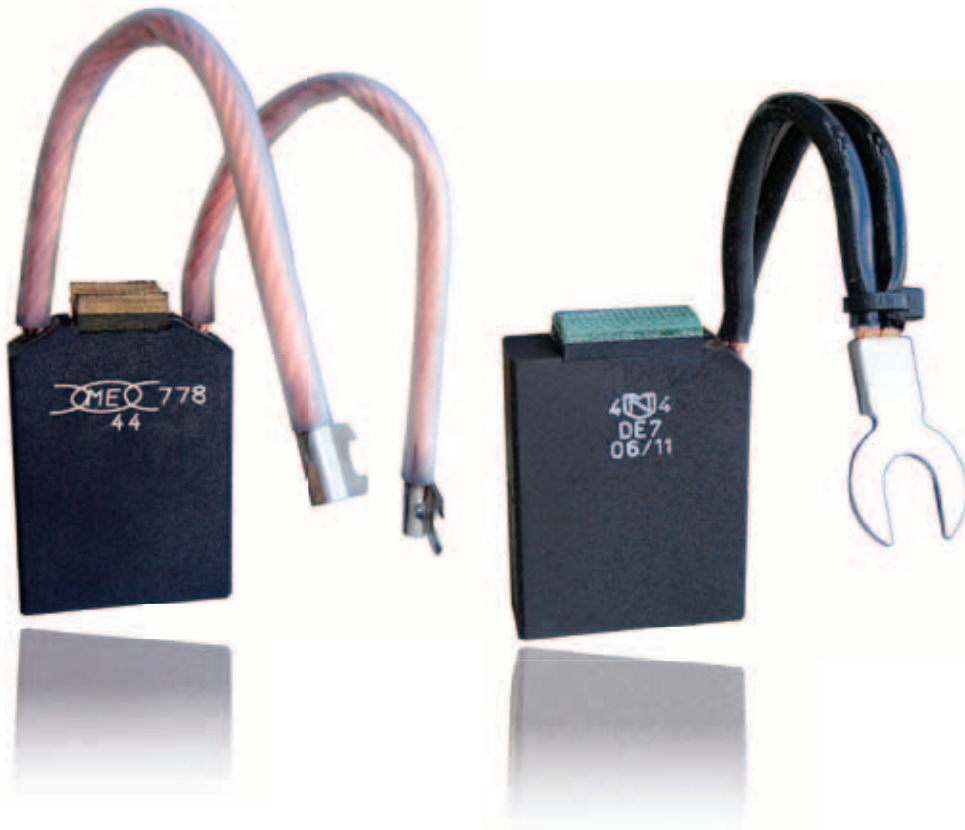


MorganAM&T™

Traction Brush & Brush Gear



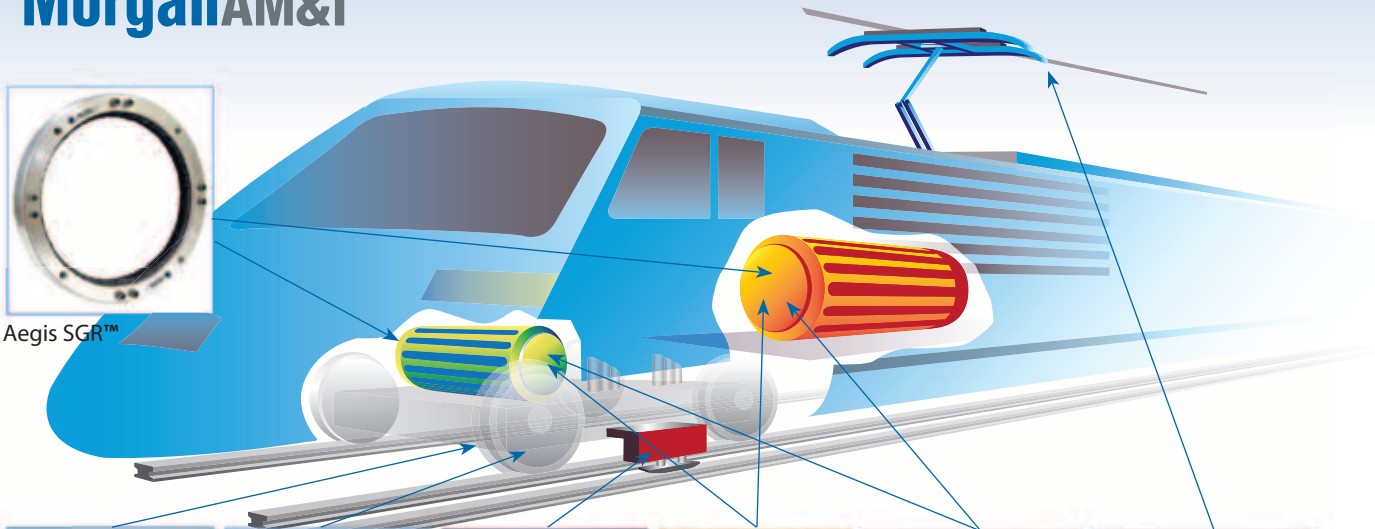
Morgan AM&T (Advanced Materials and Technology)
is a Business of The Morgan Crucible Company plc

