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A Client Profile

HUGHES TOOL COMPANY



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Black gold, the name given to crude oil by petroleum industry pioneers, has taken on prophetic overtones in the last few years. Those early drillers laid the foundation for an industry whose products fueled America's industrial growth and expansion, products that made practical mass production of the internal combustion engine and gave this nation a new mobility, itself reshaping the very core of our social structure.

Behind the drama of the wildcatter, the oil strike, the vast fortunes won and lost overnight, lies an invention of one man—Howard R. Hughes Sr. It was Hughes who, in 1909 at an oil well in Goose Creek, Texas, successfully tested his new rotary rock bit incorporating rolling cone cutters. His idea was so well conceived that—with

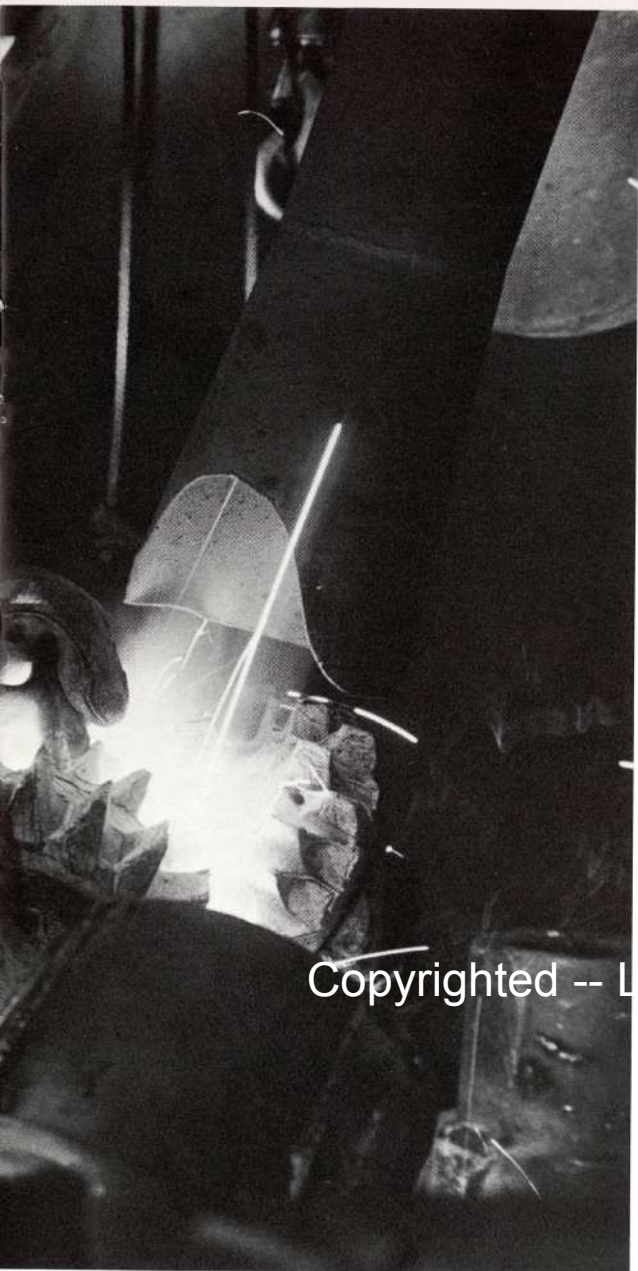
modifications and constant research and engineering improvements—it remains the basic design of some of the most advanced rock bits used today. The rolling cone cutter rock bit gave the petroleum industry the tool it needed to bore through thousands of feet of earth, sand and hard rock at higher speeds and lower costs.

After the successful test of his new rock bit, Hughes established a corporation in Houston and began manufacturing bits utilizing his revolutionary design. His son, Howard R. Hughes, Jr., became sole owner of the Hughes Tool Company on the death of his father in 1924 and began a broad program of expansion and diversification under which the rock bit operations became part of Hughes Tool's Oil Tool Division. On December 14, 1972, more than sixty years after its founding,

Hughes Tool Company went public with an offering of five million shares on the New York Stock Exchange.

