German Engineering with Passion.

TWIN WIDE 14

Technical fact sheet

- Electrically powered
- Radio remotely controlled
- Loads and unloads the nosewheel automatically with one click on the remote
- Only 1 person required for operation
- for example for Military transport Aircraft, Regional Airliner, Narrow-Body Airliner, Business-Jets

The safest and most effective way of moving aircraft towbarless.

Electrify your Ground Handling.

Towing capacity up to 85 t (187.400 lbs)

mototok® easy moving

3196 – 10/2015

Mototok. Generate more Space in your Hangar.

Move Aircraft the innovative Way.

Operate more precisely.

mototok® easy moving

Design Philosophy

The underlying philosophy to the design of all our equipment is that it utilises the latest technology applicable to its sphere of operation and is (relatively) lightweight and portable in nature.

Mototok excels in narrow situations: Park your aircraft safely, easily and effectively where you want: In the hangars corner, directly towards the hangars wall or near by other aircraft in the hangar. Save space in the process – depending on your hangar situation up to 40%.

Operating with normal tugs with or without a towbar is intricate. Turning the nose wheel whilst maneuvering without moving the aircraft is impossible. And you have to consider the exit path of the tug. Thus parking the aircraft with old technology is unprofitable. You are not able to use your hangars full capacity.

The low height, the compact design and the radio remote control of mototok tugs gives you the fully control of the hangars space. It saves costs through optimized use of limited space.

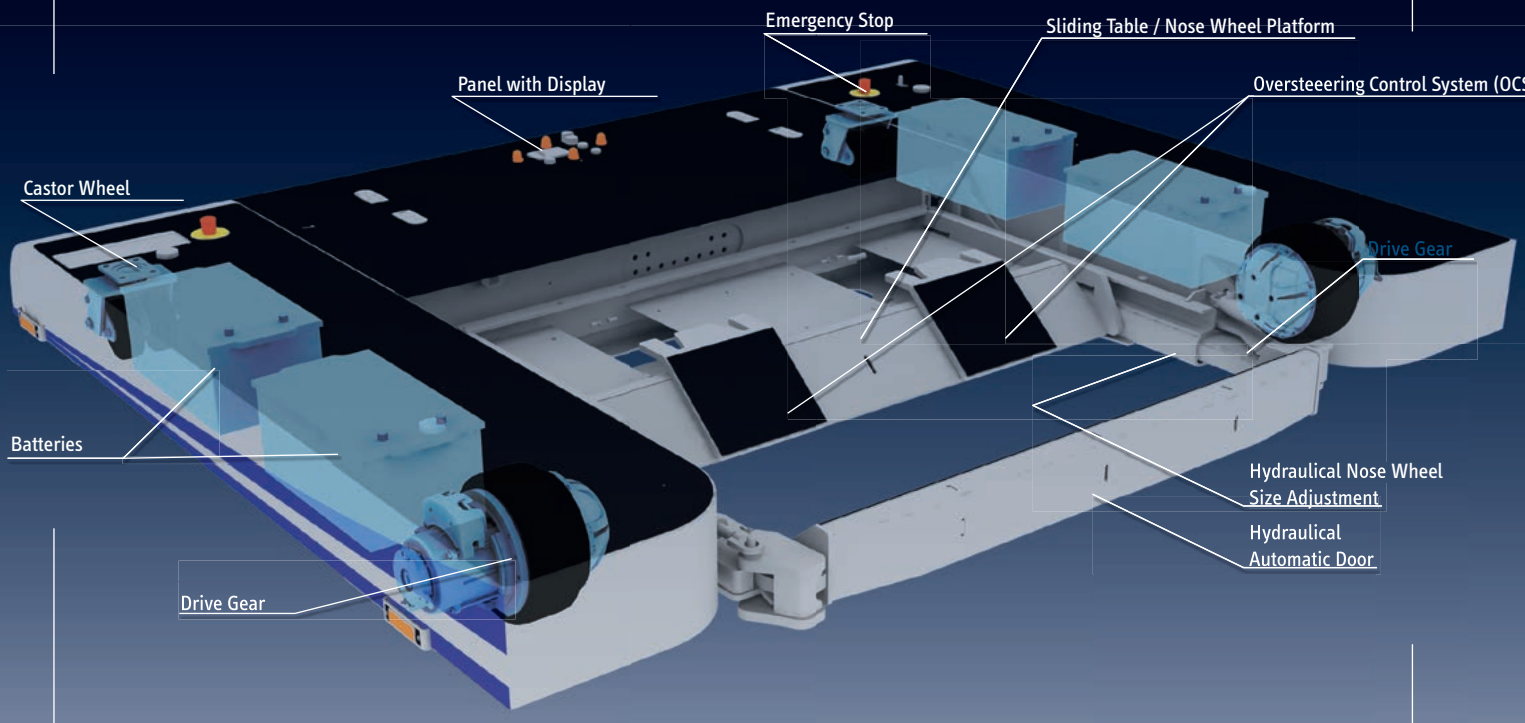
The 4 biggest advantages of using an electric driven mototok-tug

1. **Cost effective.**
   - Low personnel costs by means of wireless transmission control – the operator is essentially a "wing walker" himself.
   - Increases the number of aircrafts in your Hangar.
   - No driving licence required.
   - Extremely low maintenance costs, no maintenance plan necessary.
2. **Safe.**
   - Hydraulic fixation of the nose wheel.
   - Fully programmable speeds, braking curves, initial torques and over steering protection – Controlled and regulated by internal microprocessor.
   - Gentle treatment of the landing gear with a built in hydropneumatic system.
3. **Flexible.**
   - Maneuver a wide range of aircraft with the same mototok-model – ONE MACHINE for all corporate aircraft single or double nose wheel including helicopters.
   - Connect the aircraft from the front or the rear.
   - Hydraulic nose wheel adjustment – for different nose wheel diameters.
   - 100 % circumferential visual control around the aircraft. No knocks. No collisions. Optimum use of limited space!
4. **Easy-to-use.**
   Docking takes a matter of seconds from the rear or front of the nose wheel. Simply drive the mototok up to the nose wheel. The wheel is then hydraulically fixed firmly in position and raised – ready for take off! All this with no awkward strap, no inconvenient winch. No bolts or tools are required.
   - Radio remote controlled operating under an industrial frequency code approved for airports.
   - Automatic connection to the aircraft's nose wheel with one click.
   - No straps, no winch, no tools required.

Description

Mototok is a battery powered pedestrian controlled vehicle capable of moving a wide range of aircraft types.

Mototok is steered by a remote console connected to the tug either via radio or a coiled steel wired armoured cable of 15 meters length (extended). This enables the operator to view the aircraft and tug from the safest position whilst giving the best visibility. The tug can be positioned, engaged and disengaged from the aircraft by the operator remotely.



mototok® easy moving

Only mototok generates up to 40% more space in your hangar.

mototok excels in tight situations: Park your aircraft safely, easily and effectively where you want: In the hangars corner, directly towards the hangars wall or near by other aircraft in the hangar. Save space in the process – depending on your hangar situation up to 40%.

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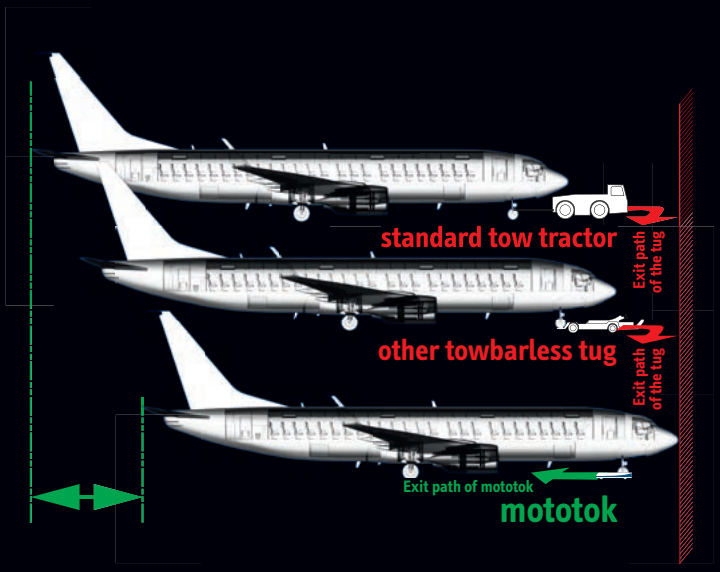
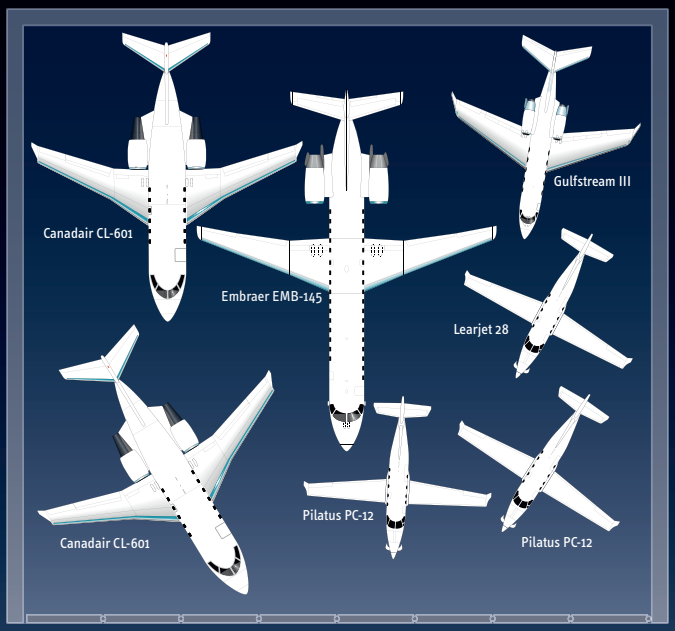




Typically situation in a hangar – managed with a conventional tow tractor. The biggest disadvantages are:

— All aircraft faces to the hangars gate because you have to consider the exit path of the tow tractor. Parking directly in a hangars corner is impossible.

— The distance between the aircraft has to be acceptably big. Maneuvering with a tow tractor means you have to move the machine to turn the nose wheel. Turning the nose wheel without moving the aircraft is impossible!

You are not able to use your hangars full capacity!

