

# SPEARHEAD

STUBBLE MANAGEMENT SYSTEM



The management of crop stubble residue is an important part of the harvest process.

Traditional management of arable crop stubble has been geared around using the combine as the primary tool for dealing with unwanted crop residue, straw and chaff, but dealing with unwanted crop residue in this way can be costly.

In challenging times all farmers are looking to reduce costs and improve the efficiency of every operation they undertake in the growing of their crops.

Effective Stubble Management involves the pulverisation and enhanced decomposition of crop residues as part of a professional harvesting process.

The purpose of Stubble Management is to optimise the cycle of operations to provide improved yields and better business economics.

Spearhead has worked closely with European farmers and internationally acclaimed universities for more than 10 years in the development of the Stubble Master – a machine designed to further benefit the stubble management process.

The Spearhead Stubble Master Stubble Management System is a high performance mulching system designed to manage the chopping, mulching and spreading of crop stubble residues.



The Stubble Master is equipped with specialist high suction blades which help to add soil dust to the pulverised stubble. In some types of crop the effective projection of waste corn and weeds is obtained.

Your stubble management system can have a dramatic impact on crop performance, your operational capacity and ultimately a positive impact on the financial performance of your business.



FASTER RESIDUE DECOMPOSITION



IMPROVED SOIL STRUCTURE



REDUCED PESTICIDES



IMPROVED FERTILISER UTILISATION



REDUCED FUEL CONSUMPTION



REDUCED WORKING HOURS



REDUCED DOWNTIME DURING HARVEST



REDUCED HARVEST COST

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## STUBBLE TYPES

### LONG STUBBLE

Increasing combine cutting height benefits combine forward speeds and fuel consumption. Use the Stubble Master after the combine to effectively pulverise long stubbles enhancing faster residue decomposition and improving fertiliser utilisation.

### MEDIUM STUBBLE

Increasing the combine cutting height slightly means that cut material lies higher supporting faster drying. Using the Stubble Master following completion of the harvest process effectively pulverises medium stubbles, encourages faster residue decomposition and improves fertiliser utilisation.

### SHORT STUBBLE

Short stubble also benefits from pulverisation. The resulting effects of enhanced decomposition coupled with effective fertiliser utilisation and less reliance on pesticides can be seen.



## ALL CROPS

### MAIZE OR CORN STUBBLE

The effective pulverisation of Maize stalks makes the subsequent field work easier and most importantly aids in the prevention of diseases and pests such as the European Corn Borer (*Ostrinia nubilalis*).

### RAPE OR CANOLA STUBBLE

The effective pulverisation of Rape Stubble close to ground level helps to break down the remaining Rape stalks whilst activating the waste seed. Stubble management in Rape significantly reduces disease and contributes towards lower reliance on pesticides.

### GRASS SEED

Effective on time, trimming at the recommended cutting height improves pulverisation and distribution of cut grass.

