

Abradable / Abrasive Tip Coatings Alert

**March 29, 2023**

**IP & Knowledge Management**

[Structural design and high temperature tribological behavior of a new turbine **blade tip**protective **coating**](https://www.sciencedirect.com/science/article/pii/S0257897223000919)

S Yang, S Gao, W Xue, B Wu, D Duan - Surface and Coatings Technology, 2023 - Elsevier

… continue to rise, the **abradable** sealing **coating** applied to the casing surface … sealing **coating**  
(such as 8 % Y 2 O 3 stabilized ZrO 2 , YSZ), which exacerbates the occurrence of **blade** **tip** …

[Numerical Prediction of the Influence of Rub-Induced Thermal Stress on the **Abradability**of CuAl-Polyester Sealing **Coating**](https://link.springer.com/article/10.1007/s11666-022-01523-9)

W Sun, S Zhang, J Liu, P Ouyang, T Liu, C Wu… - Journal of Thermal …, 2023 - Springer

… **abradability** of seal coatings. In this paper, the relationship between rub-induced thermal  
stress and **abradability** of CuAl seal **coating** … and high-speed **abradability** test rig. The thermal …

[Surface crack detection of the **abradable**seal **coating**by laser bidirectional scanning thermography](https://www.sciencedirect.com/science/article/pii/S1350449522004790)

E Lin, H Wang, L Dong, [Z Piao](https://scholar.google.com/citations?user=mgzAr5UAAAAJ&hl=en&oi=sra), J Yang, Z Xing… - Infrared Physics & …, 2023 - Elsevier

… surface crack defects in the **abradable** seal **coating** with non-… thermal distribution of the  
**abradable** seal **coating** under laser … surface crack defects of **abradable** sealant coatings. The …

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For colleagues outside the U.S.: some research articles shown here may be available via your in-house journal subscriptions.

Contact [Jeff Barr](mailto:jeff_barr@praxair.com) if you have any questions, or have trouble finding any documents.

If you have an innovative idea that you would like to share with the whole community, post your idea to the [Today I Heard](https://impact.linde.com/ideaboxes/5f3be456720b0222b5eb1d2d) challenge on the [Impact](https://impact.linde.com/) innovation portal for consideration by a subject matter expert.

[High temperature **abradable**sealing **coating**for SiCf/SiC ceramic matrix composites](https://www.sciencedirect.com/science/article/pii/S027288422203317X)

J Huang, R Liu, Q Hu, X Guo, G Li, Y Tu, X Lu, M Xu… - Ceramics …, 2023 - Elsevier

A study of porous YSZ **abradable** sealing **coating** (ASC) plasma-sprayed onto SiC f /SiC  
ceramic matrix composites (CMC) through the compatibility of intermediate layers is reported. …

[Investigations on microstructure, oxidation, and tribological behavior of NiCoCrAlYTa/Y2O3 **blade tip**protective **coating**produced by electro spark deposition over a …](https://www.sciencedirect.com/science/article/pii/S0301679X23000610)

S Yang, S Gao, W Xue, B Wu, D Duan - Tribology International, 2023 - Elsevier

… In this work, a **blade** **tip** protective **coating**, NiCoCrAlYTa/Y 2 O 3 metal matrix nanocomposite  
**coating** (MMNCs), was prepared on nickel-based superalloys using electro spark …

[Tribological properties of laser cladding nickel-based WC reinforced Ag self-lubricating **coating** on RuT450 surface](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS0030399223002864%26hl%3Den%26sa%3DX%26d%3D6404950863285446676%26ei%3DcOwhZNLBHY3GsQKJi6fgCA%26scisig%3DAJ9-iYvqS3F7CwP7CAXIriMpXgBZ%26oi%3Dscholaralrt%26html%3D%26pos%3D0%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7C1e7bfa1b32734b15283f08db2ef84e84%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638155416242157289%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=Kmcc%2FDDFhnTy07WNxGEM5ROCVgjXqq8GgYySn6f8oB0%3D&reserved=0)