But if going public marked a major shift in the corporate and financial structure of the Houston-based operation, its key position in the rock bit industry remained unaltered. Easing the transition from private company to public corporation was the fact that there was no significant change in top management. Raymond M. Holliday and James R. Lesch, both of whom had been heading the Oil Tool Division, continued with Hughes Tool Company, Mr. Holliday as chairman of the board and chief executive officer and Mr. Lesch as president and chief operating officer.

According to Gene Harris, partner in charge of the engagement since 1972, Hughes Tool Company became an audit



Left: Rock bits are composed of three separate head sections and three cones. The three head sections are welded together, positioning the free-turning cones so the teeth will intermesh.

Below: Lubrication fittings of all rock bits are inspected carefully to ensure that there are no rough edges that could cause problems in use.

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client of our Houston office in 1927. Working closely with Gene on the engagement are Leslie E. Greenberg, tax partner, and manager Philip J. Kolman III.

"We served Hughes Tool as a private company, then assisted in its going public. It has been a long—and close—relationship," Mr. Harris said. "These close ties, with such men as Mr. Holliday, Mr. Lesch and Calvin J. Collier, Jr., senior vice president-finance and secretary-treasurer and an H&S alumnus, have been a big help to us in providing Hughes Tool with the services it expects from us."

Hughes Tool is a worldwide operation, with manufacturing subsidiaries in Buenos Aires, Argentina; Salvador, Brazil; Mexico City, Mexico; Belfast, Northern Ireland; and Maracaibo, Venezuela, and a sales subsidiary in Mel-

ville, Australia. In addition, companies in Vera Cruz, Mexico; Milan, Italy; and Calgary, Canada are licensed to make Hughes Tool products. In 1974 Hughes Tool acquired Byron Jackson Inc., now BJ-HUGHES Inc., which also has several overseas operations. International sales, in fact, account for almost half the company's total volume. Has the global nature of Hughes' operations posed any problems for Gene Harris? "Not really," he stated. "We have developed a good reporting program with our participating offices responsible for Hughes Tool's overseas operations. We keep each other advised."

Hughes Tool's dominant market position (Messrs. Holliday and Lesch put the corporation's share of the rock bit market in the United States at somewhat over 50 percent) is based on the rolling cone cutter principle first designed by Howard

Hughes Sr. Drilling through 20,000 or more feet of rock is not quite the same as boring a hole through an inch or two of wood. The bit actually crushes the rock as it rotates and descends. In its present design, the Hughes "Tricone" bit is composed of three toothed cones set at precise angles so that the teeth intermesh properly to cut efficiently without clogging as the bit revolves. In simplified terms, as the bit rotates, weight (forty tons is not unusual) is placed on the cones which themselves rotate, constantly grinding their teeth against the rock. These teeth can be high-grade steel or special tungsten-carbide "compacts" (teeth-like inserts) imbedded in the cone. The tungsten-carbide compacts, used in more expensive bits, last far longer than ordinary steel and represent a major step in prolonging bit life, thus reducing



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overall drilling costs. The size, shape, positioning and angling of the teeth on every bit are carefully determined and engineered to meet the needs of a driller. Different rock or earth formations demand different bit-teeth configurations.

An important development, introduced several years ago by Hughes Tool, has gone a long way in prolonging bit life and lowering drilling costs. The company's top-of-the-line Hugheset journal bearing bit priced at close to \$9,000 for the largest 17½-inch size, utilizes a most sophisticated journal-bearing design lubricated by a special alloy. The alloy, in a solid metallic state until the bit is put into use, softens under the heat and pressure of drilling and functions as a lubricant.