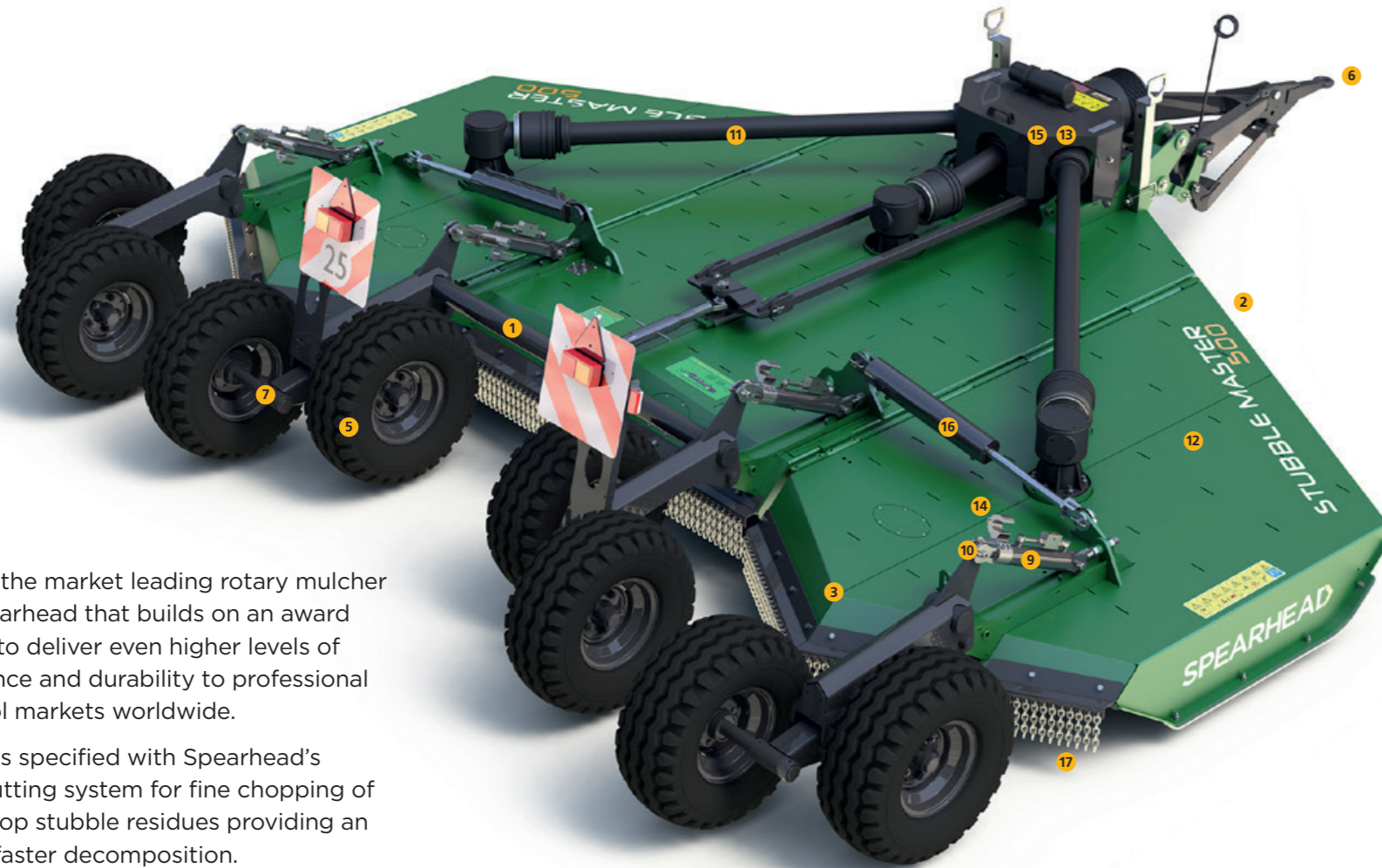
## PROCESSES

### CONTROLLED TRAFFIC FARMING (CTF)

The Stubble Master helps with the pulverisation and important distribution of crop stubble residues – especially on wide track widths where it can be difficult for the combine to distribute the cut straw evenly across the width of the header.

### STUBBLE MASTER AND CULTIVATIONS

The Stubble Master is a strong machine and as an option can be fitted with a rear towing hitch to trail light cultivation equipment allowing for a one pass operation at the same time as enhancing the activation of waste seed.



Stubble Master is the market leading rotary mulcher offering from Spearhead that builds on an award winning heritage to deliver even higher levels of quality, performance and durability to professional vegetation control markets worldwide.

The sleek design is specified with Spearhead's renowned HD6 cutting system for fine chopping of vegetation and crop stubble residues providing an even spread and faster decomposition.

The Stubble Master ensures increased output and reduced operating costs whilst retaining Spearhead's legendary cutting capacity and quality finish.

## 1 TRANSPORT STABILITY

Wide centre axles allow better weight distribution and added stability during transport. When wing decks are raised the wing axles fold within 3.0 metres for compact transport within legal requirements.

## 2 INWARD CROP FLOW

The front of the machine is angled at 45 degrees to allow a clean input letting vegetation flow into the front of the machine without obstruction.

## 3 CLEAN OUTPUT

The delta shaped deck promotes excellent flow from the rear of the machine promoting better spread of chopped material.

## 4 GEARBOX PROTECTION

The blade holder incorporates a protection ring around the gearbox shaft to prevent string and wire damage to the gearbox seals.

## 5 LARGE DIAMETER WHEELS

Staggered wheel alignment combined with larger diameter wheels assist with smoother operation and higher working speeds.

## 6 SELF LEVELLING DRAWBAR

The machine hitch remains parallel to the tractor drawbar at all times. Simple adjustment also provides a low or high hitch option in one drawbar system.