Same hangar with electric wireless remote controlled mototok aircraft tug:

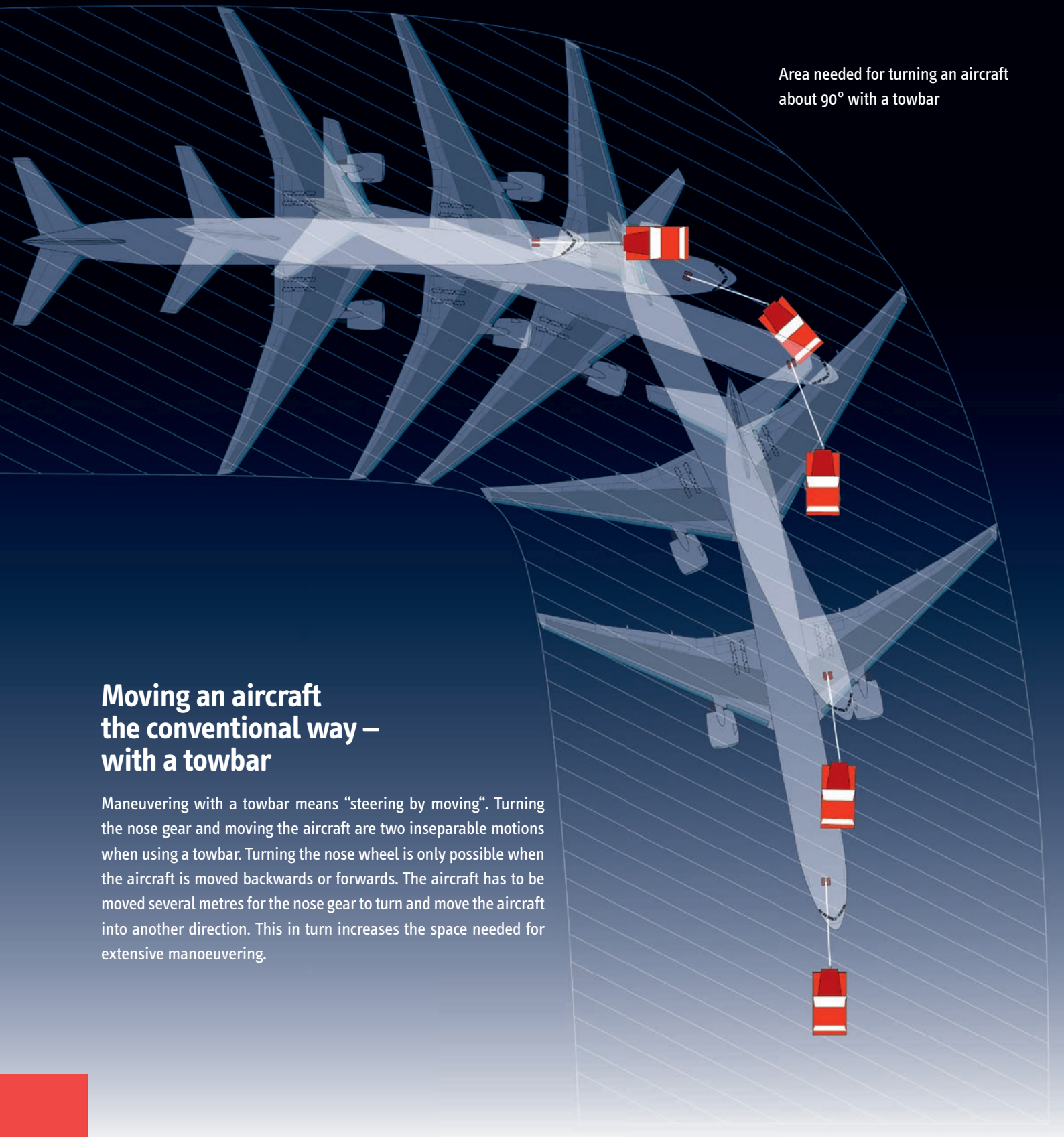
+ Park your aircraft directly towards a wall or in the hangars corner. You don't have to consider the exit path of mototok due to mototoks very compact design.

+ „Stack“ aircraft – park your aircraft with extreme minimal distance. Mototok turns the nose wheel on the spot with no movement of the aircrafts fuselage or wingtips. Maneuvering in extreme narrow situations is from now on no problem.

Increase the capacity of your hangar up to 40% by optimizing parking space!

mototok® easy moving

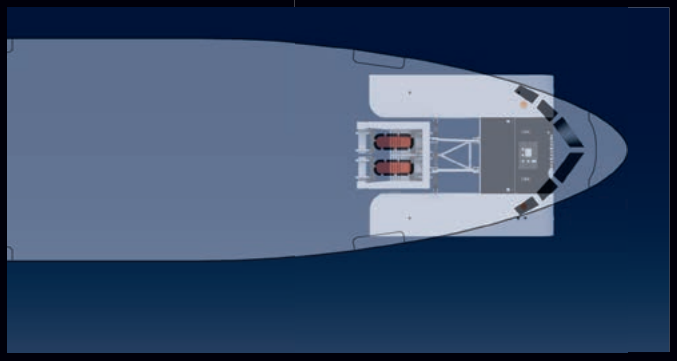
Why does mototok saves parking space in your hangar?

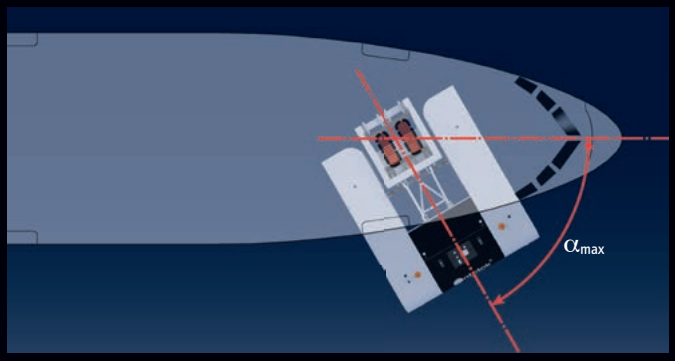


Area needed for turning an aircraft about 90° with a towbar

Moving an aircraft the conventional way – with a towbar

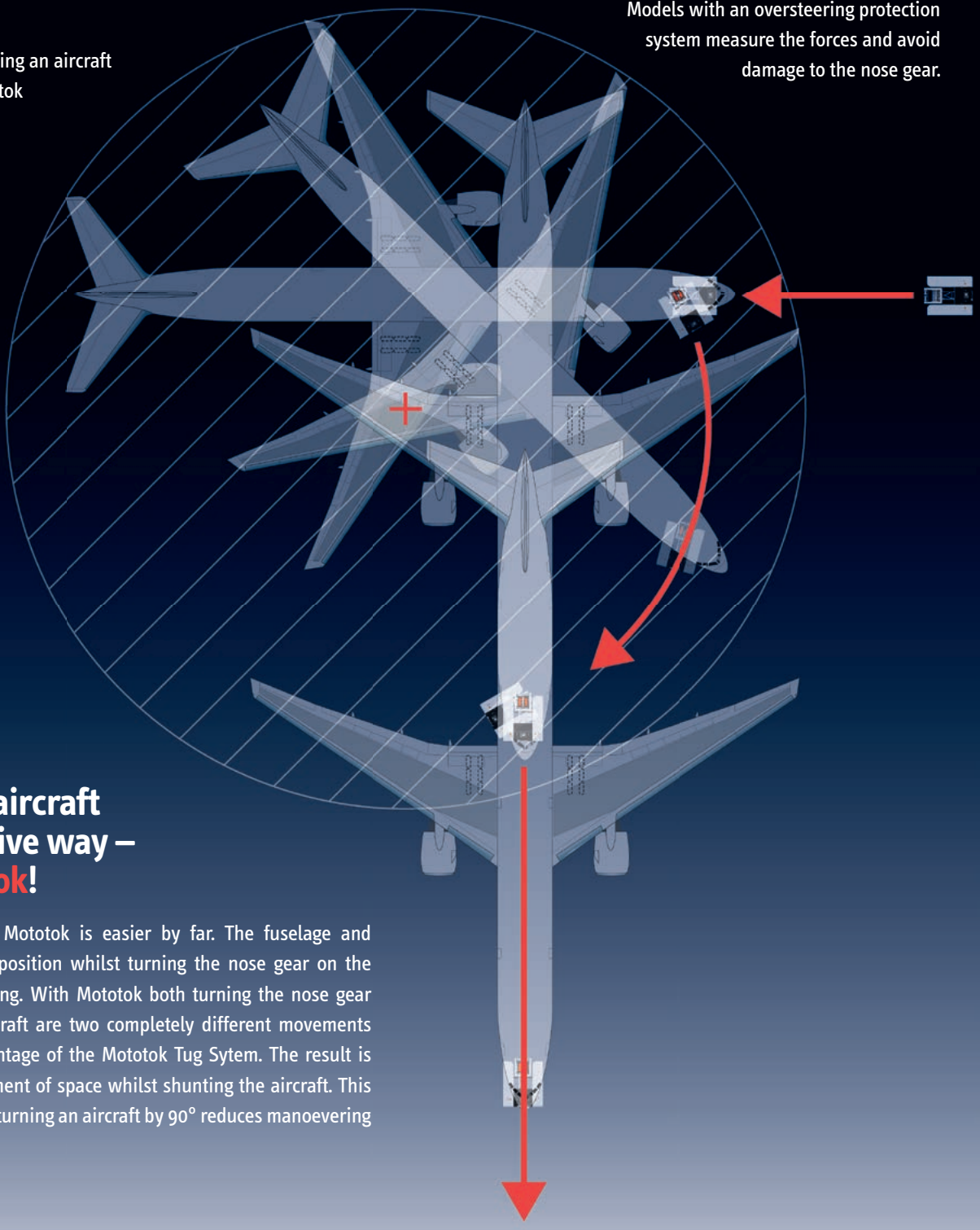
Maneuvering with a towbar means “steering by moving“. Turning the nose gear and moving the aircraft are two inseparable motions when using a towbar. Turning the nose wheel is only possible when the aircraft is moved backwards or forwards. The aircraft has to be moved several metres for the nose gear to turn and move the aircraft into another direction. This in turn increases the space needed for extensive manoeuvering.





Models with an oversteering protection system measure the forces and avoid damage to the nose gear.

Area needed for turning an aircraft about 90° with mototok



Moving an aircraft the innovative way – with mototok!

Manouevering with Mototok is easier by far. The fuselage and wingtips remain in position whilst turning the nose gear on the spot for manoeuvering. With Mototok both turning the nose gear and moving the aircraft are two completely different movements – the deciding advantage of the Mototok Tug Sytem. The result is a minimum requirement of space whilst shunting the aircraft. This example shows that turning an aircraft by 90° reduces manoevering space to a circle.

mototok® easy moving

The biggest advantages of using an electric driven mototok-tug

1. **Cost effective.**
   - Low personnel costs by means of wireless transmission control – the operator is essentially a “wing walker” himself.
   - Increases the number of aircrafts in your Hangar.
   - No driving licence required.
   - Extremely low maintenance costs, no maintenance plan necessary.

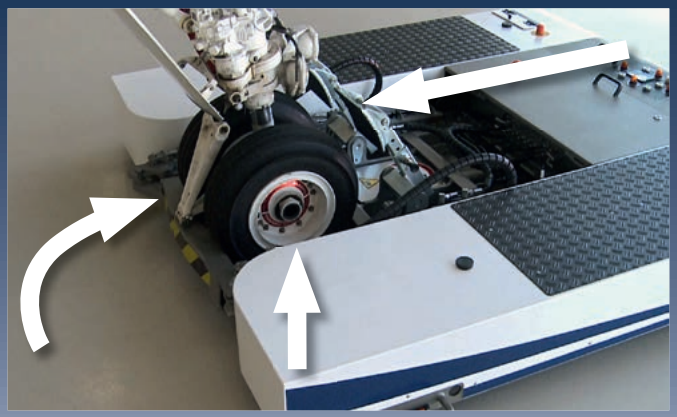
2. **Safe.**
   - Hydraulic fixation of the nose wheel.
   - Fully programmable speeds, braking curves, initial torques and over steering protection – Controlled and regulated by internal microprocessor.
   - Gentle treatment of the landing gear with a built in hydro-pneumatic system.

