

**SPECIFICATIONS FOR ARTICULATED MID-MOUNT 22' DOUBLE STACK GEAR
PUMP BOOM MOWER MOUNTED ON TRACTOR**

**ACCEPTABLE TRACTOR BRANDS/MODELS: JOHN DEERE 6110M, NEW HOLLAND
T6.145 W/ AUTO COMMAND TRANSMISSION OR EQUIVALENT**

ACCEPTABLE MOWER BRAND/MODEL: TIGER BENGAL OR EQUIVALENT

**MOWER PORTION MUST BE BID AS A SEPARATE INSTALLED UNIT AND A
COMPLETE UNIT WITH TRACTOR AS LISTED.**

GENERAL

It is the purpose of this specification to describe a 22' mid-mounted, hydraulically powered boom mower for cutting grass and brush on roadsides and other areas that are not accessible to conventional mowing equipment. The unit bid must be a current production model that has been in production on the open market for a minimum of one (1) year that meets or exceeds the following minimum specifications.

SPECIFICATIONS FOR TIGER MOWERS BENGAL BOOM MOWER OR EQUIVALENT

It is the purpose of the following specifications to describe a hydraulic driven boom mower. Mowing is forward and right of the right rear tire and extended by means of an articulated two section boom with hydraulic break away. This unit shall be constructed to interchange with any of the following: 50" Rotary Cutting Head, 60" Rotary Cutting Head, 63" Flail cutting head, 50" Flail Cutting Head, 48" Saw Blade, 50" WetCut Sprayer, Boom Snow Blower, 22" Rotary Ditcher, 60" Side Rotary Mower or 75" Side Flail Mower.

ALL SPECIFICATIONS ARE CONSIDERED MINIMUM UNLESS OTHERWISE NOTED.

Boom Mower

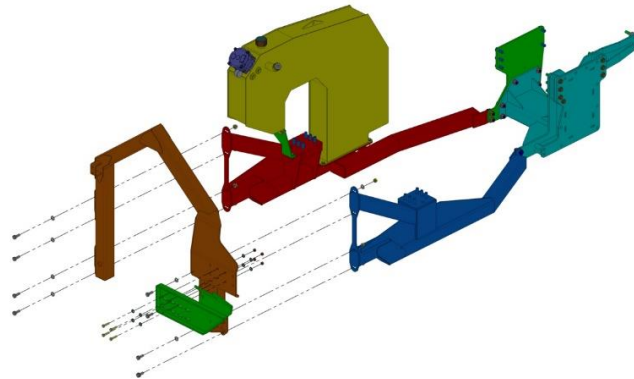
SAFETY AND TESTING:

- Shall meet the following industry standards: SAE: J232(Rotary), J1001(Flail), J284, J990, J1065. ANSI/ASAE- 201.4, S203.13, S205.2, S279.12, S350, EP363.1, S483, S493. ASTM: A370. (VENDOR REQUIREMENT) Submit compliance report signed by a registered Professional Engineer (PE).
- Unit shall be equipped with a 7 second brake valve on the cutting assembly.
- Unit shall be equipped with a “Red Emergency Stop Button” integrated into the mower control panel and a 7 second brake valve on the cutting assembly
- Electric Solenoid control transport lock to be integrated into the mower control box.
- A roof mounted light bar must be supplied and installed. Light bar shall include stop, turn, tail, and brake lights.
- An automatic “Boom Swivel Stop System” shall be installed in order to help prevent accidental damage to the tractor.
 - Design shall incorporate proximity switches to first slow the boom down as it approaches the boom rest and then stops it at the boom rest.
 - Stop location will be adjustable and is tractor/cab specific.

FULL LENGTH SUBFRAME SYSTEM AND BOOM REST:

- Main Frame shall be constructed to be supported on the front tractor bolster, center of tractor and rear axle housings, to absorb side torque and impact of severe applications.
- member, running under engine, shall be welded, box frame constructed, and connect the mainframe to each side of tractor (specifically excluding frames over hood designs). A bolt on mast assembly shall have an integral swing cylinder as a welded assembly with the mast assembly.
- Main Frame shall have a bolt on mast assembly to allow easy change from Boom Mowers to Side Mower attachments. Weldment shall bolt face to face with tower and shall have a mounting surface with not less than 10, 3/4" grade 5 bolts. Mounting surface shall be constructed of 80,000 lbs. steel 1/2" thick. (VENDOR REQUIREMENT) Vendor shall submit diagram of mast mounting.