## 7 WALKING AXLES

The machine is fitted with staggered wheels with walking axles as standard allowing the machine to float over rough ground reducing fatigue on the chassis.

## 8 HD6 BLADE SYSTEM

Heavy duty six blade mulching system fitted with free swinging blades which have 'high lift' fins to lift crops into the cutting zone. Contrarotation of the rotors ensures a more evenly distributed mulch.

## 9 INDIVIDUAL WHEEL LIFT RAMS

Efficient and reliable low pressure wheel lift rams create less stress when lifting out of work and ensure consistent levelling across the complete machine.

## 10 INDIVIDUAL FINE HEIGHT ADJUSTMENT

All rams have the unique threaded adjuster for fine tuning of the cutting height.

## 11 BALANCING TIE BARS

The unique tie-bar system incorporates a rocking T bar which is easy to adjust and keeps an even pull from the drawbar to the rear axle.

## 12 SMOOTH DECK

A smooth deck sheds water and debris to avoid chaff build up. The deck is clear of obstructions making it easy to clean.

## 13 SLIP CLUTCH PROTECTION

Each gearbox is protected by its own individual slip clutch protecting the machine from shock loading should an obstruction be encountered.

## 14 SIMPLE CUTTING HEIGHT CONTROL

Cutting height control is aided by simple flip over height adjusters on each individual height adjustment ram.

## 15 GEARBOX DRIVELINE DESIGN

250hp primary splitter gearbox divides power equally to the rotor gearboxes. Gearboxes are mounted on heavy duty steel reinforcing plates to ensure total rigidity.

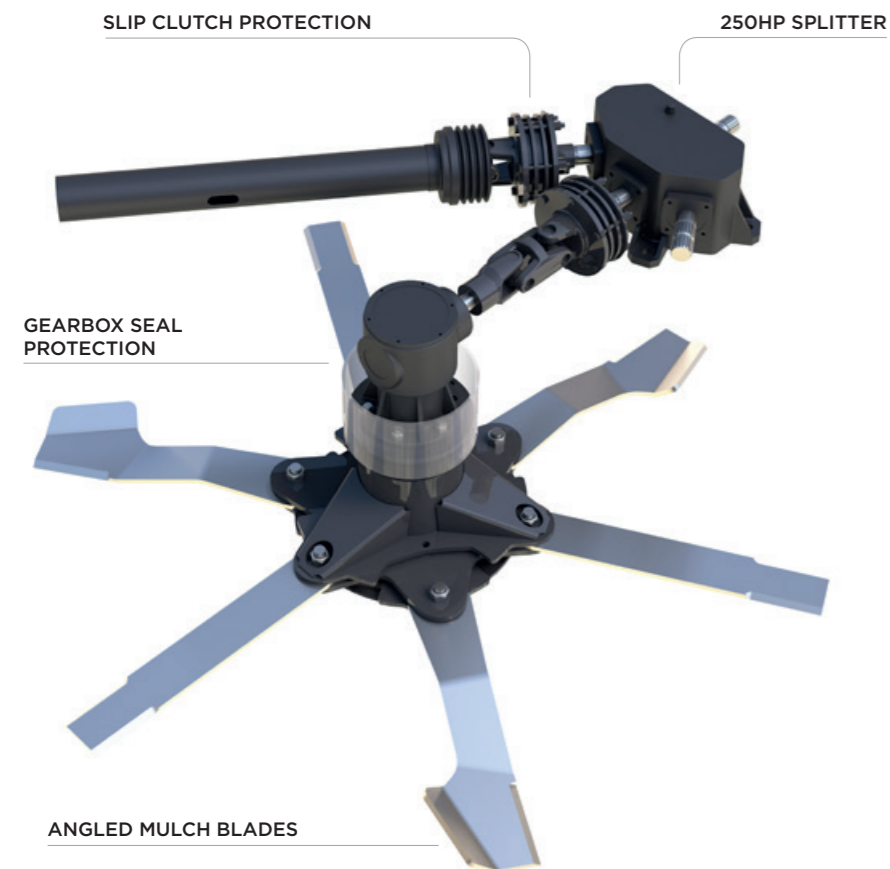
## 16 HYDRAULIC WING LIFT

The wings are mounted on heavy duty full length hinges tabbed into the deck construction for extra strength and fold hydraulically for transport.

