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Office for the Prevention of
Damage Caused by Wildlife

REPORT

ON

HWH Airport Lawn Mower Type HS-2 TRIPLEX

AND EXPERIENCE

GATHERED
AT
AALBORG AIRPORT, DENMARK

By

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Research Assistant

Introduction

For years, Danish airports and airbases have been trying to find more efficient ways to maintain their vast grass areas. Aalborg Airport, Denmark, has now found a very satisfactory solution to this problem. This report was written in order to inform other airports and airbases of the method, and it is our hope that it may serve as a source of inspiration or even as the basis for a decision to introduce the novel method.

History and objectives

Lawn mowing at Aalborg Airport used to be covered by a contract with a manufacturer of green pellets. This setup was unsatisfactory for several reasons, and when the contract was discontinued the airport looked for other solutions to the lawn mowing problem. The airport decided to be in charge of lawn mowing itself and examined the market for suitable lawn mowers. One machine was commissioned for a trial period but without satisfactory results. The airport already operated a HWH flail mower with a single flail mover section. This mower had proven excellent performance and it was thought that a wider HWH model would be the right solution. A contact was made to HWH Production A/S, a Danish manufacturer, and the parties agreed to go ahead with the development work.

Development

The development work was carried out as a joint effort by Aalborg Airport and HWH Production A/S ensuring that the airport's requirements were incorporated in the new lawn mower. In principle the lawn mower consists of three standard HWH flail mowers which have been built together. HWH has developed the hydraulic driving line which is required for the flail mowers. This driving line was developed and fitted to the tractor in such a way that it could satisfy the airport's wishes to operate other tools as well.
The HWH Airport Lawn Mower Type HS-2 TRIPLEX--the name of the machine--has been fitted on a newly developed Deutz tractor, model IN-trac 6.30. This tractor is an absolute novelty, and Aalborg Airport was not only the first Danish buyer, but this tractor was the first one to be released for export from the W.German manufacturer after two years of test driving.

Technical description

HWH Airport Lawn Mower Type HS-2 TRIPLEX is a front-end fitted hydraulic flail mower consisting of three flail sections. The two wing sections can be moved to an upright position to facilitate transport. During operation the flail sections are mounted in such a way that they always maintain a horizontal operating position, regardless of the tractor's inclination. The suspensions are moveable to allow the flail sections to always follow the ground surface. Mounting on the tractor is obtained by means of an A-frame and hydraulic hose quick coupling. The hydraulics are driven by an external power unit suspended at the rear-end tractor three-point hitch, driven by the PTO shaft. The inner side of the flail section shield features a replaceable corrugated lining designed to ensure that the cut-off grass is whirled back to the flails. Owing to this feature the grass is completely shredded, and the high peripheral speed of the flails effectively blows the shredded grass downward between the grass stubs. The tractor's front lift features a system for variable surface contact pressure, patented by HWH Production A/S, Denmark. The load distribution is controlled from the cabin and is monitored directly on a visual control dial.

Technical specifications:
HWH Airport Lawn Mower Type HS-2 TRIPLEX

Flail sections:	3 sections of 1.9 m	Cutting speed:	5-6 km/h at max. output
Operating width:	5.7 m	Cutting height:	5-9 cm
Total width:	6.2 m	Coupling:	Cat. 2 Accord. 3 frame
Transporting height:	approx. 3.6 m	Driving station:	24 l min - 210 bar
Weight:	2,200 kgs	Number of flails:	42 per section
Power requirement:	min. 60 KW engine	Flail revolutions:	Optimally 1 [illegible]

The tractor is a Deutz IN-trac 6.30. Being a forwarder tractor, the engine is positioned below the cabin behind the front axle. This tractor features 4-wheel drive, wheels of identical size and 50/50 weight distribution. It is front-wheel controlled and has front and rear lift and PTO. The engine is a 6-cylinder, air-cooled 85 kW diesel with mechanical transmission. A small bed is mounted above the rear axle for tools.

The Deutz IN-trac series differs from the competition by having a unique placing of the cabin which affords an excellent view of front-end fitted tools. The Deutz tractor has a very large glass area, particularly in the forward direction but also downward and in the sides. Other tractors could have been used for the HWH Airport Lawn Mower Type HS-2 TRIPLEX. The only requirement is an engine output of approx. 90 kW, and it is an obvious advantage with optimum view of the mower sections. A Mercedes-Benz Unimog model U 1300L with a 6 cylinder 96 kW diesel engine could be applied as well as a farm tractor with a reversely-mounted operator's seat and the mower mounted on the rear lift.

