switches accessible from ground level,  
in engine module and in operator's cab



# 6090 FS Hydraulic Mining Shovel Specifications

## Hydraulic System with Pump Managing System

Main pumps	8 × variable flow axial piston pumps	
Maximum oil flow, main pumps	8 × 936 L/min	8 × 247 gal/min
Maximum pressure, attachment	300 bar	4,350 psi
Maximum pressure, travel	360 bar	5,220 psi
Swing pumps	6 × reversible swash plate pumps	
Maximum oil flow, swing pumps	6 × 488 L/min	6 × 129 gal/min
Maximum pressure, swing pumps	350 bar	5,080 psi
Total volume of hydraulic oil – approximately	13 000 L	3,450 gal
Hydraulic tank capacity – approximately	10 000 L	2,640 gal

- Pump Managing System contains:
  - Electronic load limit control
  - Flow on demand from main pumps depending on joystick position
  - Automatic regulation of main pumps to zero flow without demand
  - Automatic RPM reduction of engine speed during working breaks
  - Reduced oil flow of main pumps at high hydraulic oil temperature or engine temperature
- Pressure cut-off for main pumps
- Cooling of pump transmission gear oil
- Filters:
  - Full-flow high-pressure filters (100 µm) for the main pumps, installed directly behind each pump
  - High pressure filters (100 µm) for the closed swing circuit
  - Full-flow filters (10 µm) for the complete return circuit
  - Full-flow filters (10 µm) for the cooling return circuit
  - Pressure filters (40 µm and 6 µm) for servo circuit
  - Transmission oil filters (40 µm)

## Hydraulic Oil Cooling

Oil flow of cooling pumps	4 × 975 L/min	4 × 258 gal/min
Diameter of fans	4 × 1524 mm 4 × 60 in	

- Cooling system is fully independent of all main circuits, i.e. controlled cooling capacity is available whenever engine is running
- Gear-type cooling pumps supplying high-volume, low-pressure oil to aluminum coolers
- Fan speed is thermostatically controlled
- Extremely high cooling efficiency to ensure optimum oil temperature

## Swing System

Swing drives	Six compact planetary transmissions with axial piston motors
Parking brakes	Wet multiple disc brake, spring-loaded/hydraulically released
Maximum swing speed	3.9 rpm
Swing ring	Triple race roller bearing with sealed internal gearing

- Closed-loop swing circuit with torque control
- Hydraulic braking of the swing motion by counteracting control
- All race ways of swing ring as well as grease bath for internal gearing supplied by automatic central lubrication system

## Retractable Service Station

Retractable service station installed underneath the engine module and easily accessible from ground

Equipped with:

- Quick couplings for:
  - Diesel fuel
  - Engine coolant – left/right
  - Pump transmission gear oil – left/right
  - Swing transmissions gear oil – each
  - Engine oil (oil pan) – left/right
  - Engine oil (additional tank – optional) – left/right
  - Hydraulic oil tank
  - Grease container
- Cat jump-start socket
- Indicator lights for fuel tanks left/right full and grease container full

# 6090 FS Hydraulic Mining Shovel Specifications

## Operator's Cab

Operator's eye level – approximately	8.8 m	28 ft 10 in
Internal dimensions of cab		
Length	2200 mm	7 ft 3 in
Width	1600 mm	5 ft 3 in
Height	2150 mm	7 ft 1 in
Internal dimensions of amenity cab		
Length	1600 mm	5 ft 3 in
Width	1600 mm	5 ft 3 in
Height	2150 mm	7 ft 1 in

- Under roof mounted heating, ventilating and air conditioning system
- Pneumatically cushioned and multi-adjustable comfort seat with lumbar support, seat heating, safety belt, head and armrests
- Switch in seat cushion to automatically neutralize the hydraulic controls when operator leaves the seat
- Joystick controls integrated in independently adjustable seat consoles
- Fold-away auxiliary seat with safety belt
- FOPS (rock guard; approved according to ISO 10262:1998) integrated into cab structure
- All-round safety glass, armored windshield and sliding side window
- Windshield with parallel intermittent wiper/washer
- Roller blinds at all windows
- External sun shields at side windows
- Board Control System (BCS III); electronic monitoring, data logging and diagnostic system for vital signs and service data of engines, hydraulic system and lubrication system, featuring:
  - Robust instrument panel including large (12 in) colored touch-screen for intuitive handling
  - On-screen PDF documentation (e.g. operating instructions, technical handbook, spare parts catalog, electric circuit diagram)
  - On-screen troubleshooting assistance
  - Graphic charts of logged data
  - Fault memory with storage of related conditions
  - USB, Lan (TCP/IP) and CAN BUS interfaces for data export
- Machine access via retractable access stairway, stairway angle approximately 45°, hydraulically operated
- Sliding emergency ladder (kick-down type) with ladder cage