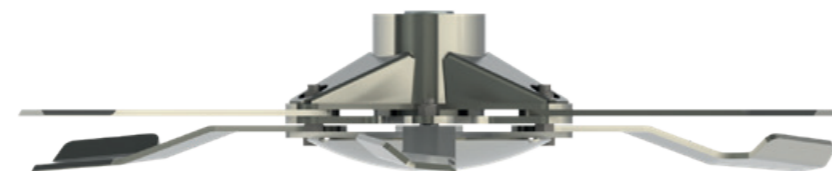
## 17 SAFETY CHAINS

Full length chain skirting is present at the front and rear of the machine to minimise flying debris. An optional rubber flap kit is also available.

The Stubble Master utilises a specialist blade design that assists in the most effective chopping and pulverisation of crop stubble residues. When coupled with Spearhead's innovative six blade rotor system this approach provides unrivalled benefits.

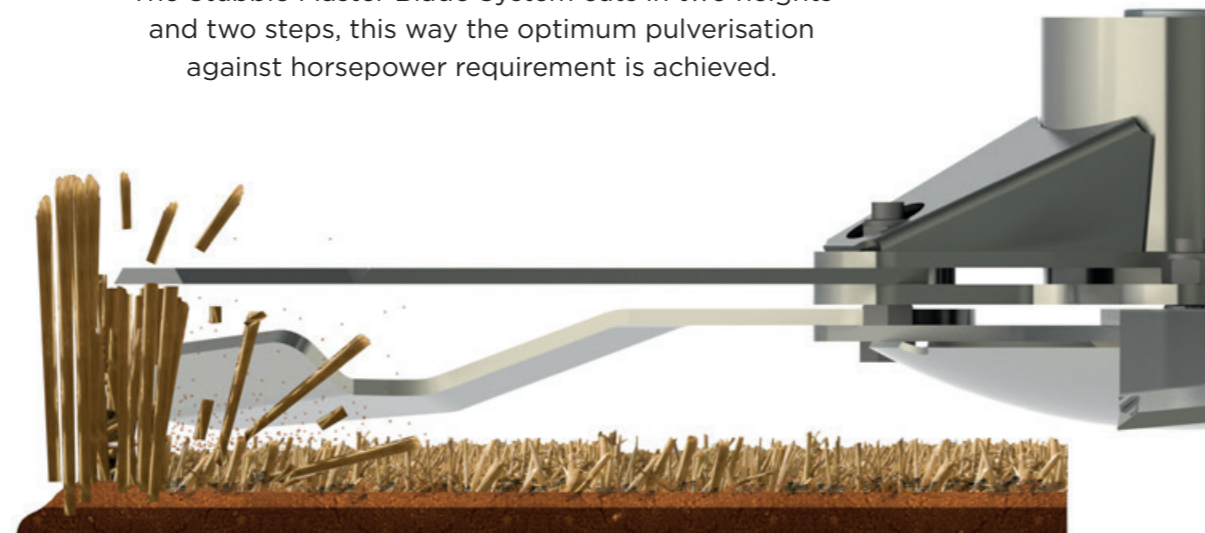


CONVENTIONAL BLADE SYSTEM



STUBBLE MASTER BLADE SYSTEM

The Stubble Master Blade System cuts in two heights and two steps, this way the optimum pulverisation against horsepower requirement is achieved.



**Improved decomposition** – Blades and additional mulching knives mix fine soil particles with well mulched material. This produces the perfect environment for fast decomposition. It also encourages unwanted volunteers to germinate.

## WHAT THE FARMERS FOUND

- › Farmers working with the Stubble Master in Germany have reduced harvest costs by up to €36/ha by increasing stubble height to 35 centimetres.
- › Combine diesel consumption was reduced by up to 10 litres per hectare.
- › Long stubble left by combines with wider headers followed by the Stubble Master provided much better distribution of the mulched material.

## PROOF THAT IT WORKS

- › Evaluation of the Stubble Master Stubble Management system was completed by Dresden University in Germany.
- › They compared the system against the most common method used by farmers in Germany, combining at 14 centimetre stubble height and using the combine's straw chopper to deal with the residue.
- › During the evaluation testers measured diesel consumption, fuel consumption and machine capacity.
- › Tests were conducted in winter wheat yielding 6.5t/ha and grown on medium to heavy soils.