Towing with a conventional Tractor:
At least 4 Persons needed

Circumferential view – only one person with a radio remote control (RRC) needed for moving the aircraft

3. Flexible.

- Maneuver a wide range of aircraft with the same mototok-model – ONE MACHINE for all corporate aircraft single or double nose wheel including helicopters.
- Connect the aircraft from the front or the rear.
- Hydraulic nose wheel adjustment – for different nose wheel diameters.
- 100 % circumferential visual control around the aircraft. No knocks. No collisions. Optimum use of limited space!

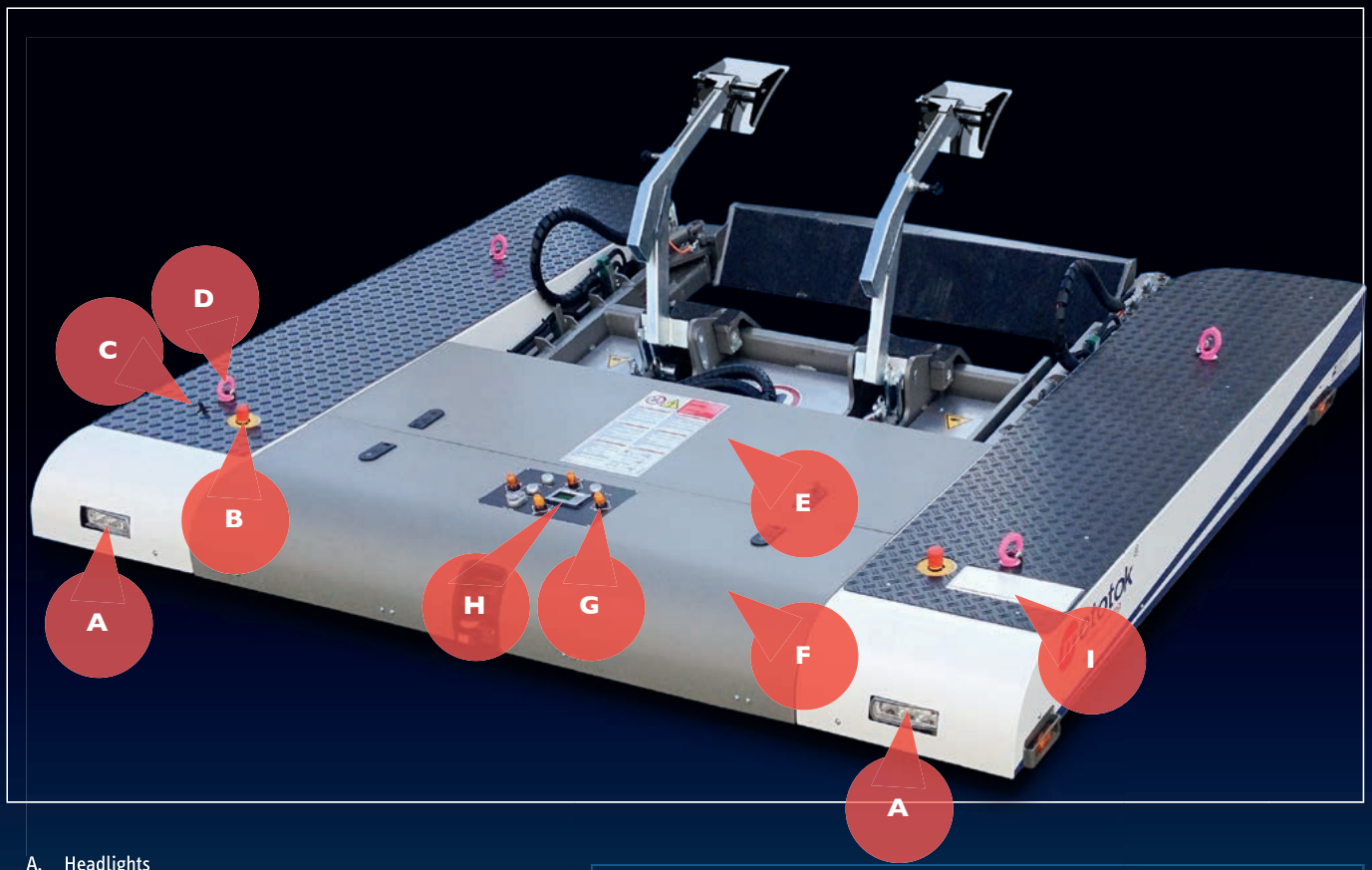


4. Easy-to-use.

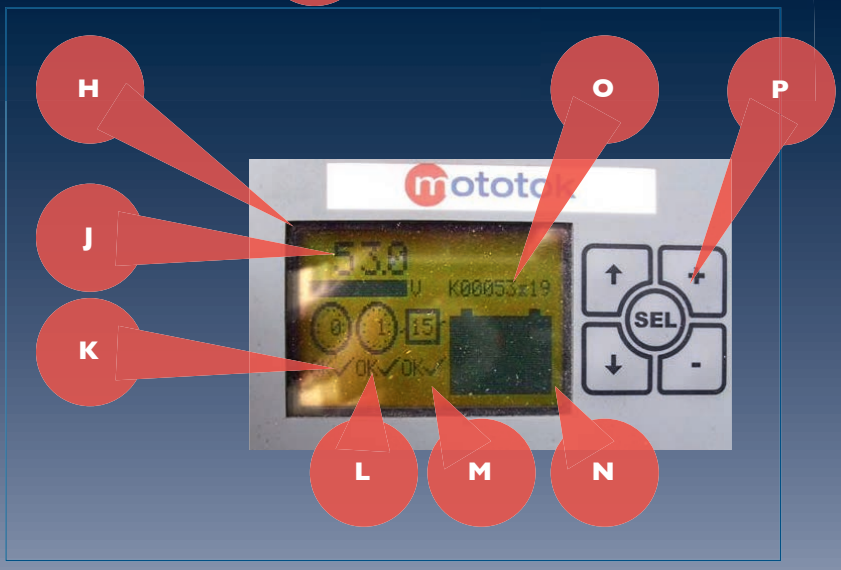
Docking takes a matter of seconds from the rear or front of the nose wheel. Simply drive the mototok up to the nose wheel. The wheel is then hydraulically fixed firmly in position and raised – ready for take off! All this with no awkward strap, no inconvenient winch. No bolts or tools are required.

- Radio remote controlled operating under an industrial frequency code approved for airports.
- Automatic connection to the aircraft's nose wheel with one click.
- No straps, no winch, no tools required.

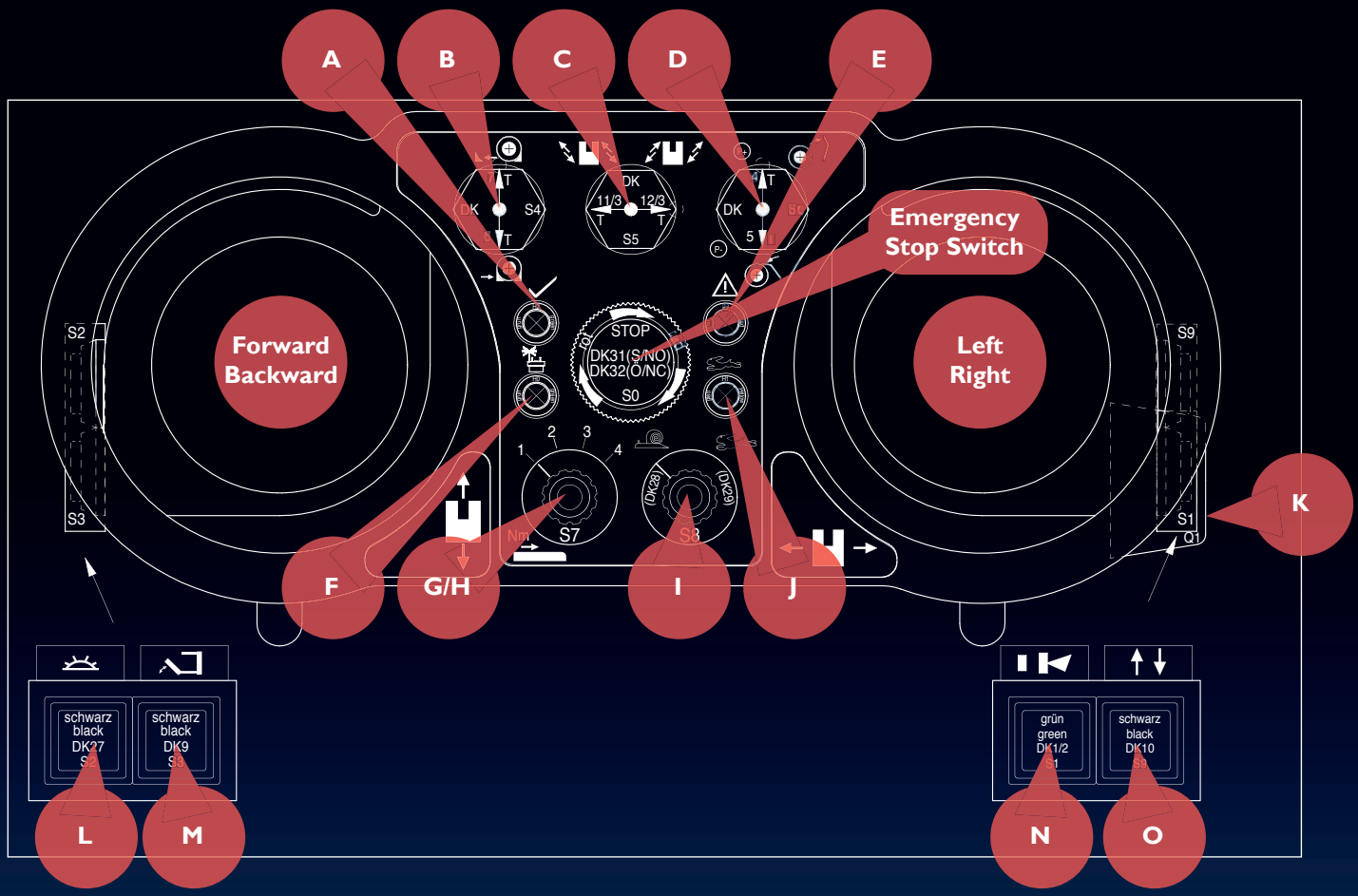
Operating Elements and Display



A. Headlights
B. Emergency Stop
C. Antenna
D. Thread for the pink Transporting Eyebolts
E. Hydraulic Compartment
F. Electrical Compartment
G. Driving Direction Indicator Lights
H. Display
I. Charger / Ground Power Socket
J. Battery Voltage
K. Display of the left Drive / left Drive Error Code
L. Display of the right Drive / right Drive Error Code
M. Control Board Error Code
N. Battery Level
O. Operating Time Indicator
P. Analysis & Programming Panel – provides the analysis of possible defects and the programming of key parameters (only for authorized personnel)



Remote Control



A. Green LED indicates that the main instrument is switched on.

B. The switch for the sliding table can be pushed upwards (sliding table moves backwards) and downwards (sliding table moves forward). The switch jumps back automatically to the middle position. When actuating the switch, the sliding table will be moved towards the nose wheel until the hydraulic push button switches off. When the hydraulic push button has switched and the elevating platform has not been raised, it is not possible to drive. The driving function is interrupted until the platform is in the upper end position.