What does this mean to the driller? A "standard" drill bit may last an average

of 120 hours before it has to be replaced. A Hughes journal bearing bit can last several times longer depending on drilling conditions. One journal bearing bit set a new record recently by drilling 9,620 ft. in 686½ hours. Since the entire drilling operation must be shut down for up to twelve hours every time the bit has to be changed (the process requires removal of thousands of feet of drill pipe from the hole), anything that can cut down the number of these "round trips," as they are called by the drilling industry, means substantial savings. (The cost of running a rig can be more than \$50,000 per day on some offshore drilling platforms.)

Hughes Tool is probably best known for its rock bits, but the company's facilities in Houston, sprawling over 84 acres and employing

some 4,600 people (an additional 2,900 are on the payroll around the world), provide other services to the drilling industry. One of the more important of these is the production of tool joints, essentially threaded connections that are welded to the ends of standard 30-foot lengths of drill pipe. Hughes does not manufacture drill pipe; all pipe is purchased by the customer and delivered first to Hughes to have the joints welded to each end. At the present time Hughes is using inertia welding equipment which permits a higher rate of output than possible with other welding methods. In inertia welding the tool joint is spun at high speed and the pipe is pushed hard against the end of it. The resulting friction and pressure creates temperatures high enough to soften the metal at the joint and weld the two pieces together

Photographs not included in Web version



Left: Rock bit cones in foreground are studded with tungsten-carbide "compacts," extremely hard inserts which provide longer cutting life than steel teeth. Precise positioning of the compacts is vital if the bit is to perform correctly.

Above: Smiling after review of figures to be shown in the company's annual report for 1975 are (l. to r.) James R. Lesch, Hughes Tool Company president and chief operating officer, Raymond M. Holliday, chairman and chief executive officer, Calvin J. Collier, Jr., senior vice president-finance and secretary treasurer, and Gene Harris, H&S partner in charge of the engagement.

Above right: Wayne Bryant (l), Hughes Tool, Advertising Department, discusses raw steel billets destined to be forged and machined into finished tool joints with Geoffrey Pearse, technical projects editor for the London-based *Mining Journal*. All steel purchased by Hughes is tested to ensure that it meets specifications.

—all in a matter of seconds. The new inertia welding facilities were completed in 1974. The company now has an ongoing \$90 million plant modernization and expansion program for Hughes Tool and its subsidiary BJ-HUGHES Inc. which will be essentially completed in 1976.

Additional products manufactured in the Houston plant include "big hole" drilling bits used in boring large shafts, such as in mining; auger-type portable hole diggers for the construction and utility industries; and the Hughes "Impactor" paving breaker used in demolition and construction work.

BJ-HUGHES Inc., located in Houston and Long Beach, California, is a leading manufacturer of oilfield tools used on rotary rigs and a major supplier of oil well cementing and well stimulation services.

The growth of the Hughes Tool organ-

ization is the result of people as much as products. Serving the petroleum industry requires in-depth expertise over a wide range of disciplines—metallurgy, geology, hydraulics and engineering, to name a few. This Hughes has, from the highly qualified staff of its Houston research and development laboratories, to the field engineers who visit just about every driller using Hughes equipment in the U.S. once or twice a week to see how the product lines are functioning and how they may be improved. Visits are also made to the drilling rigs operating in foreign areas but at less frequent intervals because of remote locations.

This expertise starts right at the top, since no corporation can prosper unless its management is as strong as its product line and its sales and marketing

organization. Raymond Holliday, an attorney and a CPA, attended the graduate business school at Texas A&M and has been with Hughes Tool since 1938. James Lesch, with Hughes Tool since 1946, holds a degree in mechanical engineering. Mr. Lesch spent his first twelve years with the company in the oilfields, in engineering, before moving to sales management. He was transferred to Houston headquarters as manager of rock bit sales and then promoted to senior vice president.

Their close contact with just about every major drilling operation around the world has given Holliday and Lesch a broad grasp of and deep insight into the realities and problems facing the petroleum industry today. And since the future of Hughes Tool is tied so closely to that of the petroleum industry, it is not sur-

Right: High-speed abrasive wheel is used to remove flash, excess metal, from rough tool joint right after it has been forged. When finished, tool joints are welded to ends of drill pipe, permitting the lengths of pipe to be screwed together on the drilling rig.