- A double axel mounted boom stow system shall be attached directly to tractor with a frame member extending to the right-hand and left-hand rear axle housing and further extend forward to mower main frame. 3-point hitch system shall function normally. A single post or single column boom stow will not be accepted.
- Stow system shall consist of an axle brace extending from the mower mainframe running and below and attached to the right and left rear axle housing. The axle brace shall attach directly to the upright posts behind each axle.
- The axle brace shall be of the square tube design. Axle brace shall be provided of not less than A500 material 4" x 4" square tube with a minimum 1/4" wall. The tube shall attach to the mower mainframe and extend below and attach to the right rear axle. A similar brace shall be provided to the left side.
- The upper stow assembly shall be constructed of 1/4" x 4" x 4" square tubing saddle mounted to axle brace extending above and behind the right rear axle.
- Dual axle braces are required to distribute the load of the boom mower, support the hydraulic tank, and support the extreme duty boom rest.

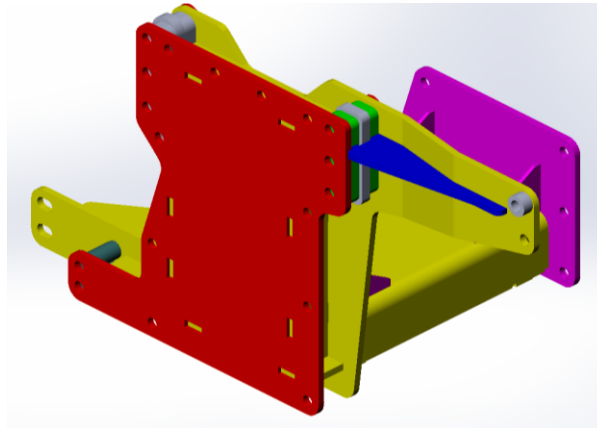


MAIN FRAME CENTER SECTION:

- 1/4" Standoffs required to provide a more concentrated clamping area for main frame center section
- Integral structure forward of main frame with additional bolts required to distribute load of boom mower.

- A minimum of 14 mounting bolts are required for mid-section of main frame / John Deere 6110 M
- 140 mm bolt length where required
- Removal of paint required between tractor and main frame mid-section at time of installation

MID SECTION OF FULL-LENGTH SUB FRAME SYSTEM:



BOOM SWIVEL BRACKET:

- Boom Swivel device shall be mounted with a minimum clearance to the ground of 42 inches
- Must be able to fully extend all boom cylinders and be able to achieve maximum boom reach while rear tractor tire is within 6 inches of a 32" tall guard rail.
- Swivel shall be box construction with a 100,000 PSI yield steel swivel cylinder tang with a vertical bearing boss, with steel backed, porous bronze inner structure, and acetal resin overlay bearings. Bearings shall have grease pockets built in and support a 2 1/2" vertical pin. Pin shall be constructed of 4140 cold drawn steel, pre-hardened (heat treated), to a minimum yield of 105,000 PSI, pin shall be zinc plated. (VENDOR REQUIREMENT) Submit manufacturer of bearing, model and size.
- Swivel shall connect to inner boom cylinder with a greaseless spherical bearing. (VENDOR REQUIREMENT) Submit type of bearing and size.
- Swivel shall be supported by a greaseless thrust washer to eliminate galling between swivel bracket and boom mounting bracket. (VENDOR REQUIREMENT) Submit ID and OD dimensions and thickness.

- Hydraulic Hoses shall be routed thru hose clamp/guides with hose guards to prevent chaffing.
- Base shall have integral boom swivel attachment fork and constructed of 3/4" and 1" thick 100,000 PSI steel. (VENDOR REQUIREMENT) Submit material and thickness of fork.
- Horizontal swing cylinder shall have an internal cushion device to limit flow when boom is operated to the forward boom position.