C. The safety clamp sensing device can be pushed upwards and downwards. Hereby the safety clamp moves towards the nose wheel and back. The switch jumps back automatically to the middle position. If the sensing device is pushed for longer than necessary an overflow valve opens to ensure that there is always sufficient pressure on the nose wheel and that it is not overstrained. The safety clamp's job is to prevent the nose wheel from lifting. This is specially important for aircraft whose engines are located behind the main fuselage.

D. Touch switch for headlights and working lights.

E. Not in use. Disregard

F. Non-stop flashing red LED light shows a connection loss. If the LED flashes very fast, the radio transmission to the vehicle is malfunctioning. If the LED slowly fades out, there is an interruption of the CANBUS transmission from the remote control to the control board.

G. Rotary selection switch – The sensitivity of the steering joystick can be altered.
Position 1: lowest sensitivity. The steering reacts sluggishly.
Position 2: raises the sensitivity by 10%.
Position 3: raises the sensitivity by 20%.
Position 4: raises the sensitivity by 30%

H. Vehicles with automatic track guiding system (AGV):
Position 4: track guiding system is switched on
Position 3: track guiding system off, vehicle drives at the same speed as it does with track guiding
Position 2: vehicle drives with lowered platform at normal fast speed and with raised platform at slow speed
Position 1: normal speed as preselected with switch I

I. Rotary switch for setting the speed (fast/rabbit or slow/snail)

J. Green control LED, indicates that the fastest speed has been selected.

K. On/off switch for remote control. By turning the black rotary knob the vehicle is switched on. The black rotary knob can be pulled out and is a key. If the key switch is turned clockwise, two acoustic signals will sound, which means that the remote control has found a free channel. Now only the green reset N has to be pushed and the vehicle is ready for use

L. Only military version. Switch from white to red light (combat lighting)

M. Button for door open and door close. If the button is pushed repeatedly, the door moves in the opposite direction. Only vehicles with automatic doors.

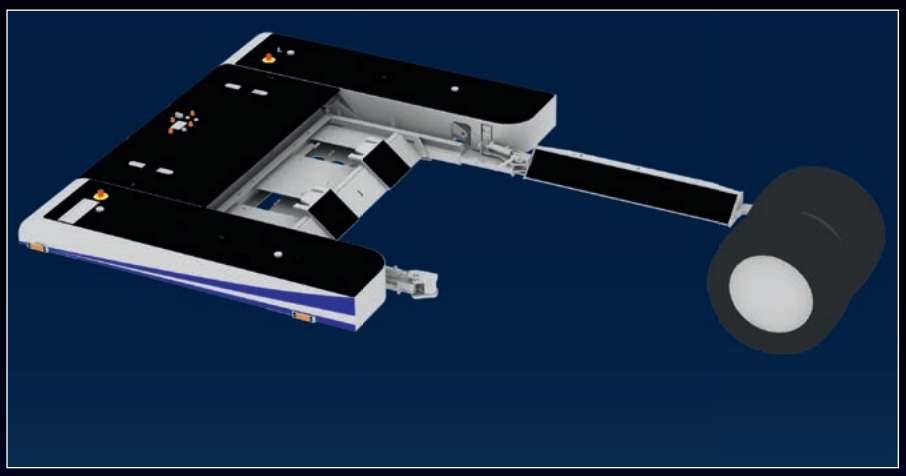
N. The green button must always be pushed after switching on the remote control. It is used for controlling the safety systems. The safety systems have to go through a function test before every start-up. If there is no RESET (green button) the Mototok does not react to the joystick or any other button command.

O. Button for raising and lowering the lifting platform. Raising the lifting platform is done by clicking twice within 0.5 seconds as with a computer mouse. When the platform is up, it can be lowered by clicking once. If the platform is lowered, the sliding table moves back automatically and gives the nose wheel free.

Operating Procedures

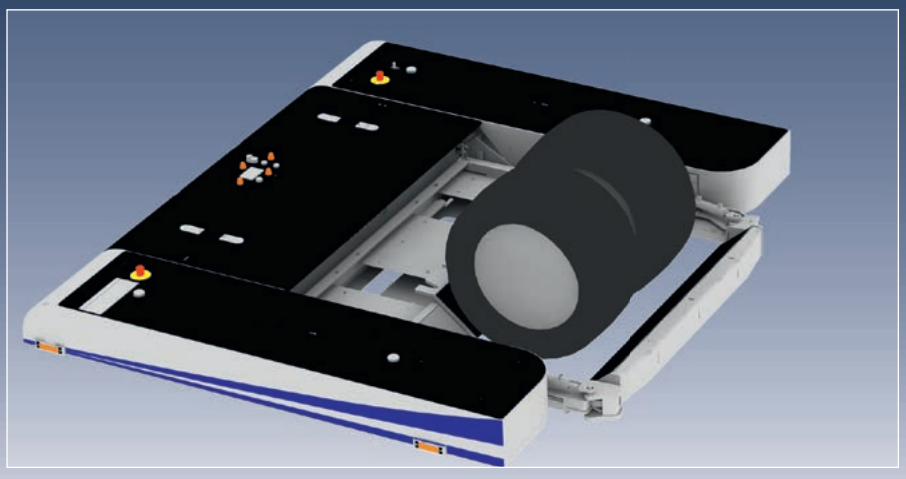
Engaging and Disengaging the Nose Wheel

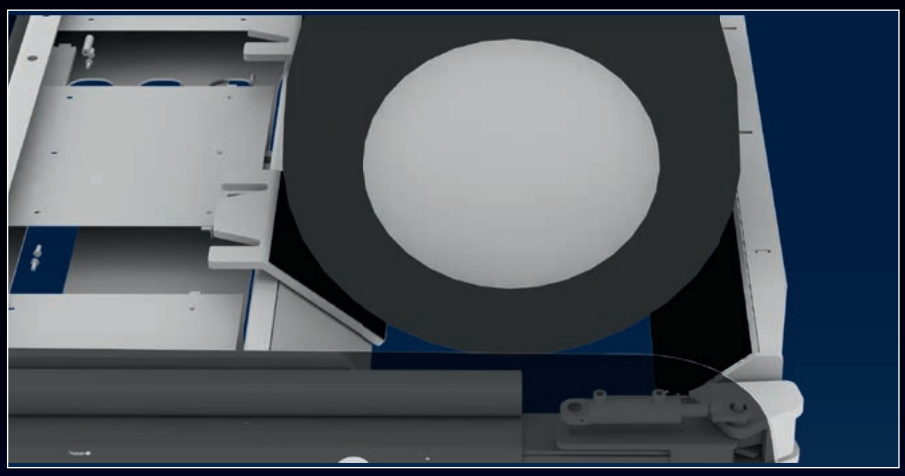
The engaging procedure can be started automatically by pressing just one button on the remote control:



1. Drive the Mototok with opened hydraulical door and lowered platform towards the nose wheel of the aircraft until the nose wheel touches the sliding table. Then press the start-button on the remote control.

2. The hydraulical door closes.





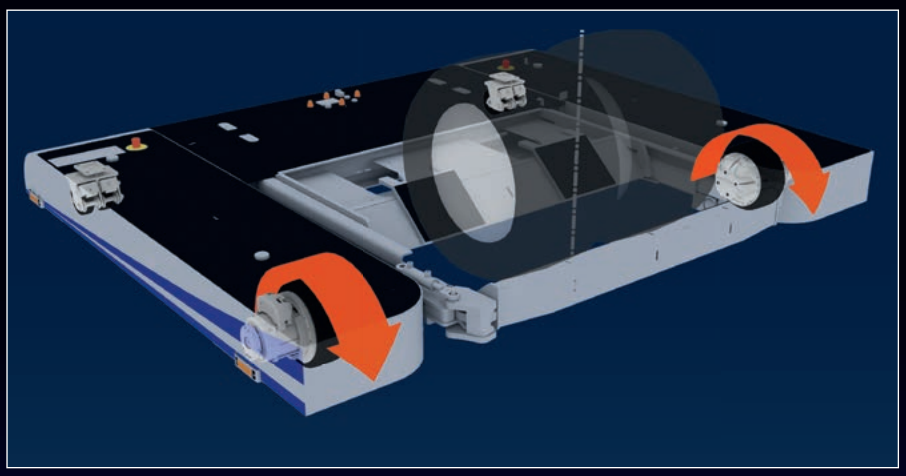
3. The sliding table presses the nose wheel towards the closed hydraulical door until a specified pressure is reached.

4. The platform lifts up and raises the nose wheel

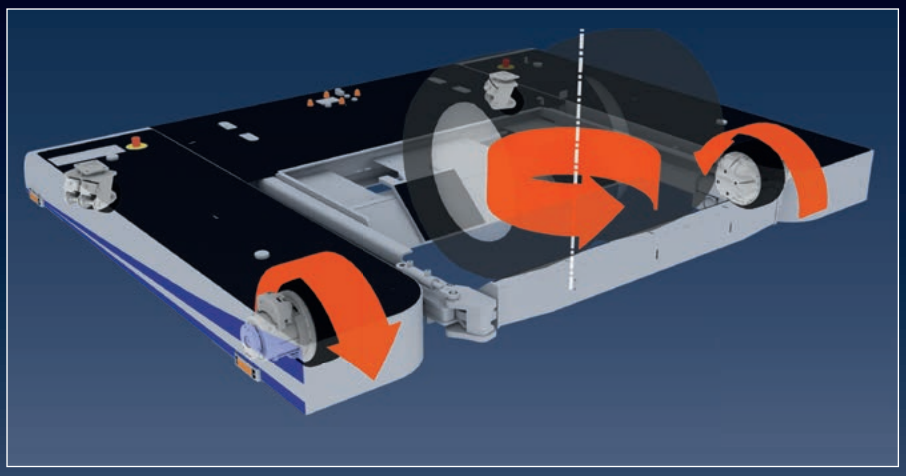
Operating Procedures

Maneuvering

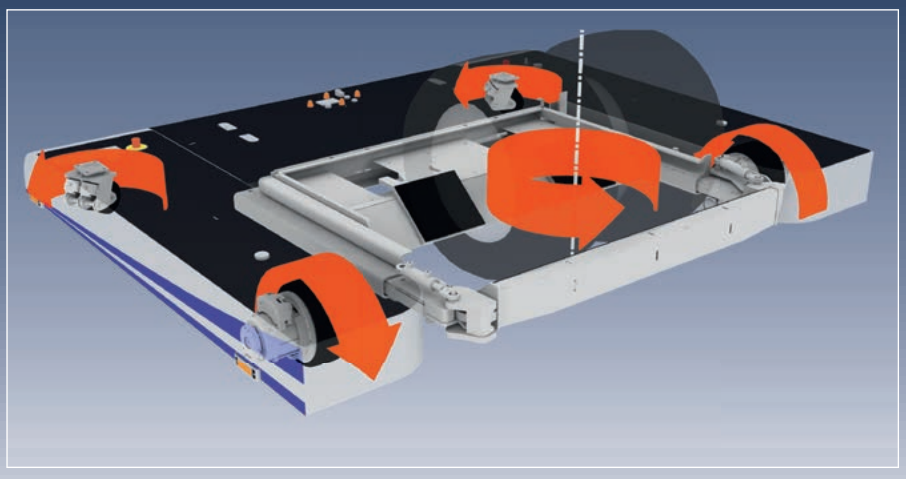
Mototok is extremely manoeuvrable and intelligent. The steering of a mototok is performed through different rotating speed of both processor-controlled wheel-hub motors. These carefully control the torque proportionally to each of the drive wheels.