Innovating tomorrow's solutions today

www.morganamt.com



Aegis SGR™



Wheel Flange
Lubrication



Earthing Unit



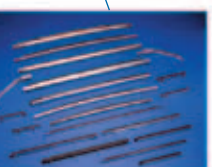
3rd Rail Shoes



Holders



Brushes & Contacts



Pantograph Carbons

Morgan AM&T is a leading global supplier to the Railway Industry, providing products, services and solutions for electric motors and current collector systems.

Morgan AM&T spans the world, supplying not only carbon pantograph strips but also carbon brushes, brush holder assemblies, third rail shoes, earthing units and expertise.

By combining our product range and technical expertise we can assist in optimising system performance. Morgan AM&T has highly trained Technical Sales Engineers for local support, backed up by a team of Traction Experts and together they provide technical solutions for all our customers.

Morgan AM&T work with all major global OEM's, Railways and Urban Transport Systems.

Morgan can offer:-

- Local sales engineering support
- Application engineering technical support team to investigate problems and offer solutions.
- Design improvements for better performance and reliability.
- Over a 100 years of traction experience.
- Material technology & development facilities
- Machine Test Centre to simulate field conditions
- Technical training courses either held at the customer's site, a Morgan regional business unit or in our technical centre of excellence.



Typical design Features

Pressure systems employing clock springs for robust performance. Constant force Springs for compact designs. Copper based alloys have become established as optimum for the holder bodies.

Brush pockets are broached to give the required tolerances, IEC136 being widely accepted as the industry standard. Surface finishes, such as electroplating or painting can be applied when required.

End Mounted assemblies

End mounted holder assemblies complete with supports and terminal plates. Typical of designs supplied for use on battery locos, light rail and metro applications. Either clock springs or constant force springs may be specified.

Earth Return Current Units

Employing novel materials and design, Morgan has developed units for a variety of applications including Locomotive, EMU and Light Rail solutions.

Pins, Pillar & Insulators

Double ended mounting pins, pillars and stand off insulators. Moulded in either high strength GRP with excellent electrical and mechanical properties or mica glass for special high temperature requirements.

Spring Clips

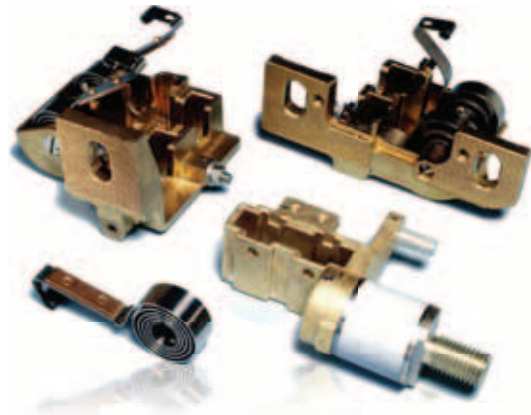
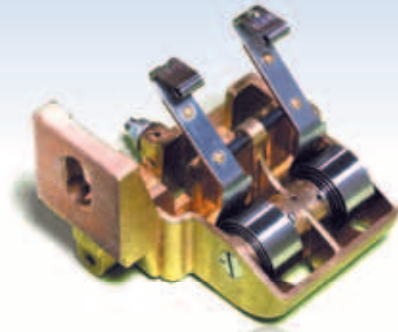
In addition to offering a wide range of class leading carbon brush materials, we are able to offer brush holders and their components such as replacement springs clips.

Engineering Innovation

Our design team will take your current product and re-engineer it to optimise performance and improve reliability

Morgan New Improved Re-design

- Design review
- Individual brush pockets to improve commutation and contact.
- Adopt semi-captive C/F.
- Springs can be replaced in situ.
- Include spring hold off facility.
- Weight reduction.