## RESULTS

### COMPARISON OF WORK RATES & FUEL CONSUMPTION

Stubble height	Diesel consumed (l)	Areas covered (ha)	Speed(km/h)	Fuel consumption (l/ha)	Work rate (ha/hr)
26.5 cm	3.5	1.337	13.2	2.6	10.2
36.5 cm	6.8	2.735	13.5	2.5	10.4

### COMBINE WORK RATES & FUEL CONSUMPTION

Stubble height (cm)	Test number	Average speed (km/h)	Area harvested (ha)	Diesel used (l)	Fuel consumption rate (l/ha)	Average fuel consumption (l/ha)	Work rate (ha/hr)	Average work rate (ha/hr)
14.5 : Normal	1	5.1	0.7865	14.3	18.18	18.4	3.33	3.5
	2	5.5	0.7865	14.7	18.69		3.58	
26.5 : Medium	1	6	0.806	11	13.65	13.6	3.91	4.0
	2	6.4	0.806	11	13.65		4.19	
36.5 : Long	1	7.1	0.8255	9.25	11.21	11.4	4.63	4.7
	2	7.2	0.8255	9.5	11.51		4.68	

### CONCLUSIONS

- › Combine work rate increased by 12.5% and fuel consumption dropped by 26% at 26.5 centimetre stubble height.
- › Combine work rate increased by a further 12% coupled with a 12% reduction in fuel consumption when the height was raised to 36.5 cm.
- › Long stubble left by combines with wider headers followed by the Stubble Master provided much better distribution of the mulched material.

## WHAT DOES IT MEAN ON THE FARM?

The farmers who evaluated this system had the following experiences:

- › Changing from normal stubble levels around 15 centimetres up to longer stubble around 35 centimetres decreased their combine's fuel consumption from 20 l/ha to 12 l/ha.
- › Capacity also increased from 3.6 ha/hr to 5.4 ha/hr.
- › Total savings equalled €36/ha
- › The cost of using a Stubble Master 910 with a 200 horsepower tractor, including diesel (costing €0.80/litre) was €10/ha.
- › It needed 2.5 l/ha of fuel and would work at 12 ha/hr.
- › The increased work rate of the combine and the high work rate of the Stubble Master mean you can complete both operations in less time than it would normally take to harvest.
- › Based upon a 720 ha harvest which normally takes 200 hours (3.4ha/hr), the following results have been achieved when increasing stubble height.
  - › **Combining Time = 133 hours**
  - › **Mowing Time = 60 hours**
  - › **Time saving = 7 hours**
  - › **Harvest pressure is greatly reduced.**



## KEY INFORMATION

- › As the combine cutterbar is raised the capacity of the combine increases.
- › A 10 centimetre increase in cutterbar height results in approximately 20% higher combine capacity.
- › Combining long stubbles reduces the through flow of straw through the combine by up to 50%.
- › Combine diesel consumption can be reduced by up to 10 litres per hectare.
- › The risk of carrying stones through the combine is reduced resulting in less downtime and a longer combine life span.
- › Seed separation is improved due to less straw being processed through the combine.
- › Combine capacity is increased therefore in years with difficult weather conditions combining can be completed faster.
- › Harvest is faster and therefore more likely to take place in better weather conditions resulting in lower drying costs and better harvest logistics.
- › Moisture content is 2% lower in long stubble.
- › In long stubble, pulverisation with the Stubble Master results in faster decomposition of crop stubble residues making sowing easier.
- › In long stubble, and especially when following the widest combine headers, utilising a Stubble Master ensures a much better distribution of the cut material.



## KEY INFORMATION

- › Medium stubbles leave straw higher from the ground which aids the drying process.
- › By utilising the Stubble Master, organic material is pulverised and dust particles are quickly added.
- › Microorganisms begin working right away and crop stubble residues start to rot.
- › Pesticide requirements are reduced.
- › Healthier plants develop in the following season.
- › More nutrients are released back into the soil, and the stem mass does not harbour diseases and pests.
- › Through pulverisation decomposition occurs faster.
- › Useful nutrients are released in the growing season, especially nitrogen.
- › Fewer nutrients are washed out of the stubbles over winter.
- › In some crops an effective sprouting of waste seeds is possible.
- › The harvest process is optimised providing similar economic benefits to those seen in long stubbles.