Technical specifications:
Deutz IN-trac 6.30

Engine:		Dimensions:	
Output:	95 kW at 2417 RPM	Length:	5164 mm
Number of cylinders:	6 air cooled	Width:	2390 mm
Volume:	6128 ccm	Height:	3150 mm
Max. torque:	384 Nm at 1610 RPM	Axle base:	2703 mm
Torque inclination:	13%	Clearance:	510 mm
Transmission:		Weight:	6200 kgs
Speeds:	32 forward, 8 reverse	Hydraulics:	
Driving speed:	0.42-30.9 km/h	Pumping capacity:	58.5 l/min - 175 bar
PTO:		Lifting capacity,	
Output:	75.6 kW	front/rear:	4400/6300 daN
Econ:	1000 RPM		
Rear:	540/1000 RPM		

Technical specifications:
Mercedes-Benz Unimog model U 1300L

Engine:		Dimensions:	
Output:	96 kW at 2800 RPM	Length:	5110 mm
Number of cylinders:	6	Width:	2300 mm
Volume:	5675 ccm	Height:	2610 mm
Max. torque:	361 Nm at 1600 RPM	Axle base:	3250 mm
Transmission:		Clearance:	490 mm
Speeds:	8 forward, 8 reverse (creep speed)	Weight:	3900 kgs
Driving speed:	6.0-75.0 km/h		

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Experiences

Aalborg Airport has gathered experiences during a trial period in 1988 and a full season in 1989. The tractor has performed without any problems, the only interruption being a material fault on a part which was replaced under the guarantee. The tractor and the mower thus bear witness of good workmanship and a fully developed quality.
Similarly, the mowing quality fully satisfies expectations. As the mower is front-end mounted, the grass is untouched before mowing, and together with the variable surface contact pressure system, which distributes the weight of the heavy machine evenly on all supporting points, this ensures that the grass rises immediately after mowing. The shredded grass is injected by the flails between the grass stubs. Thanks to this technique, the grass does not become yellow, and the fine micro climate at the grass roots ensures rapid growth. Humus is added to the soil, and earthworms and micro organisms thrive well in this humus layer. The soil is ventilated and the water balance is improved. The result is a much healthier lawn. The need for fertilizers is essentially reduced as a consequence of the improved micro climate and because bio mass is not removed from the area.

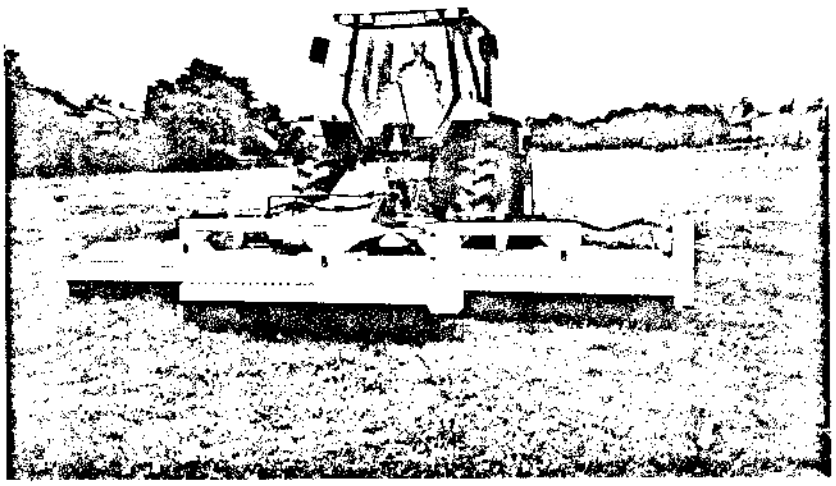
Aalborg Airport has approx. 250 hectares of lawn which needs mowing. During 1989 this area was mowed three times and work consumed 90, 92 and 92 tractor hours. However, approx. 90 hours represents only actual mowing time, and it should be expected that some time is spent on daily cleaning. Particularly in dry weather the lawn mower leaves plenty of cleaning to be done as the tractor becomes covered by shredded grass and earth particles. The total consumption of time including preparing, mowing, cleaning and service totalled 30 days per time. This equals a performance ratio of 2.8 hectares per driving hour and 1.5 hectares per hour, equal to approx. 12 hectares per working day. It is estimated that 1989 was an average year regarding the growth conditions for grass.