Below: Rough tool joints (in background) are machined smooth and brought to the specified outside diameter, making them ready for the next step in the production process.



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prising that both men express optimism about the future—an optimism tempered by a keen awareness of the very serious problems facing the industry.

Starting in the late fifties, drilling began dropping off. In 1972, however, spurred by the sharply rising prices being charged by overseas producers and then the oil embargo, the pace of drilling rose markedly. Since then petroleum industry activity (based on the number of rigs operating as well as footage being drilled) has been rising steadily, a pattern paralleled by the financial performance of Hughes Tool. Net income and sales have shown a steady—and strong—increase every year since 1971, and both rose to record highs in 1975.

Raymond Holliday anticipates a continued rise in the number of rotary rigs operating in 1976 as well as in the footage

drilled. He estimates an increase of 4½ percent in the number of operating rigs and a 6 percent hike in footage drilled, both figures for worldwide operations. The percentages probably would be even higher, he stated, if the U.S. Government had a consistent national policy designed to encourage petroleum exploration and production.

Drilling for oil or gas represents an enormous investment, Mr. Holliday said. An average rig, he pointed out, can require up to \$100,000 worth of rock bits in one year—and still drill dry holes.

Similar concern is voiced by James Lesch. “The oil companies need very substantial amounts of capital,” he said. “It’s easy enough to say that the producers should spend more on exploration and drilling. But they need vast sums to invest in pipelines and refineries. Finding oil

is useless unless you can get the crude to the refineries—assuming the refinery capacity is there to begin with. No one really knows what petroleum reserves we have right here in the United States and offshore. The one thing that does seem undeniable, however, is that we’ll never know unless the oil companies are given the proper incentives to make their investment in exploration financially feasible.”

In Mr. Lesch’s opinion, the public has not really been informed of the facts. “Everyone is saying that we’ll be in good shape once we start pumping oil out of Alaska. Since Canada has announced it will stop selling oil to the U.S. before the end of this decade, the Alaskan oil will simply replace what we’re losing from Canada. We certainly won’t be any better off.



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"The real need now is to find more reserves," Mr. Lesch emphasized, pointing out that most petroleum experts believe that a substantial portion of future reserves will be found in Alaska and in offshore locations. "Energy conservation measures we've implemented in the last few years have helped," he said, "but this has simply slowed the rate of growth of petroleum products usage. Most authorities believe our petroleum consumption will continue to increase at about 2.5 percent per year for the near future."

But can the slack be taken up by other energy sources? "Sure, there are alternate sources. Gasification and liquefaction of coal, the shale oil deposits, even nuclear energy—all are potentials right now. The main obstacle is not technology—we can do it if we have to—the big roadblocks are economic and legal. But even if the

country decided to jump right in and begin work tomorrow on developing practical energy sources, it takes from ten to fifteen years before these will be substantial enough to become important factors in our energy picture. For the immediate future, at least, oil and natural gas still seem to be our prime sources.

"What the country really needs," Mr. Lesch said, supporting Mr. Holliday's earlier statement, "is a comprehensive energy policy that considers all energy resources and provides for the development of these resources."

How does Hughes Tool see its own immediate future? Obviously management is optimistic in the face of the continued growing need for petroleum and petroleum products. Although the company is definitely not

ruling out acquisition or diversification, "we are not considering anything specifically at this time," Mr. Holliday said.

"Our philosophy since going public," he observed, "has been to broaden our base, especially in tools and services related to the production of oil and gas."

If Raymond Holliday and James Lesch express concern about the future, it is a concern based on a realistic appraisal of the problems facing both the petroleum industry and a nation whose greatness was built on an abundance of energy sources. Their tempered outlook, however, cannot mask a strongly positive view of the future, an evaluation based on their knowledge of the inherent strength of the petroleum industry and the ability of Hughes Tool Company to continue to serve that industry as well in the future as it has for almost seventy years. ○