A perfect turn on the spot is naturally no problem: one motor rotates forwards, the other backwards. Both motors recognise rotational resistance and carry out a precise turning manoevre.



For better maneuvrability on slippery ground like on aircraft carrier Mototok equips the military models with an active 4-wheel-steering system. It calculates simultaneously the steering angles to give true Ackermann steering to the castor wheels. Mototok can also automatically readjust its steering geometry to enable it to rotate on its own axis (turning on the spot).



Accessories

Trailor coupling adaptor

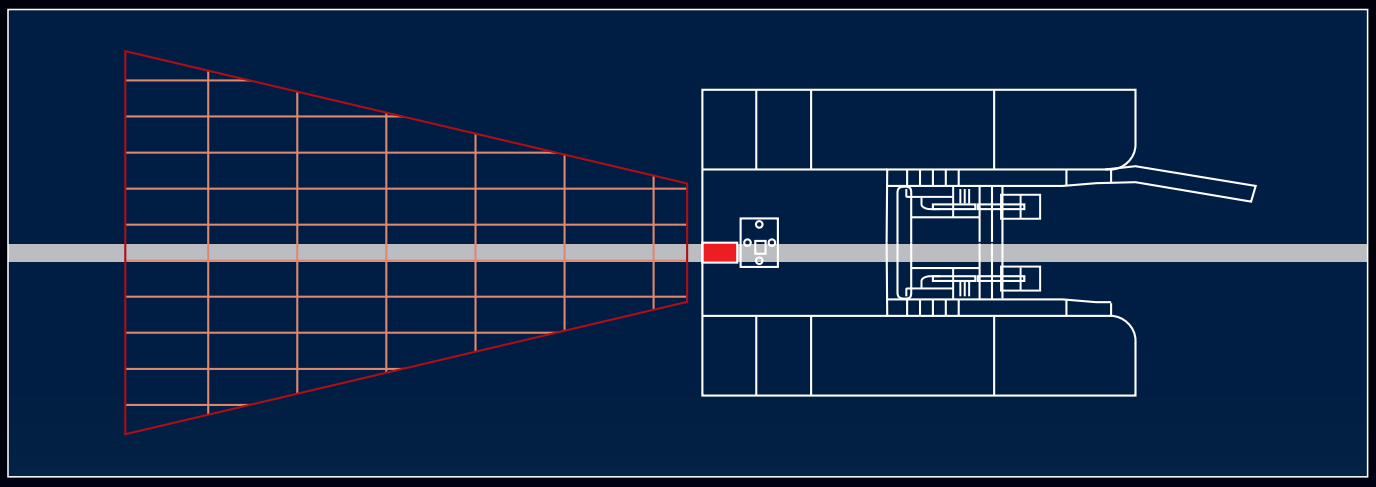
for multi-functonal extensions

Cable for Radio Remote Control

Insert the optional cable connection switches off the radio function automatically.

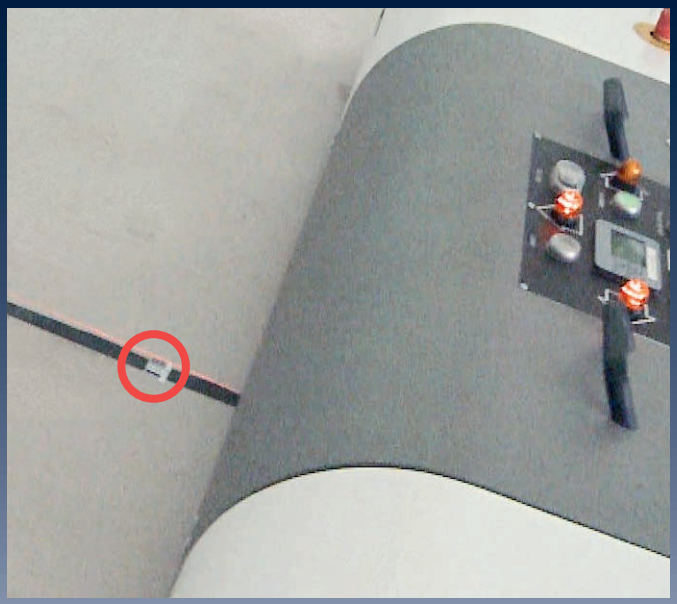
Automatic camera-guided steering control

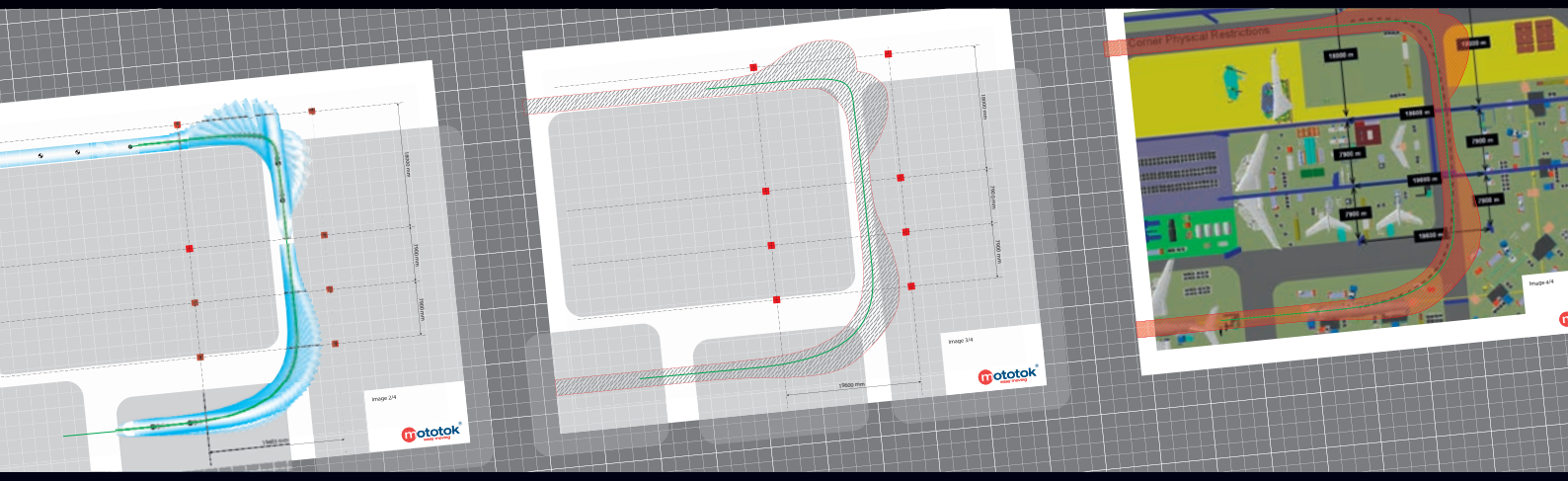
AGV
AUTOMATIC GUIDED VEHICLE

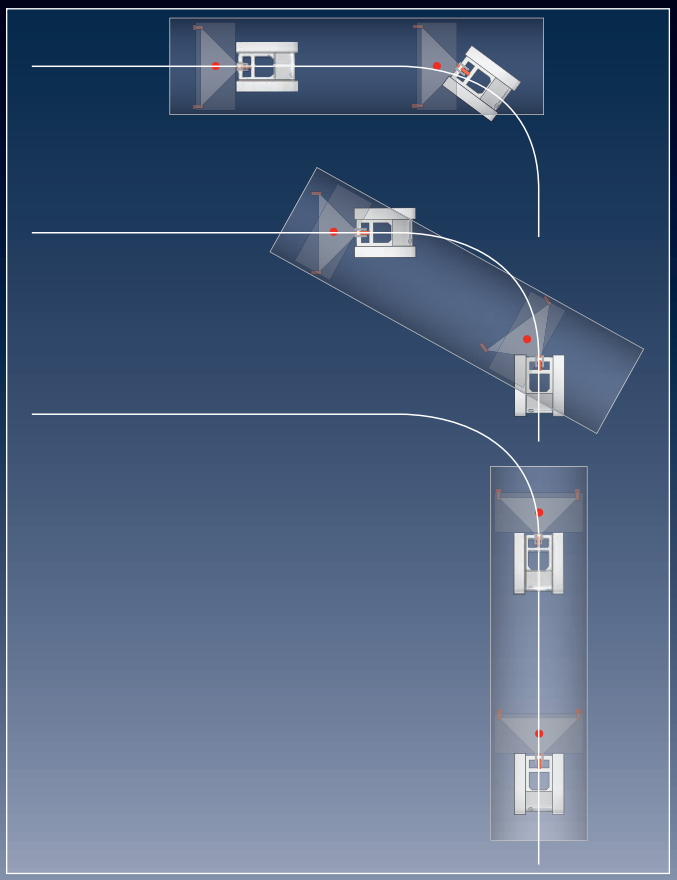


The principle: A camera continuously scans the floor below the Mototok. A solid line of defined width is recognized as the guiding line. Next the camera recognises the position and curvature of the guiding line to within 3 mm and when there is a variation in parallelism it reacts with control signals that are led to the drive wheels. By means of different rpms of the two drive wheels, steering is then initiated – the Mototok follows the line.

Bar codes on the floor make automatic steering of the Mototok possible, e.g. if there is a junction, a change in speed or a stop.





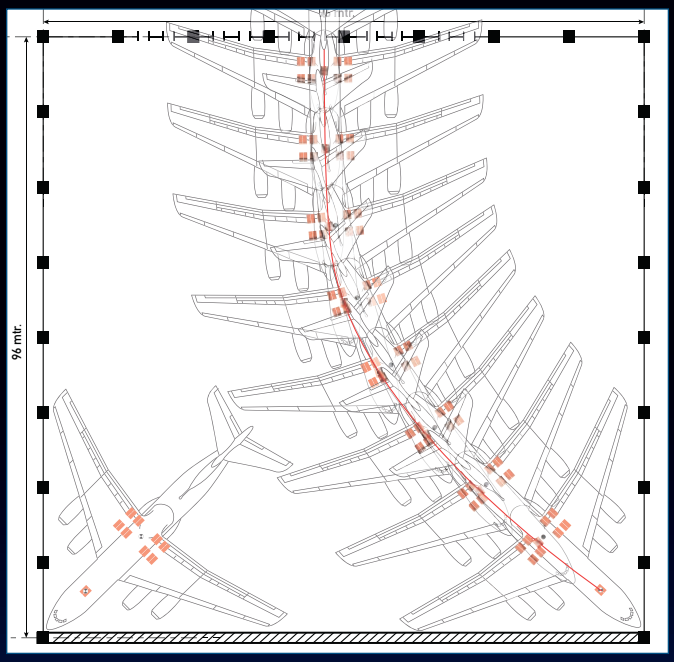


On production lines during aircraft manufacture, Mototok is a versatile tool that can be used with great flexibility. During assembly, Mototok automatically moves the aircraft fuselage to the individual assembly points. In very space-restricted production environments, two synchronized Mototoks may also be used, as shown in this example of a production hall design. In addition, we work together with you to develop the optimal path through your hall.

mototok® easy moving

Solutions for a wide range of demands.