## Undercarriage

Travel speed (2 stages)		
1st stage – maximum	1.4 km/h	0.9 mph
2nd stage – maximum	1.9 km/h	1.2 mph
Maximum tractive force	4338 kN	974,880 lbf
Gradeability of travel drives – maximum	44%	
Track pads (each side)	48	
Bottom rollers (each side)	7	
Support rollers (each side)	2 plus a skid plate in between	
Travel drives (each side)	1 planetary transmission with 2 two-stage axial piston motors	
Parking brake	Wet multiple disc brake, spring applied/hydraulically released	

- Cast double-grouser combined pad-links with bushings connected by hardened full floating pins
- All running surfaces of sprockets, idlers, rollers and pad links, as well as teeth contact areas of sprocket and pad links, are hardened
- Fully hydraulic, self-adjusting track tensioning system with piston accumulator
- Automatic hydraulic retarder valve to prevent over-speed on downhill travel
- Acoustic travel alarm
- Idlers, bottom rollers and support rollers are connected to the automatic lubrication system

# 6090 FS Hydraulic Mining Shovel Specifications

## Automatic Lubrication System

Capacity of grease container                      1000 L                      264 gal

- Dual-circuit system with hydraulically driven heavy-duty pump and electronic time relay control to adjust the pause/lube times
- Connected to the lubrication system are:
  - Raceways of the swing roller bearing
  - Pivot points of attachment, bucket and cylinders
  - Bottom rollers of undercarriage
- System failures displayed by Board Control System
- Grease filters (200 µm) between service station and container as well as directly behind grease pump