PRIMARY BOOM:

- Primary boom shall be constructed of a minimum 8" x 6" 1/4", 70,000 psi yield strength structural steel tube reinforced with 1/4", 100,000 psi yield strength steel laminating plates.
- Primary boom shall have a one-piece reinforced cylinder attaching rib, with the end welds strategically welded around end of rib to boom upper surface. Inner reinforcement shall be a 1/4" x 5" anchor plate, saddle mounted to the top of boom. Anchor plate shall be structurally welded to main tube and have 2, 1" diameter core welds in the top center of plate. Outer reinforcement shall be 1/4" box sectioned, 100,000 PSI steel with 2, 1" x 6" core weldments on each side, and 1, 1 x 1 1/4" oblong core welds. Inner end of Primary boom shall have a 1 1/2" diameter 105,000 PSI yield, hardened, nitride surface pin, with a high-strength, steel backed, porous bronze inner structure, acetal resin overlay bearing installed. (VENDOR REQUIREMENT) Submit a complete description of boom, materials, and boom reinforcements.
- Pressure and return lines will be pre-formed steel tubes, or hoses, with hoses at pivot points and mounted to back of boom. (Specifically excluding hoses and tubing inside or front of booms)
- Top mounted double acting lift cylinder shall have a nitrogen accumulator.
- Cylinder end attach points shall have replaceable bearings. Primary boom lift cylinder shall not be less than 5" in diameter.

SECONDARY BOOM:

- Secondary boom shall be constructed of a minimum 6" x 4" x 1/4", 50,000 psi yield strength structural steel tube reinforced with 1/4", 100,000 psi yield strength steel laminating plates.

- Pressure and return lines are preformed steel tubes and hoses mounted to rear of boom.
- Cylinders shall be welded, double acting and mounted to top of boom. Hydraulic cylinder mounted between primary and secondary boom shall have a spherical bearing rod end.
- Outer end of secondary boom shall have an integrally designed mounting boss, box sectioned into the boom. (Specifically excluding external boom end reinforcements)
- The secondary boom shall be a double weldment. This weldment offers greater strength around the pin boss that the cutter head connects to. The weldment must also incorporate the pin boss for the dog leg linkage.

HYDRAULICS:

- Tandem section gear pump shall be direct drive from the tractor front crankshaft adapter.
- Pump shall be direct drive from the tractor front crankshaft adapter. (rubber mounted engine design shall have a double u-joint pump drive shaft) (VENDOR REQUIREMENT) Submit type of shaft attachment supplied.
- Reservoir shall be internally treated against corrosion with industry approved chemical agent at time of manufacture. Reservoir shall have a in tank filter rated at 75 GPM, 10-micron, 200 beta, element with bypass, restriction gauge, minimum (1) one PSI pressure at suction outlet and have ball valve at suction line. Tank pressurized to 3 PSI. (VENDOR REQUIREMENT) Submit material used to treat reservoir. Type, design and micron size of filter element.
- Reservoir shall be mounted in tractors left hand rear wheel well. Reservoir shall have sufficient clearance for proper cooling and shall be a minimum 37 gallons of oil in an operating condition. Reservoir shall have a minimum of not less than 5" clearance (oil cold) from top of reservoir for expansion. Hydraulic fluid level located with sight glasses on reservoir and temperature gauge to be built-into Cab Control Box (in tractor)
- A hydraulic temperature gauge shall be incorporated into the mower system control box and be located in the cab of the tractor.
- Hydraulic Oil Cooler shall be mounted on the LH side of the tractor support frame. The hydraulic cooler shall have bypass protection. This system will have on / off controls located in the cab of the tractor. These controls will be equipped with a reversing mode to remove debris from radiator fins.

Coolers mounted in front of tractor that block lights and are susceptible to damage will not be accepted.

- Hydraulic pressure connections shall meet SAE O-ring and JIC standards.
- Tandem Pump shall be front mount, cast steel housing, steel gears, rated at 3250 PSI, 45 GPM and 96 HP input. (specifically excluding piston type pumps and cast aluminum housing pumps)
- Suction hose shall be unrestricted. (Specifically excluding suction filters and screens)
- Hydraulic oil shall meet a cleanliness standard of ISO 46 rating, and the ISO Code 16/14/11 or better. (VENDOR REQUIREMENT) Submit report of oil sample.
- Hydraulic hoses and tubes shall be cleaned with pneumatic, triple projectile cleaning, and shall maintain a JDS-G169, class 5.6. ISO cleanliness rating.
- Motor shall have cast steel housing with steel gears.
- Mower control valve shall be an electrically controlled, pilot operated. Logic elements shall be used to control pressures and ramp up and down speed to prevent excessive pressure spikes to system. Valve shall stop mower from turning in the off position and will not cause a restriction to generate drift while in the off position.
- Mower control valve shall stop cutter assembly in maximum of 7 seconds from full RPM. (VENDOR REQUIREMENT) State time to stop from full RPM.