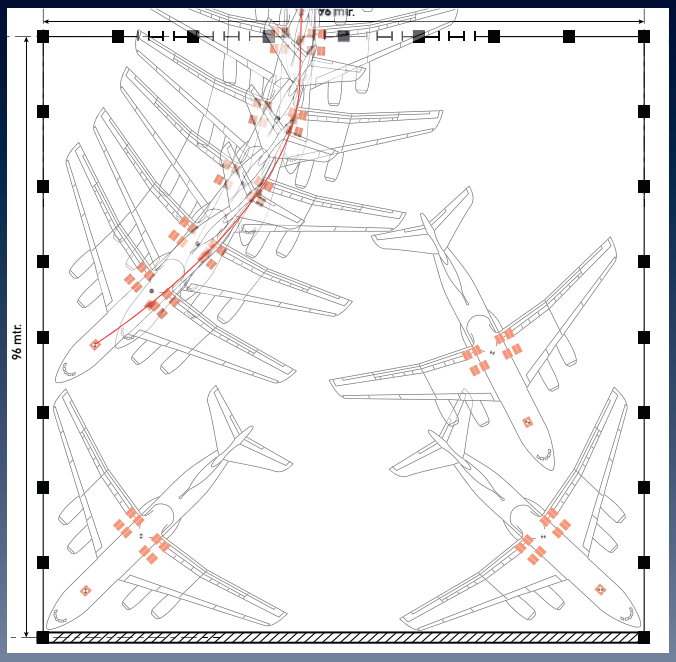
With its innovative design, Mototok shows that its strength is flexibility: in many different situations and for many different demands. With our team of engineers, we are able at all times to react to any special specifications. At your request, our machines are refined and manufactured to meet extremely specific requirements.



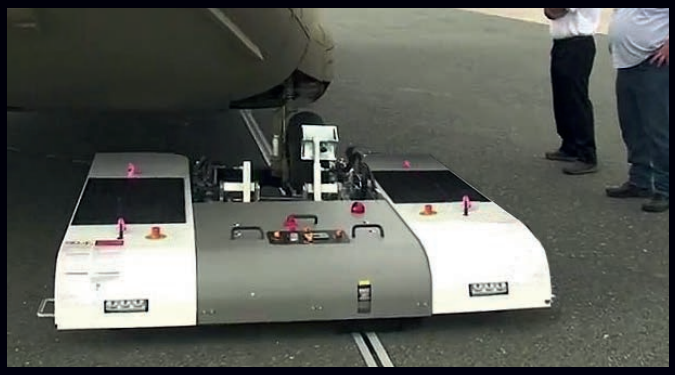
Option 1
Jacks mounted on a mototok

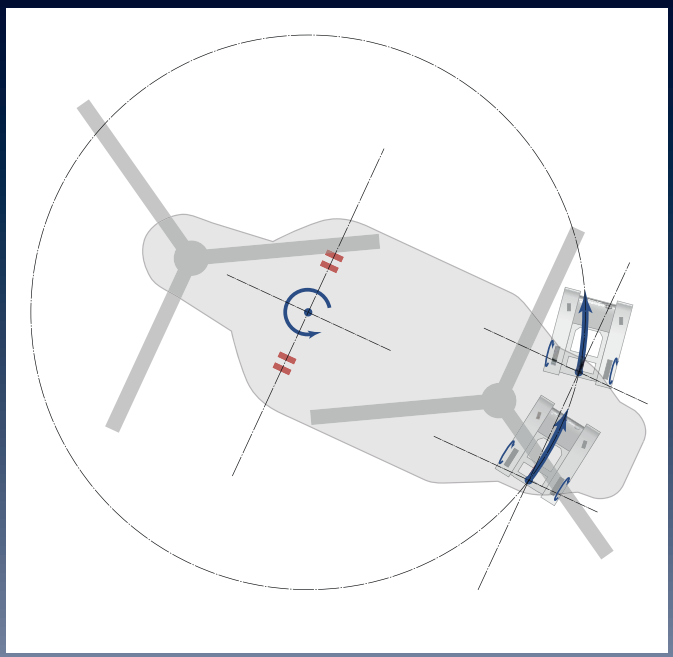
Option 2
mototok tows a cart

Design for transporting an aircraft fuselage during production

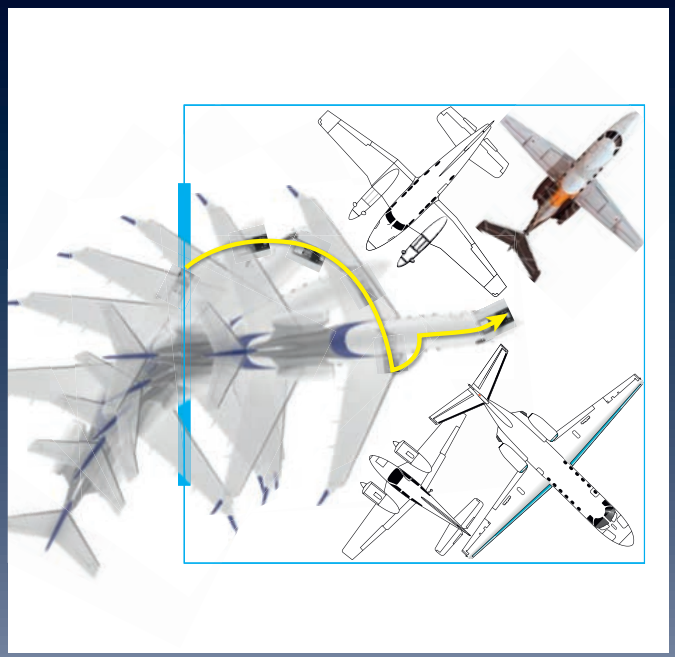


Design for a hangar with several Iljuschin 76 aircraft





Design for transporting a Boeing CH-47 Chinook



Design for a hangar with several different aircraft

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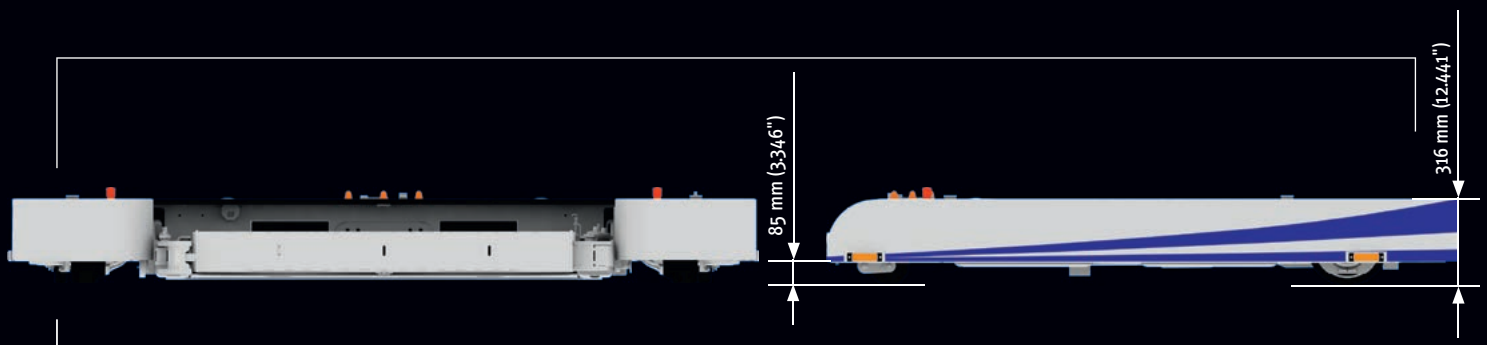
Technical Data

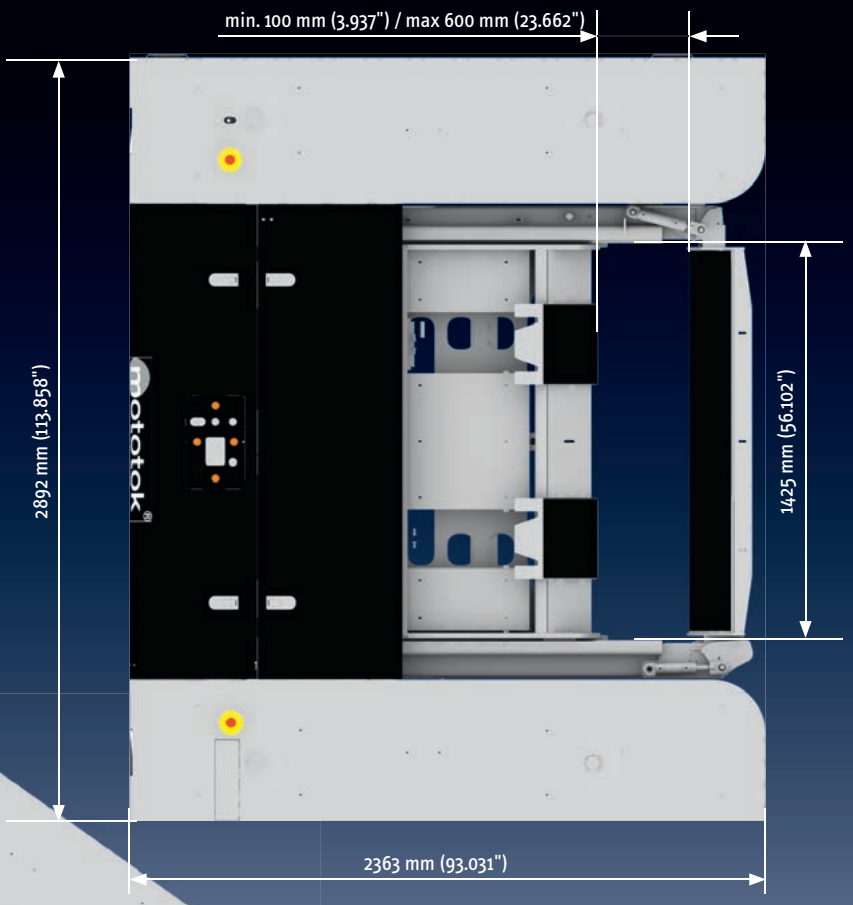
Mototok		TWIN WIDE 14
Use for		double nosewheel
Maximum towing capacity [1) 2)]		55 / 75 / 85 t
		121,254 / 165,347 / 187,393 lbs
Maximum nosewheel weight capacity [2)]		7 / 9 / 12 t
		15,432 / 19,842 / 26,455 lbs
Dimensions (without antenna, grips on the surface)	width	2892 mm
		113.858 inch
	length	2363 mm
		93.031 inch
	height	316 mm
		12.441 inch
Ground clearance		85 mm
		3.346 inch
Width of the wheel opening		1425 mm
		56.102 inch
Depth of the wheel opening	min.	100 mm
		3.937 inch
	max.	600 mm
		23.662 inch
Unladen weight		3500 kg
		7,716 lbs
Time to load/fix aircraft		approx. 15 sec
Speed		2.5 – 6 km/h
		1.55 – 3.73 mph
Batteries (maintenance-free, deep cycle gel batteries)		4 x 200 Ah
Voltage		48 V
Range (depending on the workload)		3-4 days
Possible terrain		Concrete, stone, asphalt
Tyres		Puncture-proof tyres
Operating temperature -15 ~ +50 Celsius		-15 ... +50 °C
		+5 ... +122 °F
Relative humidity		40 ... 90 %
Optional Equipment		
Radio remote control (with safety features, waterproof, certification of conformity), worldwide safety approval, including airports, TÜV certified	TÜV CERT	inclusive
Fully hands free hydraulic door		inclusive
Hydraulic nosewheel securing [3)]		inclusive
Ground power cable for gound power connection 13,4V / 25,6 V [4)]		available
Driving light (LED, 10,000 hour operating life, very high beam range)		inclusive
Yellow flashlight		inclusive
Safety beeper		inclusive
Trailer coupling adaptor for multi-functional extensions		available
Military spiral cable connection (approx. 15 m) between aggregate and control unit		available
Automatic controls by ground markings (AGV functionality)		available
Adaptations for special demands (i.e. military version / range of production)		available
Oversteering Control System (OCS)		available

