

# UTILITY ARBORICULTURE EQUIPMENT<sup>1</sup>

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The Pacific Northwest experiences a long growing season, combined with the prolific growth of alder, maple and fir, creating problems of continuous right-of-way maintenance. With the reduction of chemical use in the last 15 years, a serious problem has developed, namely, how to tackle a right-of-way that has gotten out of control. With tall, fast-growing species, a powerline becomes threatened in a few short years, blocking access and causing line outages when trees come in contact with a line. Pipeline easements become obliterated, brush growth closes access roads and interferes with aerial pipeline patrols. Vegetation on roadside produce fallen leaves and debris that plug water runoff ditches and obstruct driver vision around corners, causing safety concerns. In the winter months this over-growth shades road surfaces, causing icy road conditions.

Cross-country powerlines seldom have access roads in steep country. It is impossible to use conventional brush chipping operations to reduce the slash, without roads. The only method previously available to cut the trees interfering with the powerlines was sending a hand slashing crew up the mountain to cut the trees with chainsaws. This method is very slow, labor intensive and affected by the weather. It is extremely difficult to get steady, productive hours from a crew in such strenuous work. Add hot summer weather or cold wind and snow and the cost goes up considerably.

Hand cutting methods do not reduce the bulk of fallen trees, particularly in heavy stands of timber. The result is trees on top of trees, causing potentially extreme fire hazards. A right-of-way that once was difficult to traverse is now impossible. Fallen trees block trails, roads, etc., virtually preventing walk-in access for pole treatment crews, insulator inspection, patrols, etc. Once a fire starts in downed and dead timber it is difficult to stop.

A unique problem in the Northwest is the old-growth stumps, left over from years of logging

large virgin forests. These stumps dominate our rights-of-way and average 5-8 feet in diameter and are normally 6-10 feet tall. With only a few inches of rot, the stump is solid wood. Old stumps are prohibitively expensive to dig out or move, so they must be dealt with as they exist. The top of each stump is a fertile seed bed and produces young tree growth. A tree that grows here is very unstable and has to grow only a few years to be tall enough to reach powerlines. Regaining control of overgrown rights-of-way in a cost-effective manner is compounded by the rate of growth, terrain and obstacles present in the Pacific Northwest.

Kemp West started line clearance work for Puget Power, using the standard hand slashing method. Since this is a competitive market, our company felt that a machine could be designed to cut the brush and still handle the terrain and old-growth stumps. After searching nationwide, we settled on a machine that was originally built for tree planting. After major re-designing, the newly developed machine was introduced as the "Track-Mac", later named "The Shar". After many improvements, the "Trac-Mac" has proven itself with features like a quadra-tracked undercarriage, center steering and center oscillation, side movement boom with a hydraulically powered horizontal cutting disc turning 500 rpm. The "Trac-Mac" has a very low center of gravity for side hill stability and more track surface than a similarly sized bull dozer and provides for high floatation. The ground pressure rating of this machine is 3 lbs. per square inch, equal to that of the average human foot.

The cutting head is built from a thick plate 70 inches in diameter with 5 inch teeth protruding from top, bottom and sides. This unit weighs 1000 pounds. Power to the disc is through a diesel-driven hydraulic motor rated at over 80 diesel horsepower, equal to that of a mid sized car at full throttle.

This unit combined with a skilled operator is

1. Presented at the annual conference of the International Society of Arboriculture in St. Charles, Illinois in August 1989.

capable of cutting a steady diet of trees 8-12 inches in diameter and clearing 1-3 acres per day, depending on terrain and density of material. This machine combines three operations in one. Shearing tree from stump with the side teeth, grinding stump with bottom teeth and mulching brush with teeth mounted on the top of the cutting head. The tree stumps are shattered which reduces stump resprouting. With all functions completed in one pass the result is minimal disturbance to low growing subspecies.

The "Shar" brushcutter is ideal for rolling hills, 20 degree side slopes and its swinging boom allows it to reach small banks and around stumps.

In less severe work sites we developed the "Challenger", with numerous features, including steering in the center and a swinging boom. The rubber tires allow travel on country roads, saving trucking transportation costs. In sparse or scattered brush areas this unit can move quickly across open ground, traveling at 15 mph. The "Kemp West Cutterhead" is mounted on a 10 foot long boom which swings from side to side. This creates a cutting swath nearly 20 feet wide. This is a very important feature. For example, a 20 foot wide right-of-way is cleared with the "Challenger" only having to make a single pass, whereas other rubber tired machines with an 8 foot cutting swath must travel the same area 3 times to cut the desired 20 feet. As the end result, the Challenger creates 1/3rd the impact on the same section of ground. On acceptable job-sites this machine is very cost-effective and can produce up to 5 acres per day in the Northwest.