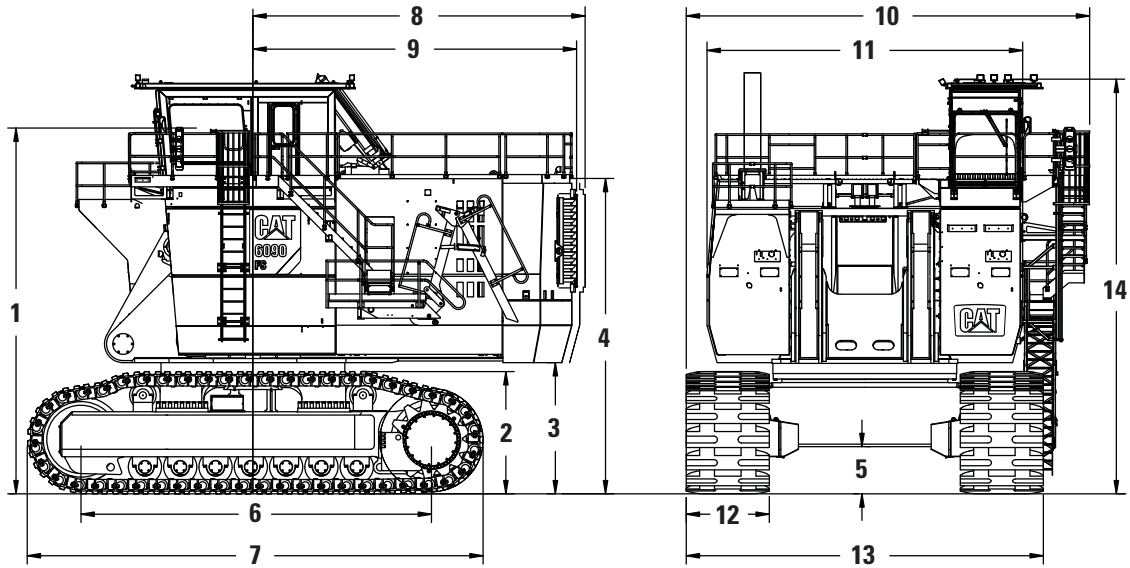
## Attachment

- Boom and stick are torsion-resistant, welded box design of high-tensile steel with massive steel castings at pivot areas
- Welding procedures allow for internal counter-welding (double prep weld) wherever possible
- Boom and stick are stress-relieved after welding
- Inspection hole in boom and stick
- Catwalks with rails at boom
- Pressure-free lowering of boom and stick by means of a float valve
- Shovel attachment with unique TriPower kinematics ensuring the following main features:
  - Horizontal automatic constant-angle bucket guidance
  - Vertical automatic constant-angle bucket guidance
  - Automatic roll-back limiter to prevent material spillage
  - Kinematic assistance to hydraulic forces
  - Constant boom momentum throughout the entire lift arc
  - Crowd force assistance
- All buckets are equipped with a wear package consisting of:
  - Special liner material covering main wear areas inside and outside of bucket
  - Lip shrouds between teeth
  - Wing shrouds on side walls
  - Heel shrouds at bottom edges
- Special wear packages for highly abrasive materials on request

# 6090 FS Hydraulic Mining Shovel Specifications

## Dimensions

All dimensions are approximate.