Mistakes and technical alterations reserved / Date 10.2015
1) The stated towing capacity is valid for towing on normal ground conditions without an incline of more than 0 %.
2) Depends on the ordered drive motor and the design of the hydraulic system
3) This prevents the nosewheel from rising and slipping out of position. The securing device is hydraulically lowered onto the nosewheel and securely locked at the push of a button. Standard: mechanical securing system.
4) In most aircraft, the generator voltage is 28.4 V. The 25.6 V on-board batteries are charged with this voltage. With the mototok ground power supply, the on-board voltage can be maintained and used to start the turbines.

Dimensions



All dimensions without antenna, handgrips, etc.
Subject to change without prior notice



Mistakes and technical alterations reserved / Date 10.2015

mototok® easy moving

Batteries / Ground Power System

mototok	TWIN WIDE 14
Batteries (maintenance-free, deep cycle gel batteries)	4 batteries x 12 V / 220 Ah

Nominal Voltage	12 V
Nominal Capacity C_{20} | 1,75V/C | 20°C	220 Ah
Discharge current I_{20}	10000 A
Max. load with suitable matching contacts	approx. 770 A
Length	518 mm
Width	274 mm
Height up to top cover	216 mm
Height over Terminals	242 mm
Weight	approx. 70 kg
Internal resistance acc. to IEC 896-2	3,5 Ohm
Short circuit current acc. to IEC 896-2	3606 A
Terminal	A-Terminal

Constant current discharge

1,85 V/C Discharge in A at 20°C	
5'	329,0
10'	274,0
20'	196,0
30'	160,0
1h	104,0
3h	46,5
5h	31,0
8h	20,4
10h	16,7

1,80 V/C Discharge in A at 20°C	
5'	381,0
10'	313,0
20'	222,0
30'	176,0
1h	110,0
3h	48,5
5h	32,0
8h	21,1
10h	17,3

1,75 V/C Discharge in A at 20°C	
5'	437,0
10'	349,0
20'	237,0
30'	183,0
1h	115,0
3h	49,7
5h	32,3
8h	21,5
10h	17,7

1,70 V/C Discharge in A at 20°C	
5'	486,0
10'	380,0
20'	251,0
30'	191,0
1h	117,0
3h	50,6
5h	32,8
8h	21,8
10h	17,7

1,65 V/C Discharge in A at 20°C	
5'	531,0
10'	395,0
20'	262,0
30'	198,0
1h	120,0
3h	51,0
5h	30,6
8h	19,1
10h	15,3

1,60 V/C Discharge in A at 20°C	
5'	581,0
10'	411,0
20'	269,0
30'	202,0
1h	121,0
3h	51,1
5h	30,6
8h	19,1
10h	15,3

Constant power discharge

1,85 V/C Discharge in W/bloc at 20°C	
3'	4690,0
5'	4102,0
10'	3449,0
15'	2843,0
20'	2375,0
30'	1800,0
45'	1408,0
60'	1135,0
90'	875,0

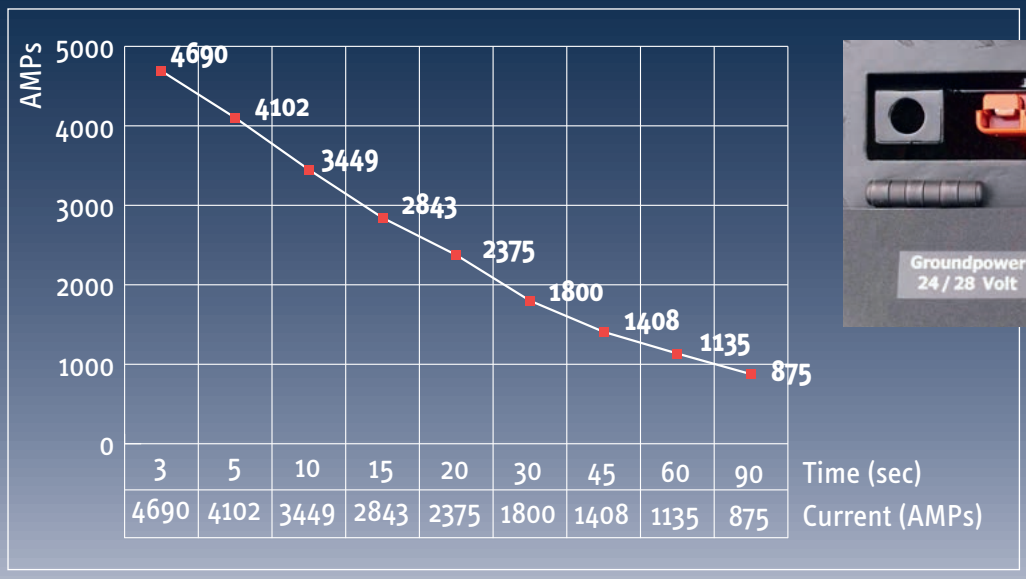
1,80 V/C Discharge in W/bloc at 20°C	
3'	5268,0
5'	4695,0
10'	3815,0
15'	3040,0
20'	2580,0
30'	1928,0
45'	1449,0
60'	1191,0
90'	912,0

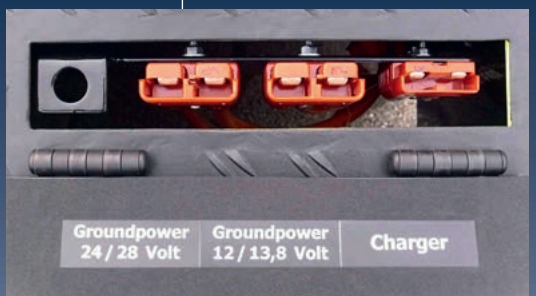
1,75 V/C Discharge in W/bloc at 20°C	
3'	5932,0
5'	5092,0
10'	3941,0
15'	3201,0
20'	2700,0
30'	2002,0
45'	1484,0
60'	1223,0
90'	933,0

1,70 V/C Discharge in W/bloc at 20°C	
3'	6350,0
5'	5446,0
10'	4034,0
15'	3302,0
20'	2774,0
30'	2048,0
45'	1512,0
60'	1245,0
90'	948,0

1,65 V/C Discharge in W/bloc at 20°C	
3'	6786,0
5'	5736,0
10'	4142,0
15'	3369,0
20'	2825,0
30'	2081,0
45'	1533,0
60'	1264,0
90'	959,0

1,60 V/C Discharge in W/bloc at 20°C	
3'	7189,0
5'	5957,0
10'	4218,0
15'	3413,0
20'	2860,0
30'	2104,0
45'	1548,0
60'	1279,0
90'	969,0





Motor / Braking System

Shunt wound sepex AC motor
with gear box on parallel axis.

Typ	MTRAC11
Wheel Diameter	300 mm
Voltage	34 V
Power	2500 W
Nominal speed	5 Km/h
Gear Ratio	1/27
Isolation	Cl. F
Duty	S3 30%
Protection	IP44
Brake	12 Nm

Mototok has three braking systems:

- Regenerative braking system
- Deceleration by reversing direction
- Electromagnetic disc-brake System

9	Dbrake	250 A
10	Nbrake	250 A
11	Fbrake	250 A
12	DBrkRamp	0.5 Sec
13	DBrkEnd	0.1 Sec
14	NBrkRamp	0.2 Sec
15	NBrkEnd	0.5 Sec

The regenerative braking system is the main braking system. When decelerating, the drive motor is used as generator. The current produced is stored back into the batteries (additional load).
If the regenerative braking is not sufficient to bring the vehicle to a stop within the pre-set delay, a deceleration can be executed by reversing direction. The drive motors are hereby polarized by the controllers in the opposite direction and supplied with the necessary power. At the moment when the electromotor comes to a stop, the electromagnetic disc brake is put into operation to block the drive. The switch-on delay is adjustable in the controllers by tenths of seconds. The brake values are adjusted by a programming device which is plugged into the controller. This insertion may be done only by authorised persons.

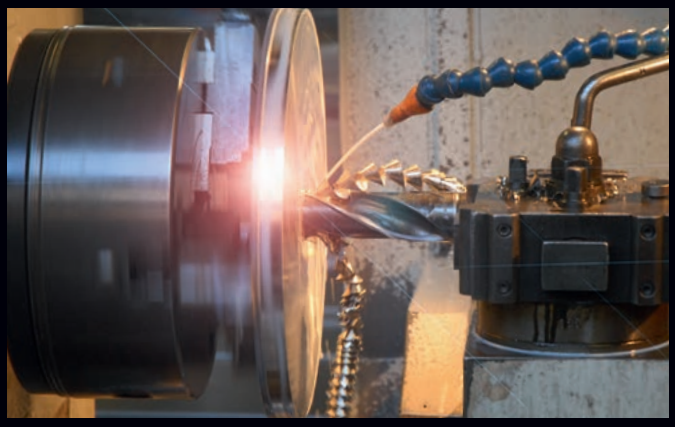
The Power of Engineering – Made in Germany

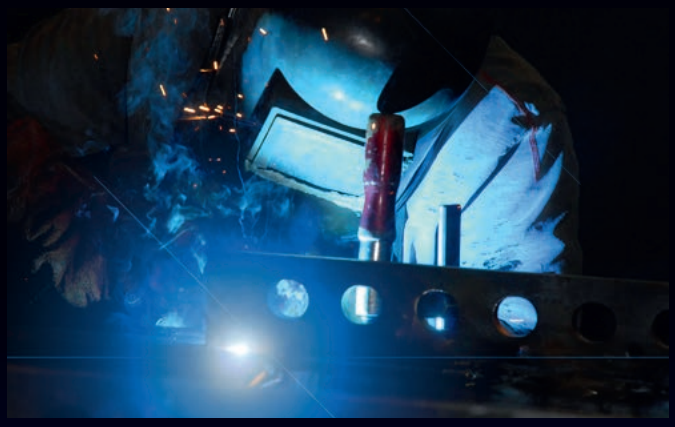
Our innovative built to last aircraft tractors are best equipped for daily heavy use as they consist of high-grade material, hand-picked components according to the finest engineering designs. Our products are capable of withstanding the toughest conditions when exposed to wind and salt water. Thanks to a selection of the finest materials, only limited maintenance is necessary.