PRODUCTION AND SALE

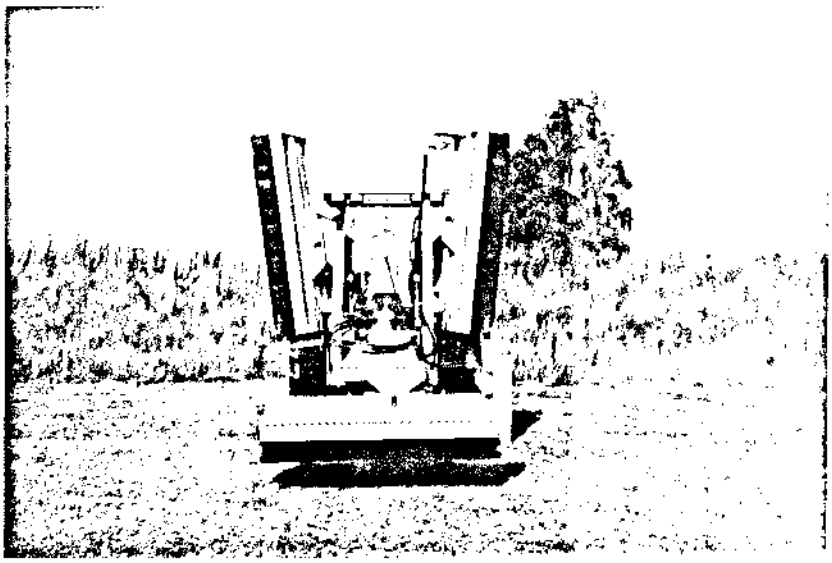
The HWH Airport Lawn Mower Type HS-2 Triplex is produced and sold by:

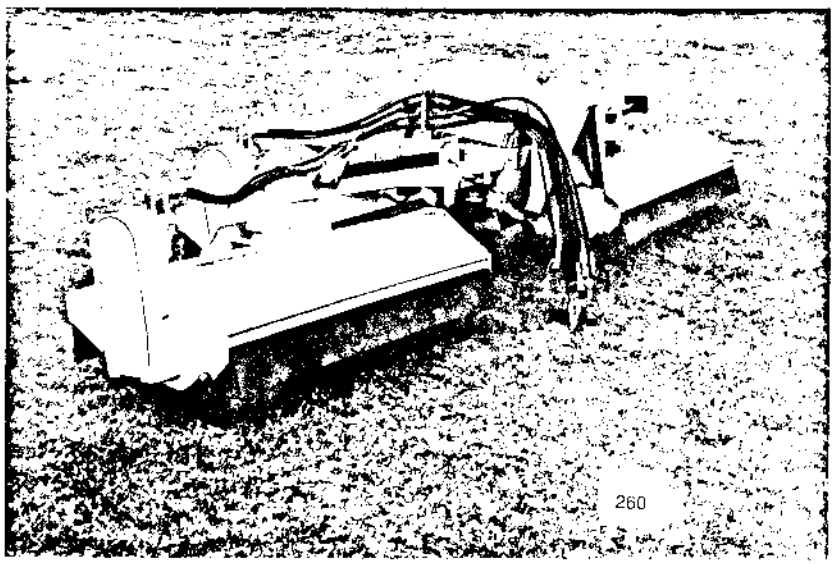
HWH production a/s
Østergade 73
DK-9560 Hadsund
Denmark

Tlf. nr. + 45 98 57 47 66
Fax. nr. + 45 98 57 49 77

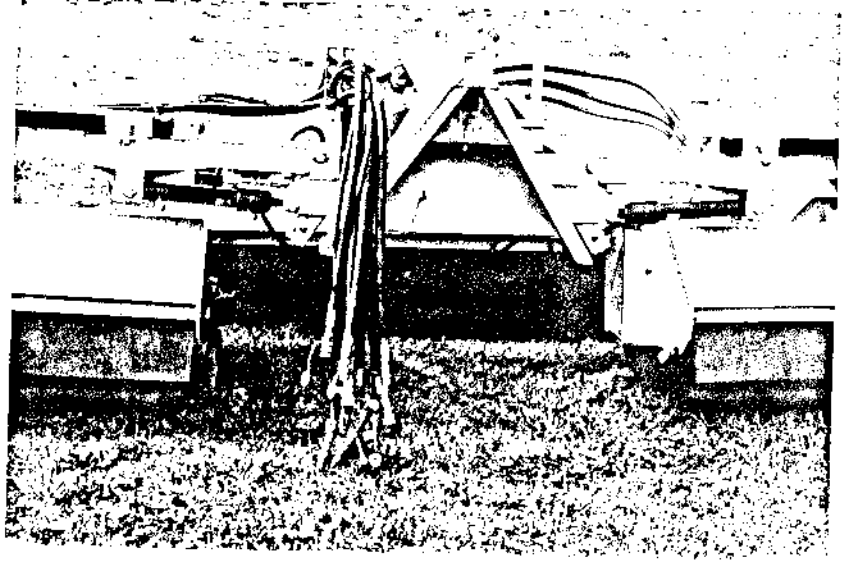


HWH's airport lawn mower type HS 2 triplex in transport position. The same space saving position is of course usable when demounted or using the built in supporting legs.