DC traction systems have inherent differences to their industrial counterparts having to cope with increased levels of vibration and thermal shock as a result of rapidly changing load currents. The advent of fast switching thyristor control and regenerative braking have added to the harsh conditions already experienced by the carbon brush which is a vital part of the current carrying chain, so it is imperative that the correct grade of brush is chosen to optimise the performance and reliability of the equipment.

Morgan AM&T the World's number one traction brush supplier offers a wide range of materials and design expertise to minimise the effects of harsh running conditions.

Morgan is an established, experienced high performance brush manufacturer with over 100 years experience in serving the traction industry. Optimum brush grades are developed in the global centres of excellence, using our own testing facilities for in house development and customer support.

Sharing knowledge and experience, Morgan will give local technical support backed up by a global team of application engineers.

By specifying a Morgan brush holder and brush our customers are safe in the knowledge that they are optimising the reliability and operation of their equipment and they have added advantage of the ease of access to Morgan's world wide technical support.



Morgan AM&T Traction Grade

Traction Grade suggestions

		GRADE	C12	CM1S	DE3	DE7	DE7000	DE8	DE9000	EG105	EG105S	EG114	EG116	EG14D/EG116S	EG236S	EG259	EG260	EG268	EG275/EG284/MET76	EG3	EG6749N	H100	IM9101/IM26	ME393/ME373/ME353	N19	N2000	N4	N48	N6000/ME377	PM50P	TA35R	
DC Traction motors	Freight	DC																														
		Rectified AC																														
		Thyristor																														
	Passenger loco (high speed)	DC																														
		Rectified AC																														
		Thyristor																														
	Suburban EMU (passenger)	DC																														
		Rectified AC																														
		Thyristor																														
	Metro/rapid transit	DC																														
		Rectified AC																														
		Thyristor																														
	Trolley bus/tram	DC																														
		Rectified AC																														
		Thyristor																														
AC Traction	AC commutator drive																															
Auxiliaries	Generators/excilers																															
	Compressors																															
	Blowers/vent fans																															
	Pumps																															
	MA sets																															
Earthing																																

Smooth Polished Surface

This indicates good performance. However, if the polish is mirror-like (glazed), high frequency chatter due to low current may be the cause. Check the side-faces of the brush for signs of vibration.

S1



Burnt Edges

Normally occurs on the trailing edge of the brush. Caused by poor commutation and heavy sparking.

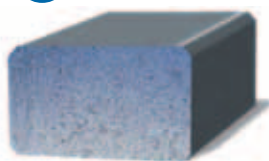
S7



Open Textured Surface

This, again, indicates that brush performance is satisfactory. Actual appearance will depend on the type of grade.

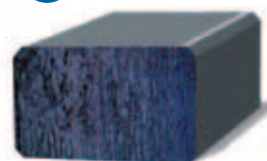
S2



Pitted Surface

Indicates heavy under-brush sparking as a result of current overload or brush instability.

S8



Finely Lined Surface

Another satisfactory condition. Fine lines indicate the presence of dust in the atmosphere. This may be overcome by the use of filters or ducting the machine's air supply from another area.

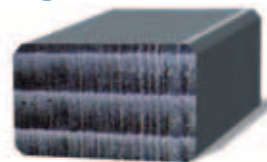
S3



Laminated Surface

This is an unusual condition caused by an armature winding fault giving rise to poor commutation.

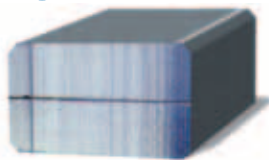
S9



Finely Serrated Surface

This is a further development of (S3) above. The causes are normally atmospheric contamination or lack of load current.

S4



Double-Bedded Surface

This occurs as a result of brush tilting on a reversing machine, i.e. the brush beds itself in both directions of rotation. In itself this does not give any cause for concern.

S10



Heavy Serrated Surface

As (4) above, but problem is more severe or has been allowed to continue for longer.

S5



Copper Particles

Copper pick-up from commutator surface can result from copper drag problems or heavy peak loads. Can cause further commutator wear.

S11



Ghost Marked Surface

This may be associated with difficult commutation and can arise from incorrect neutral position, interpole problems or other causes of poor commutation.

S6



Chipped Edges

Normally occurs on the leading (entering) edge of the brush. Breakage can result from poor commutator profile, high micas and severe brush instability.