JOY-STICK CONTROL LIFT VALVE:

- Joy-Stick Valve Option: Shall be an electro-hydraulic, load sensing valve. Valve shall have interchangeable spools and shall have a manual over-ride for each section, and 12-volt electrical actuation.
- Valve (Joystick) shall have load-independent flow control, oil flow to individual function is independent of the load pressure of the function. Valve shall have built in pressure relief in pump side module (PVP), with system capabilities of pressures of not less than 4,350 psi continuous, and 4,640 psi intermittent. PVP shall have a pressure gauge connection for service and have an open center option for fixed displacement pumps.
- Valve (Joystick) body shall have interchangeable spools, integrated pressure compensator, check valves, and different spool variants. Valves shall be configured with manual over-ride levers on one end and an electronic actuation module on the other.

- Electrohydraulic (Joystick) actuation module shall integrate directly with proportional valve body. Module shall have integrated electronics, sensors, and actuators, and shall have a feedback transducer measuring spool movement in relation to input signal, module shall control the direction, velocity, and position of main valve spool. Module shall have automatic active fault monitoring, and directional indication and LED light indication. Module shall have low hysteresis and shall have attachment for a sealed Deutsch connector. (REQUIRED) Vendor shall provide module hysteresis value, brand of connector, and IP rating of connector.
- Joystick controller shall be an ergonomic right-hand control, with two proportional functions on X-Y mode, and a top grip to house two proportional rollers. Controller handle shall have a leather-like grained surface to allow hand to breathe during operation. Controller rollers shall have a spring centered potentiometer with a working range of + or - 42o. Controller shall be adjustable with dead band adjustment, independent voltage limiting potentiometers for each function, and integrated direction switches for each proportional module. Controller shall have integral cable plug in, and an RF shielded cable shall be supplied by the manufacturer. (VENDOR REQUIREMENT) Vendor shall state the manufacturer, model, and type of electronic module, joystick, and valve.

COUNTERWEIGHT:

- Counterweight, with tractors having 34" minimum rear tires shall have a total ballasted weight (wheel weight and Beet Juice) shall be a minimum of 2,781 lbs. Wheel weight shall be cast steel, mounted flush to outside of wheel, and shall weigh not less than 1,700 lbs. (specifically excluding flame cut steel and or frame mounted weights) (VENDOR REQUIREMENT) Vendor to state total ballast weight and describe and list wheel weight.

OPERATOR PROTECTION:

- Shall have 1/2" right side, hard surfaced, polycarbonate protection for operator. Installed into the original cab manufactured door and or side window.

FRONT PUMP AND GRILL GUARD:

- A front pump guard must be supplied. These components will be of adequate construction to help protect the front pump and tractor grill from debris and impacts.

Heavy Duty 50" Rotary Head

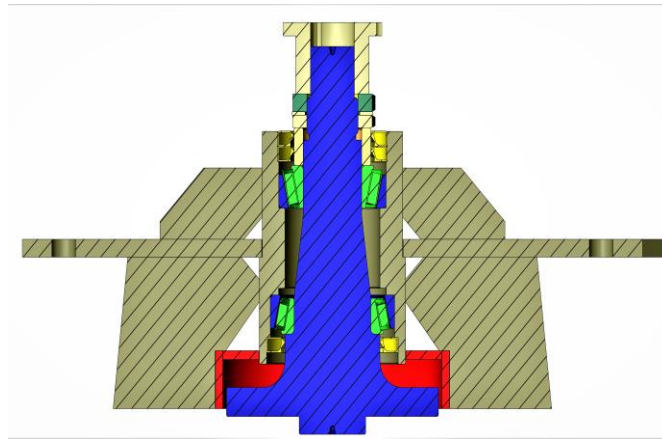
CUTTING HEAD:

- Shall be constructed of 110,000 PSI yield Domex® steel 1/8" deck and 1/4" thick side walls and (4) four trapezoidal formed 50,000 PSI Domex steel reinforcements. Top to be continuously welded for strength and eliminate debris from collecting under reinforcements. (VENDOR REQUIREMENT) Vendor shall indicate manufacturers material, PSI, and type of welding.
- Shall have full length replaceable abrasion resistant skid shoes.
- Rubber safety shield shall be bolted to back side of deck.
- Safety shield shall be operated hydraulically and shall extend below the cutting plane. Safety door shall be constructed of 100,000 PSI Domex Steel and meets all ANSI / SAE tests for rotary mowers.
- Head shall weigh no less than 805 lbs.
- Head shall rotate 180 degrees around outer boom and cutter head shall have 50" of actual cut.
- Cutter head pivot assembly shall be fully welded and integrated into the cutter head design. Bolted on heads will not be accepted. (VENDOR REQUIREMENT) Vendor shall provide line drawing of pivot assembly.

SPINDLE:

- Spindle shall be (1) one piece forged and heat treated with integral 7 1/4" O.D. drive hub. (specifically excluding multi-piece shafts and direct drive spindle assembly's) (VENDOR REQUIREMENT) Vendor to provide line drawing of spindle indicating overall length, diameter of cutting assembly attachment, and material used, including material yield strength.
- Spindle shall be attached to hydraulic motor by a flexible coupler and dust cover. (Specifically excluding direct drive motor/spindle assembly's) (VENDOR REQUIREMENT) Vendor shall describe spindle motor attachment.
- Spindle assembly shall have minimum torsional shear capacity of 4,174 ft-lb torque, 231,000 PSI yield rotational strength and distribute load over 169 sq. inch area. (VENDOR REQUIREMENT) Vendor shall provide size of attachment, number, grade, and size of bolts used to attach.

- Spindle shall have stationary wire wrap protection. Wire wraps shall be a minimum of 4 3/8" x 4 3/4", 3/8" thick. The wraps will also act as reinforcements for spindle housing. Wraps shall be not less than 1/16" from the drive spindle. The top of spindle housing shall have 2" x 3 1/2", 3/8" thick welded reinforcements. (VENDOR REQUIREMENT) Vendor shall describe wire wraps.
- Fully enclosed and welded Wire Wrap and Debris Guard is required. Refer to red portion of diagram below. The Wire Wrap and Debris Guard is required to extend the life of the spindle seals and spindle bearings.



- Spindle shall be mounted in sealed, double tapered roller bearing, grease reservoir with an O-ring plug and port to drain old grease. Assembly shall be filled with synthetic grease. (Specifically excluding barrel and spherical bearings) (VENDOR REQUIREMENT) Vendor to indicate manufacture and type of bearing.
- Spindle shall rotate 19,000 FPM blade tip speed at rated (2,300) tractor RPM. (VENDOR REQUIREMENT) Vendor shall indicate speed.

STUMP JUMPER BLADE CARRIER:

- Shall be one piece, laser cut dual spin formed, recessed center disc, with a diameter of 31". Dynamically balanced (per ISO quality G2.5 spec), 50,000 PSI yield steel dish, 5/8" x 28 5/8" diameter with a 40-degree formed outer edge extending out 3 5/8" and attached to spindle with (6) six 5/8" x 1 3/4", grade 8 bolts. US Patents - US D562,3575. (VENDOR REQUIREMENT) Vendor to Indicate type, size, and material of disc.
- Blade carrier shall have no structural welds.

- Blade carrier shall accommodate (2) (3) (4) or (6) 5/8" x 5 x 18 3/4", 360o swinging, single edge, flat (no bends), 5/8" brush knives. (Optional) Grass knives shall be available.
- Blades shall be attached by a 1 1/8" x 3 1/4" shouldered and keyed bolt, backed by T-1 spacer and hex lock nut.
- Minimum Blade support required from bolt hole to edge of Stump Jumper disc shall be 4.5 inches.
- Cutter knives shall be shot peened with a chamfered bolt hole.

BOOM DIMENSIONS, 22 REACH MODEL, 50" ROTARY HEAD:

- Reach Out feet- 22.64'
- Reach Down feet- 11.22'
- Reach Up feet- 20.27'
- Reach In feet- 7.58'

SAFETY AND TESTING

Due to the severe mowing conditions, safety tests are a requirement for the operator's safety and highway traffic safety. All equipment must meet or exceed the requirements on attachment D.