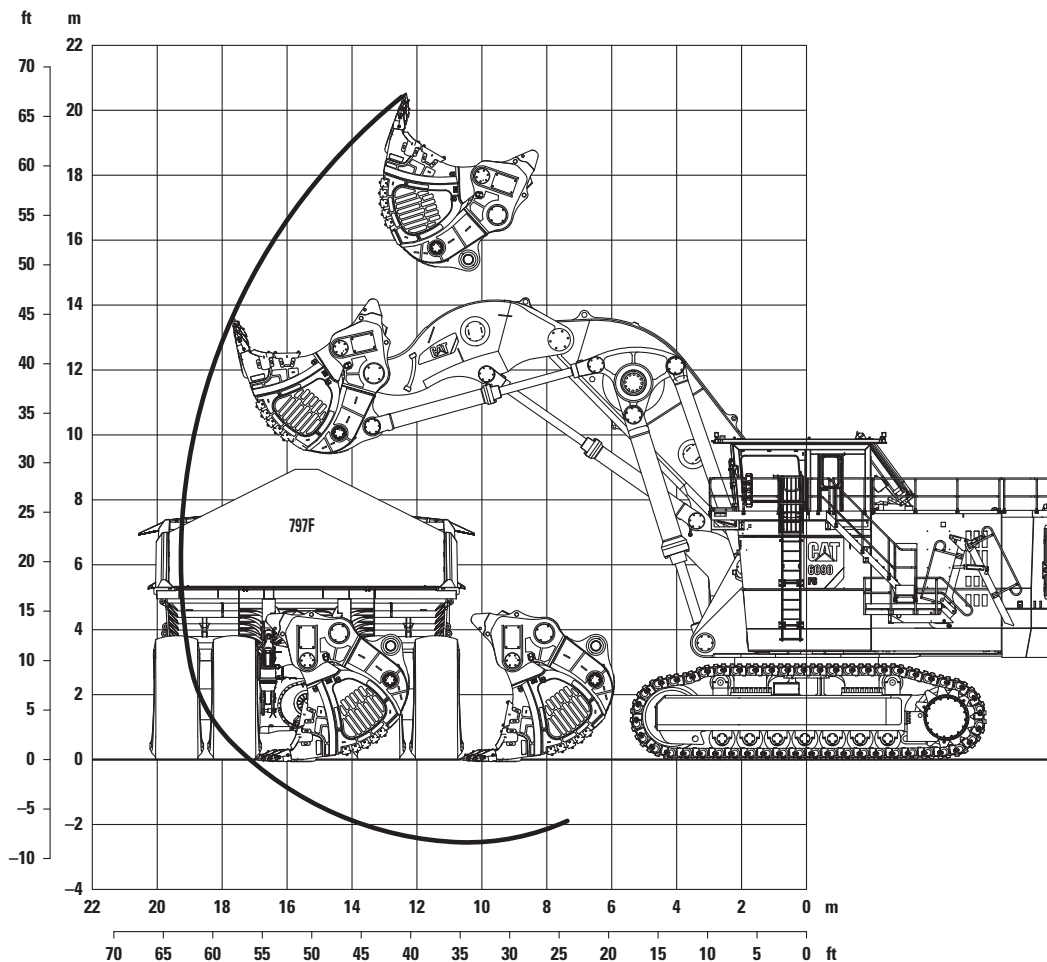


<b>1</b>	8800 mm	28 ft 10 in	<b>8</b>	8050 mm	26 ft 5 in
<b>2</b>	2945 mm	9 ft 8 in	<b>9</b>	7800 mm	25 ft 7 in
<b>3</b>	3150 mm	10 ft 4 in	<b>10</b>	9720 mm	31 ft 11 in
<b>4</b>	7470 mm	24 ft 6 in	<b>11</b>	7600 mm	24 ft 11 in
<b>5</b>	1135 mm	3 ft 9 in	<b>12</b>	2000 mm	6 ft 7 in
<b>6</b>	8420 mm	27 ft 7 in	<b>13</b>	8600 mm	28 ft 3 in
<b>7</b>	10 960 mm	35 ft 11 in	<b>14</b>	9990 mm	32 ft 9 in

# 6090 FS Hydraulic Mining Shovel Specifications

## Working Range – TriPower Face Shovel Attachment (FS)

All dimensions are approximate.



<b>Boom</b>	<b>9.5 m</b>	<b>31 ft 2 in</b>
<b>Stick</b>	<b>5.8 m</b>	<b>19 ft</b>
<b>Digging Forces (ISO)</b>		
Maximum crowd force	3138 kN	705,203 lbf
Maximum crowd force at ground level	3124 kN	702,057 lbf
Maximum breakout force	2502 kN	562,274 lbf

<b>Working Range</b>		
Maximum digging height	20.5 m	67 ft 3 in
Maximum digging reach	19.3 m	63 ft 4 in
Maximum digging depth	2.6 m	8 ft 6 in
Maximum dumping height	15.9 m	52 ft 2 in
Crowd distance on level	6.3 m	20 ft 8 in

### Face Shovels

Type	Iron Ore Shovel		Heavy Rock Shovel		Heavy Rock Shovel		Standard Rock Shovel	
Tooth system	Cat CL1 W1150		Cat CL1 W1150		Cat CL1 W1050		Cat CL1 W1050	
Capacity heaped 2:1 (ISO 7546)	37.0 m <sup>3</sup>	48.4 yd <sup>3</sup>	42.0 m <sup>3</sup>	54.9 yd <sup>3</sup>	47.0 m <sup>3</sup>	61.5 yd <sup>3</sup>	52.0 m <sup>3</sup>	68.0 yd <sup>3</sup>
Total width	5600 mm	18 ft 4 in	5600 mm	18 ft 4 in	6100 mm	20 ft 0 in	6100 mm	20 ft 0 in
Inner width	5100 mm	16 ft 9 in	5100 mm	16 ft 9 in	5600 mm	18 ft 4 in	5600 mm	18 ft 4 in
Opening width	2700 mm	8 ft 10 in	2700 mm	8 ft 10 in	2650 mm	8 ft 8 in	2650 mm	8 ft 8 in
Number of teeth	6		6		6		6	
Weight including wear package	76 400 kg	168,430 lb	78 800 kg	173,720 lb	85 600 kg	188,710 lb	87 400 kg	192,680 lb
Maximum material density (loose)	2.6 t/m <sup>3</sup>	4,380 lb/yd <sup>3</sup>	2.2 t/m <sup>3</sup>	3,710 lb/yd <sup>3</sup>	2.0 t/m <sup>3</sup>	3,370 lb/yd <sup>3</sup>	1.8 t/m <sup>3</sup>	3,030 lb/yd <sup>3</sup>

# 6090 FS Optional Equipment

## Optional Equipment

Optional equipment may vary. Consult your Cat dealer for details.

### GENERAL

- Finishing as per end user's corporate colors

### SUPERSTRUCTURE

- Hydraulic service crane on superstructure with auxiliary engine
- 2nd retractable boarding ladder on right-hand side of engine module
- Various cold-weather packages

### UNDERCARRIAGE

- Track pad width 1800 mm (5 ft 11 in)

Additional optional equipment available on request.



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