On extremely steep mountainous jobs where roads need to be built, we use our large excavator/roadbuilder equipped with bucket and thumb to move large rocks and logs to construct a road. On sections of ground that are too steep for our "Shar" or our "Challenger", we developed a brushcutting attachment for our large excavator/roadbuilder with an overall reach of 52 feet. The machine parks on the easement road and reaches out to cut steep banks above or below the road.

After many encounters with canyons where roads were not allowed because of fish bearing streams, we took our excavator/brushcutter (107,000 lbs) and incorporated a cable logging

system into this machine. The cable drums are hydraulically driven and cab operated. The cables reach out 600 feet and yard logs and debris to the road-side. This yarder will swing logs to the right or left, thus allowing the operator to sort salvagable logs on one side and brush on the other. When cable operations are done, the cables are disconnected. The brushcutter then folds down and reduces the brush pile to mulch completing the job. A 2-man operation can winch, sort and mulch 40 tons per day.

On long right-of-way contracts we still found labor intensive sections of right-of-way where our innovative machinery was stymied. Hill-tops that had too many powerpoles and guylines in the way obstructed the use of the winch cable machine and steep grades also prevented use of our tracked machines. We encountered many hillsides over 600 feet long, some more than 2000 feet. This work was still being done by our hand crews. Roadside clearing also presented a problem where brush and vegetation is on steep banks and large brushcutters could throw debris onto roads.

So, Kemp West has introduced the "Spyder" (Fig. 1), a new machine designed for roadside brush removal on all types of terrain. The "Spyder" works anywhere and everywhere . . . on steep slopes, in swamps, on many, many work sites that other equipment find impossible. This machine is a new and unique answer to the problem of using mechanical equipment effectively and efficiently on very rugged and difficult work sites.



Figure 1

The key to the "Spyder's" ability is a unique design that allows each leg or wheel to be raised or lowered, extended or retracted, move in or spread out. This allows the operator to adjust the working base of the machine to incredible angles to meet the changing terrain. This control provides extreme maneuverability and flexibility while maintaining a safe and stable environment for the operator and allows the "Spyder" to work up, down or across very steep slopes, in tight spots and production is not affected by *weather!* The "Spyder" will work in 5 feet of mud and water and not get stuck; will climb up onto a road and travel 7 mph on it's rubber tires.

With its long reach of over 27 feet, the "Spyder" can cut a swath of 55 feet in one pass, reaching across ditches, over fences, etc. If you need to reach more than 27 feet, no problem. Simply step over the fence by first lifting or walking a front leg over the fence, then a rear leg and now you can straddle the fence while driving the machine. If that is still not quite enough reach, walk the remaining legs over the fence. This maneuver is made possible by superior boom strength, combined with hi-tech hydraulics, enabling the machine to lift itself over obstacles.

The high-pressure, high-torque hydraulic motors in the large traction tires produce ample horsepower to propel the "Spyder" up a 25 degree slope. The "Spyder" is the ultimate in "low impact to environmental concerns". With its walking motion, it leaves *no* ruts and *no* gouges, resulting in *zero soil disturbance*. All low growing species are left unharmed to provide immediate desirable under story; berries, ferns, etc.

For removal of roadside vegetation the "Spyder" is the perfect choice. The shrouded and guarded cutting disc will not throw debris on road-

ways. All brush is mulched to a very small chip size, nearly that of a conventional brush chipper.

Steep roadside banks and busy one lane roads are not a problem for the "Spyder". The "Spyder's" slope clinging capacity allows it to hug the bank, straddle the ditch and stay completely off the road, eliminating the need for costly traffic control. The boom reaches straight up to nearly 30 feet in the air.

Coupled with the patented "KDX Mulcher" brushcutting unit, this machine is ideal for powerline right-of-way clearing and maintenance. This new and unique brushcutter is a new low-speed, high-torque, high-horsepower unit that will cut and mulch 12 inch diameter trees without throwing any debris or brush on roads. The "KDX Mulcher" has an optional hydraulic jaw to pick up logs, stumps and debris weighing over 2 tons.

The entire unit is capable of operating at 65 degrees side slope without losing engine oil pressure or hydraulic capacity. Weighing under 18,000 lbs it is easily transported on any conventional truck. The "Spyder" will load and unload itself from any flatbed truck.

The "Kemp West Spyder" is an entire brush crew in itself. Cuts trees, grinds stumps, mulches brush, cleans the ditches, does not block traffic nor is it affected by weather. With over 10,000 combined hours in commercial operation, we feel that this is the single most all-around cost effective unit that has been built.

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