PARTS AND SERVICE

- Each bidder must be a manufacturer's franchised dealer that must have parts, sales & service, service trucks within 250 miles on the spreadsheet for regional address attachment

Operation and Maintenance:

- Successful bidder shall be required to furnish a qualified individual(s) to provide operator preventative maintenance & safety orientation for approx. four (4) hours at each delivery location.

PRODUCT LIABILITY INSURANCE

- Suppliers shall include a copy of mowing equipment manufacturer's **Certificate of Insurance for Product Liability of at least \$25,000,000 for the products** subject to its bid.

SPECIFICATIONS FOR TRACTOR, 84 PTO HP, 4WD

**ACCEPTABLE BRANDS/MODELS: JOHN DEERE 6110M, NEW HOLLAND T6.145 W/
AUTO COMMAND TRANSMISSION, OR EQUIVALENT**

ALL SPECIFICATIONS ARE CONSIDERED MINIMUM UNLESS OTHERWISE NOTED.

- Shipping Weight Unballasted (S.A.E.): Minimum of 11,376 lbs.
- Engine: Tier 4 B, air-to-air aftercooled/cold starting aid, turbocharged. Must be B-20 compatible while maintaining full warranty.
- Fuel Moisture Separator: Required
- Cylinders: 4
- Displacement: 4.5L; 274 cubic inches
- PTO Horsepower (S.A.E.): Minimum of 84 hp
- Rated Engine Power: Minimum of 110 hp
- Transmission: Minimum 24F/24R, w/left hand power reverser
- Clutch: Wet
- Main Tractor Hydraulic System: Direct Gear Driven
- Selective Control Valves: 2 mechanical
- Main Hydraulic Pump: Load sensing variable displacement pump.
- Hydraulic Pump Flow at a Single SCV: Minimum of 30 gpm
- Remote Hydraulic Valves: Three (3) sets of dual remotes required.
- Exhaust: Vertical
- Final Drive: Planetary
- Differential Lock: Required
- Brakes: Wet Disk
- PTO w/Guard & Wet Clutch: 540/1000, electric hydraulic engagement. Digital PTO indicator.
- Adjustable Telescopic Sway Bars: Right & left side of the draft lift arms, tube type with pins (**NOTE:** Adjustable chains are not acceptable) Dealer installed is acceptable.

- Hitch: Category 2, 3-point with telescopic link ends with top link
- Draft Sensing Method: Lower link
- Tires (Radial): Front – 340/85 R24; Rear – 460/85 R34
- Wheels: Eight position adjustable front & rear. Thread width to be delivered approximately 80” center to center.
- Factory Cab Required: Factory installed w/heater & air conditioner, & ROPS. Items advertised as standard to include tinted safety glass. OSHA & ANSI approved.
- Seat: Suspension, w/seat belt & arm rest
- Manufacturer Standard Gauges: **1)** Lighted Instrument Panel; **2)** Tachometer; **3)** Electric Hour Meter; **4)** Fuel gauge; **5)** Temperature gauge; **6)** Warning Lights for Oil Pressure & Alternator; **7)** PTO Warning Light or Buzzer.
- Digital Ground Speed Indicator, Dash Mounted: Required
- Steering: Power, w/tilt & telescopic column
- Throttle: Hand & foot
- Electrical System: 12-volt, key start, 120 AMP alternator, 1300 CCA battery
- Fuel Capacity: 46.2 gallons minimum
- Lighting Package: Two (2) headlights; two (2) taillights
- Warning Flashers: Required
- Rear Fenders: Required
- SMV (Slow Moving Vehicle) Emblem: Required
- Unit to Contain All Equipment Advertised as Standard by the Manufacturer.
- Anti-Freeze Solution: Protected to -34 degrees F.
- Manuals: One (1) operator & one (1) service manual-paper, CD or internet access. One (1) operator safety CD required for safe operation training.

MISCELLANEOUS

Parts & Service Requirement:

Each bidder must supply a manufacturer’s franchised dealer list that must have parts, sales, & service, service trucks within 250 miles on the spreadsheet for regional address attachment.