Our production process corresponds and applies to all necessary demands and conditions required in the engineering industry.

DIN 18800, DIN 15018, DIN 4112, DIN EN 15614-1, EN 287-1	Certificate of Welding
EN 12895	Immunity requiremts
EN 61000-4-2	Eletrostatic discharge
EN 61000-4-3	Radio-frequency electromagnetic field
DIN 4112, DIN 18800, DIN15018, DIN 4132, DIN 1055	Statics Calculation
DIN EN 10025, DIN 1543, DIN 1013, DIN 17210, DIN 10149-2	Material Steel
2006/42/EC	Machinery Directive (European Community Legislation)
2004/108/EC	EMC Directive (European Community Legislation)
EN 292-1	Safety of Machinery – Basic Terminology, Methodology
EN 292-2	Safety of Machinery – Technical Principles and Specific:ations
EN 418	Safety of Machinery – Emergency Stop Equipment, Functional Aspects
EN 954-1	Safety of Machinery – Safety-Related Parts of Control Systems
EN 95/16/EG	Safety of Machinery – May, 17th 2006
EN 1050	Safety of Machinery – Principles for Risk Assessment
EN 60 204-1	Safety of Machinery – Electrical Equipment of Machines
EN 60 529	Degrees of Protection Provided by an Enclosure
EN 1175-1	Safety of industrial trucks – Electrical requirements for battery powered trucks
EN 13849-1 PL 1 EN	Safety of Machinery – Safety-related parts of control systems
EN 1915	Aircraft ground support equipment – Basic safety requirements
PrEN 12312-7	Aircraft ground support equipment – Aircraft movement equipment
EN 51 000-6-4 (SAE J551 expired code equivalent)	Radiated Electromagnetic Emissions (3rd party tested/certified)

(07-2014)





mototok® easy moving

Satisfaction guaranteed – our Customers (extract)

Airports

Santiago de Chile	Chile	Arturo Merino Benítez International Airport	Several Aircraft
Cannes	France	Mandelieu Airport	Several Aircraft and Helicopter *
Lyon	France	Saint Exupery Airport	Several Aircraft and Helicopter *
Dresden	Germany	Airport	General Aviation *
Dublin	Ireland	International Airport	Several Aircraft
Kuala Lumpur	Malaysia	Sultan Abdul Aziz Shah International Airport	Several Aircraft
Panama	Panama	Albrook „Marcos A. Gelabert" International Airport	Several Aircraft
Moskow	Russia	Domodedovo Airport	Several Aircraft and Helicopter *
Malaga	Spain	Airport Costa del Sol	Several Aircraft and Helicopter *
Bern	Switzerland	Airport	Several Aircraft
Lugano	Switzerland	Airport	Several Aircraft Helicopter Agusta and others *
Sion	Switzerland	International Airport	Several Aircraft
Zürich	Switzerland	International Airport	Several Aircraft and Helicopter *
Glasgow	UK	International Airport	Several Aircraft
London	UK	Luton Airport	Several Aircraft
Birmingham	USA	Shuttlesworth International Airport	Several Aircraft
Burbank	USA	Bob Hope Airport	Several Aircraft
Chicago	USA	Chicago Executive Airport	Several Aircraft
Dallas	USA	Dallas Love Field	Several Aircraft
Denison	USA	North Texas Regional Airport	Several Aircraft
Indianapolis	USA	International Airport	Several Aircraft
McKinney	USA	National Airport	Several Aircraft
Minneapolis	USA	Saint Paul International Airport	Several Aircraft
Orlando	USA	Sanford International Airport	Several Aircraft
Philadelpia	USA	International Airport	Several Aircraft
Provo	USA	Municipal Airport	Several Aircraft
Seattle	USA	Tacoma International Airport	Several Aircraft
Seattle	USA	King County International Airport	Several Aircraft
Truckee	USA	Tahoe Airport	Several Aircraft
Tulsa	USA	International Airport	Several Aircraft
Waukegan	USA	Regional Airport	Several Aircraft

FBO / MRO

AirMec	Angola	MRO / Military Aircraft
Perth	Australia	FBO
Jet Alliance Vienna	Austria	Several Aircraft
Silk Way Airlines, Baku	Azerbaijan	Several Aircraft
Flying Group, Antwerpen	Belgium	Several Aircraft
Santiago de Chile	Chile	Several Aircraft
Panaviatic Ltd	Estonia	Several Aircraft
Cannes	France	Several Aircraft and Helicopter *
Lyon	France	Several Aircraft and Helicopter *
ACC Columbia, Hannover & Cologne	Germany	Global & others
AERO Dienst, Nuremberg	Germany	FBO
Sapura Aero	Malaysia	Several Aircraft
Hawker Pacific Asia Pte Ltd	Singapore	Several Aircraft
Air Service Basel	Switzerland	G5, Global Express, BOEING 737
Alpark SA	Switzerland	Several Aircraft
JetAviation, Geneva	Switzerland	Several Aircraft
Tarkim Air	Turkey	General Aviation *
Glasgow	UK	Several Aircraft
London	UK	Several Aircraft
ACI Jet Center	USA	Several Aircraft
DUNCAN Aviation	USA	Several Aircraft
Jet Legacy Center, Tulsa	USA	Several Aircraft
Starport Aviation	USA	Several Aircraft
Synergy Flight Center	USA	Several Aircraft
Centeravia		Several Aircraft

Aircraft Manufacturers

EMBRAER S.A.S. José dos Campos	Brasil	Embraer 195, 190, 175, 170, KC 390
BOMBARDIER, Montreal	Canada	Global Express Delivery Center
Dassault Aviation	France	Twin
Airbus S.A.S., Hamburg	Germany	Spacer
Rosvertol PLC	Russia	Helicopter Production MI-series *
Pilatus Aircraft Ltd	Switzerland	PC 12 Maintenance & Delivery
Turkish Aerospace Industries, Inc. (TAI)	Turkey	F 16 Fighter Maintenance Facility, Tiger Maintenance Facility *
BOEING	USA	Plant in Philadelphia AGV

Corporations

ACM	Chile		
ABP Food Group	Ireland		
Gazprom Avia, Moscow	Russia	Falcon jets	
OAO Gazprom	Russia	Several Helicopter & Aircraft	*
Anglo American	South Africa	Agusta AW139, G5	*
Alpine Sky Jets	Switzerland		
Novartis AG (JAPAT AG), Basel	Switzerland	Global Express, EC 135	*
CNH Industrial	The Netherlands		
Access Aviation	UK		
Abbvie	USA		
ACSI Corporation	USA		
American Colors International	USA		
C & P Aviation	USA		
Caribbean Investor Group	USA		
Columbia Pacific Management	USA		
Comcast	USA	Several Aircraft	
Cook Canyon Ranch	USA		
Disney	USA		
Harbert Aviation	USA		
Home Depot	USA	Several Aircraft	
Indianapolis Colts	USA		
L-3	USA	Several Aircraft	
Regions Financial Group	USA		
State Farm	USA	Several Aircraft	
Taxxas	USA		
The Boler Company	USA		
The CocaCola Company	USA	Several Aircraft	
The Duchossois Group	USA		
TLS Aviation	USA		

Military

China Military	China	All kind of Aircraft, Helicopters	*
Columbian Air Force	Columbia		
Danish Army	Denmark	Challenger, Agusta EH 101, F 16	*
French Navy / Air Force	France	Rafale Fighter, SuperPuma, NH 90, EC 155, Panther	*
CASSIDIAN Manching (EADS)	Germany	Tornado & Eurofighter	*
Pakistan Military	Pakistan	HELIMO for Helicopters with skids	*
U.S. Army National Guard	USA	M 528	
Venezuela Military	Venezuela	Helicopters with skids & with wheels	*

Airlines

Air Nostrum, Líneas Aéreas del Mediterráneo S.A	Spain	Challenger, Agusta EH 101, F 16	*
Iberia, Líneas Aéreas de España S.A.	Spain	Spacer for BOEING and Airbus	
British Airways	UK	AIRBUS 320 Series	*
Thomson/TUI, Luton	UK	BOEING 737 Family	
Alaska Airways, Seattle	USA	BOEING 737 Family	

Special Forces

Federal Police	Germany	Helicopter Super Puma, EC 155	*
Guardia di Finanza Rome	Italy	For ATR	

Government

Sultanat of Oman	Oman	Eurocopter Super Puma Fleet	*

* Mainly Helicopter Operations

BOMBARDIER the evolution of mobility

DASSAULT AVIATION

EMBRAER

JET AVIATION

DUNCAN AVIATION

IBERIA

PILATUS

Thomson

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mototok.

Big advance. Compact design.

About mototok

Mototok GmbH was founded in 2003 by Kersten Eckert, a passionate pilot and the "k" in Mototok, together with the "t" (Thilo Wiers-Keiser) and the "o" (Olaf Hagelkruys) in the company name. Eckert originally came up with the idea after waiting for long periods for his plane to be moved out of its hangar. Not only that, but the task needed at least two to three people to watch the wings and fuselage to make sure that the plane did not run into anything. And finally, there always had to be a pilot in the plane to operate the brakes if, for example, the pin holding the tow bar failed while manoeuvring and the plane broke free.

After being in development for around five years, the first Mototok tugs hit the market in 2008 and offered new technological approaches and thus many new and unique solutions to well-known technical problems. A single person could now maintain an all-round view of the aircraft and thus supervise its movements on their own, 30% to 40% less space was required for parking and manoeuvring in the hangar and on the apron, and there were significant savings in personnel costs and shunting times. Also groundbreaking: an exclusively electric drive that was emissions-free and therefore ideal for use inside the hangar, the minimal maintenance costs and, most importantly, the fact that the pivot point of the aircraft was identical to that of the nose wheel. This was made possible by deploying an in-house developed electronic differential. As a result, neither the body nor the wings of the aircraft move during manoeuvring, ensuring maximum safety at all times. All tugs are designed to accept planes with single or dual nose wheels, both from the rear as well as from the front. Nose wheels are easily picked up using a "one-click function" that takes only 15 seconds. Operating the tugs is so easy and intuitive that training takes no longer than three hours; a driving licence is not required.

The company's customers include globally active FBOs, MROs, aircraft manufacturers, special forces, airports, airlines, the navy, the military, industrial companies with their own flight operations and, of course, business people and private pilots with their own fleet. As well as the Helimo, which has been designed especially for helicopters, there are currently a total of six tugs with a maximum capacity of 28 tonnes (M Series), 39 and 50 tons (Twin Series) and 95 tons (Spacer). In a few months, an electric tug capable of pulling a net weight of up to 195 tonnes will be added. The product range will then be suitable for virtually all narrow-body and wide-body aircrafts and helicopters – with the exception of the A 380 and Boeing 747.

The company is headquartered in Krefeld and builds the tugs in its manufacturing operation near Stuttgart, a stronghold of German engineering, close to where Mercedes and Porsche are headquartered. There are around 400 tugs in use all over the world, and the number is increasing steadily.

Learn more about mototok at www.mototok.com.

mototok®
easy moving

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