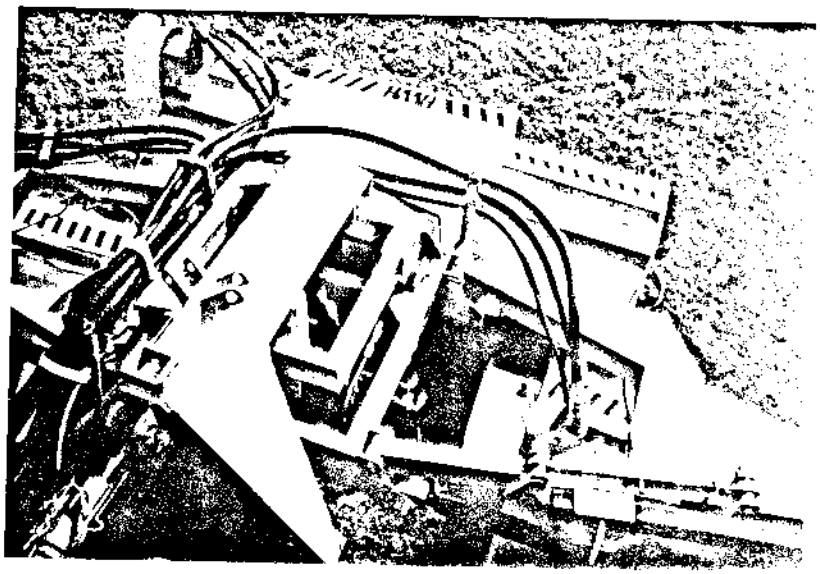


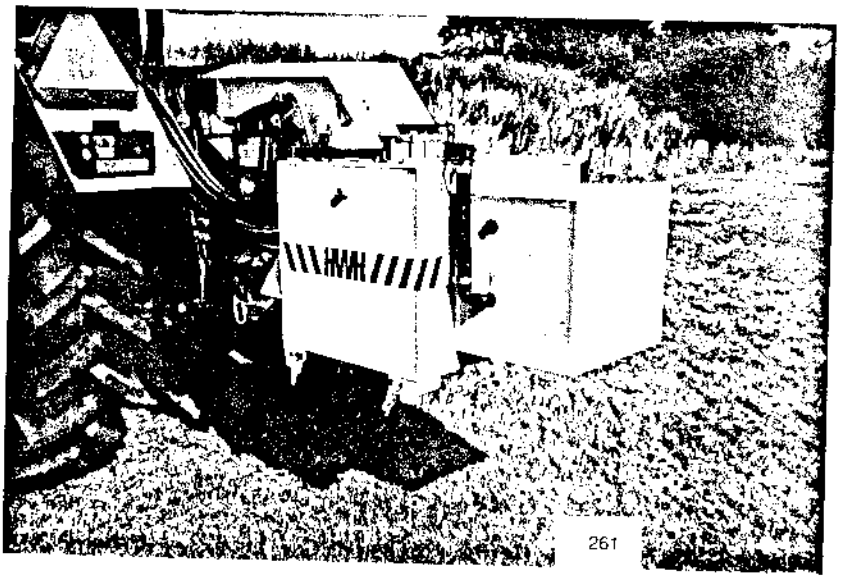
HWH's airport lawn mower type HS 2 triplex is made of 3 pcs. 1,80 m or 2,40 m cutting units. They are with the special knives and built in skid plates designed to fulfill the special demands of the airport for mowing.



HWH's airport lawn mower type HS-2 triplex is with the integrated A frame coupling very easy to couple and uncouple, in spite of its size and weight it only takes a few minutes.

HWH's airport lawn mower type HS-2, special triplex suspension that is built together with the A-frame coupling enables each cutting unit "float" on the grass by use of the patented variable surface contact pressure.





HWH's hydraulic power pack, here shown in the open position clusive of A coupling and oil cooler. It can be delivered in other different versions according to the customer's wish.