## KEY INFORMATION

- › Maize stubble that is left on the surface following harvest causes problems during cultivation.
- › Important nutrients are contained within the redundant stalks and not released back into the soil effectively unless broken down.
- › Redundant stalks harbour disease and can lead to disease carry over into the following season's crop.
- › The Stubble Master breaks down the redundant stalks and speeds up the decomposition process.
- › In Central Europe the European Corn Borer has ravaged Maize crops surviving over winter by living within redundant stalks.
- › The unique blade design of the Stubble Master "explodes" Maize stalks destroying the habitat and shelter that the European Corn Borer lives within.



## KEY INFORMATION

- › The combined Rape crop often leaves behind many waste seeds which can lie on the ground for up to 10 years as they turn to weed.
- › By effectively pulverising left over Rape stubble close to the ground standing stalks are cleared and waste seed is reactivated.
- › Faster germinating seeds provide improved cover.
- › Pesticide use is reduced.





## KEY INFORMATION

- › If punctual trimming is conducted the Stubble Master can provide benefits in the management of Grass seed.
- › Grass seed trimming needs to take place close to the ground and the angled blade system supports this.
- › As with other crops the pulverisation process supports and contributes towards faster decomposition.
- › The pulverised grass seed straw which is sometimes removed contains up to 20 kilograms of nitrogen per hectare therefore providing valuable nutritional benefits



## CONTROLLED TRAFFIC FARMING (CTF)

- › The Controlled Traffic Farming system is gaining a growing number of followers.
- › Utilising a Combine and Straw Chopper does not always provide the most effective distribution of cut straw. Winds can often further reduce the effectiveness of such equipment.
- › The Stubble Master models are matched to the most common combine header widths pulverising the straw as effectively as the combine but distributing the chopped material more evenly and consistently across the full track width.

## STUBBLE MASTER AND CULTIVATION

- › The Stubble Master is a strong, twin decked machine and as an option can be fitted with a rear towing hitch.
- › Light cultivation and harrowing equipment can be towed behind the machine to provide a simple, one-pass operation.
- › Optimal pulverisation is achieved at the same time as incorporating a better and more broken down residue into the soil.





MACHINE	STUBBLE MASTER 500	STUBBLE MASTER 730	STUBBLE MASTER 910	STUBBLE MASTER 1210
Cutting width	5.06m / 16' 7"	7.26m / 23' 10"	9.09m / 29' 9"	12.10m / 39' 8"
Working machine width	5.20m / 17' 1"	7.44m / 24' 5"	9.32m / 30' 7"	12.31m / 40' 5"
Maximum working length	5.83m / 19' 2"	6.49m / 21' 5"	6.42m / 21' 1"	6.78m / 22' 3"
Transport machine width	2.97m / 9' 9"	2.97m / 9' 9"	3.00m / 9' 10"	3.00m / 9' 10"
Transport height	2.19m / 7' 3"	3.32m / 10' 11"	3.17m / 12' 4"	3.17m / 12' 4"
Machine weight *	2920kg / 6438lbs	3660kg / 8069lbs	6750kg / 14882lbs	7750kg / 17086lbs
Gearbox rating	250hp & 111hp	250hp & 111hp	250hp & 116hp	250hp & 116hp
Cutting range	25 - 400mm / 1" - 16"	25 - 400mm / 1" - 16"	25 - 400mm / 1" - 16"	25 - 400mm / 1" - 16"
No. of rotors	3	5	5	7
No. of blades	18	30	30	42
Blade tip speed	80mps / 15748fpm	81mps / 15944fpm	88mps / 17322fpm	88mps / 17322fpm
Wing work angle	30° up / 7.5° down	30° up / 7.5° down	15° up / 5° down	15° up / 5° down
PTO protection	2-plate slip clutches on rotor gearboxes. Overrun on input shaft	2/4-plate slip clutches on rotor gearboxes. Overrun on input shaft	2/4-plate slip clutches on rotor gearboxes. Overrun on input shaft	2/4-plate slip clutches on rotor gearboxes. Overrun on input shaft
PTO speed	1000rpm	1000rpm	1000rpm	1000rpm
Maximum tractor power required **	120hp / 89kW	160hp / 119kW	190hp / 142 kW	240hp / 179kW

\* Dependent on machine specification \*\* Dependent on conditions

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