S12

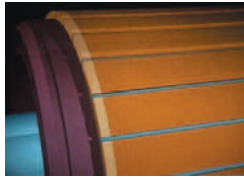




Light Film

over the entire commutator surface is one of the many normal conditions often seen on a well functioning machine. Film tone is dependent on the brush grade and current density.

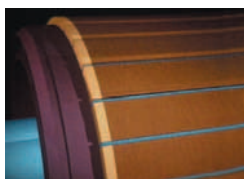
P1



Patina Dark

Good condition. Film can be light to dark in colour but the important feature is that it is uniform and even. Normally, a good film will have a slightly polished appearance.

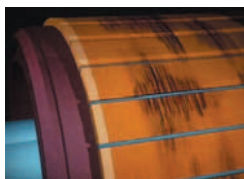
P2



Blotchy Film

this nonuniform filming condition is the most common appearance. The accumulated tolerances in the machine such as commutator roundness, brush contact pressure, unequal magnetic fields and chemical vapors all contribute to this type of film development.

P3



Slot Bar Filming

repeating light and dark filming patterns related to the number of armature coils per slot. This pattern is dependent on the machine design and usually not a function of the brush grade.

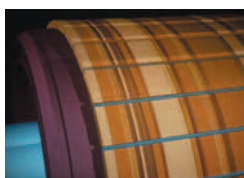
P4



Streaking

if only the film is not detrimental to the commutator. Brush and commutator life are not at risk in this condition. If metal transfer develops, this condition will progress into threading. This type of filming can be dependent on current density or brush grade.

P5



Bright Spots

Bright spots in the film suggest poor contact or overloading. The resultant under-brush sparking tends to destroy the patina and will eventually erode the commutator.

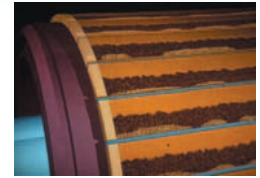
P6



Bar Burning

is the erosion of the trailing edge of the commutator bar. Failed machine components, maladjusted electrical symmetry of the machine or a poor commutating brush can result in bar burning. If not corrected, this condition can cause severe commutator damage or a flashover.

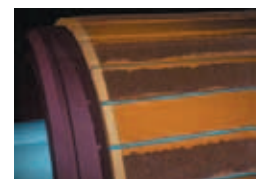
P7



Slot Bar Burning

results in commutator erosion of every second, third, or fourth bar depending on the winding design of the armature. Improper brush material, brush design or electrical adjustment of the machine can cause this condition. This condition severely damages the commutator and reduces brush life.

P8



Patina Streaked with Collector Wear

A streaky film with no commutator wear, tracks can vary in width and colour. Caused by atmospheric conditions (humidity, oil vapour or other gases) or insufficient load.

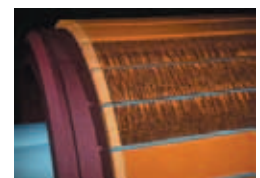
P9



Pitch Bar Burning

results in commutator bars being eroded in a pattern related to 1/2 the number of brush arms, progressing into a pattern equal to the number of brush arms. This condition is caused by a cyclic mechanical or electrical disturbance such as an unbalanced armature, misaligned shafts, bent shaft, bad bearings, weak foundation, failed equalizers or a poor riser connection. If not corrected this condition will result in a flashover.

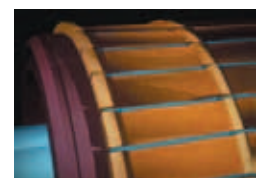
P10



Grooving

is the uniform circumferential wear, the width of the brush, that is exhibited on the commutator. Excessive abrasive dust in the atmosphere or an abrasive brush can cause this condition. Extreme light spring pressure (below 1.5 psi) can also cause this condition. Proper brush applications and filtering the air on force ventilated motors can reduce the commutator wear.

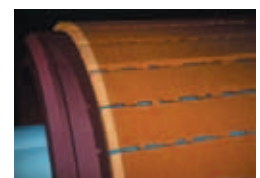
P11



Copper Drag

occurs when high energy transfers copper in a molten state. These particles become coated by contaminants from the surrounding environment or the brush treatment and do not oxidize properly to form the film on the commutator surface. These particles accumulate at the edge of the bar, eventually shorting across the insulating mica. This condition needs to be addressed immediately when discovered or serious damage may occur. Chamfering the commutator bar edges is necessary to stop the progression of this condition.

P12





Morgan AM&T
Upper Fforest Way, Swansea SA6 8PP
Tel: +44 1792 763000
Fax: +44 1792 763167
www.morganamt.com