S Liu, M Pang, F Ji - Optics & Laser Technology, 2023

… The 700 W **coating's** main wear mechanisms were severe fatigue wear, **abrasive**   
wear, and minimal oxidation wear. Minor fatigue wear, **abrasive** wear, and oxidation   
wear … The COF of the **coating** was lowered as Ag created a lubricating film on the …

[Effect of B4C addition on microstructure and tribological performance of laser cladded WC− 10Co4Cr coatings](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Flink.springer.com%2Farticle%2F10.1007%2Fs10853-023-08233-9%26hl%3Den%26sa%3DX%26d%3D3960433078067135608%26ei%3DlXweZJz4He2R6rQPjYqHyAU%26scisig%3DAAGBfm1tJP0di2urEYAS8KDHikDklBuPrg%26oi%3Dscholaralrt%26html%3D%26pos%3D1%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7C4ee390f1350e41af75a008db2cebdf0c%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638153163955695796%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=bjOCatZZQw9oBJoayuskCP1T23gtNvGaGaSOtaDcDuI%3D&reserved=0)

L Detao, H Chuang, W Fan, K Dejun - Journal of Materials Science, 2023

… C coatings is **abrasive** wear, while that of WC−10Co4Cr−15% B 4 C **coating** is   
**abrasive** wear … −5% B 4 C **coating**, indicating that the wear mechanism of **coating**   
was primary **abrasive** wear. … Therefore, the wear mechanism of WC−10Co4Cr−5 …

[Deformation behavior of plasma sprayed Fe-based amorphous/nanocrystalline **coating** under multi-scale tribological contact](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS0022309323001473%26hl%3Den%26sa%3DX%26d%3D5983553568011114532%26ei%3DlXweZJz4He2R6rQPjYqHyAU%26scisig%3DAAGBfm34XsdteaIdCMVbafI_K-sxIAqdXw%26oi%3Dscholaralrt%26html%3D%26pos%3D2%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7C4ee390f1350e41af75a008db2cebdf0c%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638153163955695796%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=LH2jVAJn6OTJQUpSsgR2W91yAsydqk5fnbO%2FhNBgEc4%3D&reserved=0)

A Kumar, SK Nayak, T Laha - Journal of Non-Crystalline Solids, 2023

… 10 N) revealed that dominating wear mechanism in the **coating** was fatigue   
accompanied by **abrasive** and oxidative wear. … **coating** surface and act as third-body   
**abrasive** particles, contributing to further groove formation (as indicated in Fig. 10c) …

[Microstructure and mechanical properties of NiCoCrAlY laser cladding **coating** after high-current pulsed electron beam irradiation](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Fwww.tandfonline.com%2Fdoi%2Ffull%2F10.1080%2F09500839.2023.2191223%26hl%3Den%26sa%3DX%26d%3D2780946705004671148%26ei%3DTL0bZKiXE5PHmAG064yQAg%26scisig%3DAAGBfm35RVdCwCoK2-KwWafzX_IJZKHGuA%26oi%3Dscholaralrt%26html%3D%26pos%3D2%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7C9bc1b03a56e6439e313608db2b48ae3a%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638151363761328715%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=LrYAYrnoFM0UwExp8fnSMKR32C3zmgzQ9l7IMlPhLLQ%3D&reserved=0)

B Chen, Y Li, J Nie, C Wei, L Dang, Q Ma - Philosophical Magazine Letters, 2023

… the surface wear resistance of the **coating** after 5 pulses of irradiation was good   
and thus not easy to deform. The main wear mechanism of the **coating** is **abrasive**   
wear [Citation21]. Compared to the **coating** after 5 pulses, the original NiCoCrAlY …

[Effects of Nano-CeO2 on Microstructure and Properties of WC/FeCoNiCrMo0. 2 Composite High Entropy Alloy Coatings by Laser Cladding](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Fwww.mdpi.com%2F2079-4991%2F13%2F6%2F1104%26hl%3Den%26sa%3DX%26d%3D11625980199476587614%26ei%3DTL0bZKiXE5PHmAG064yQAg%26scisig%3DAAGBfm147PGhWr0b-hs97Ki6imW_3dQeyQ%26oi%3Dscholaralrt%26html%3D%26pos%3D5%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7C9bc1b03a56e6439e313608db2b48ae3a%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638151363761484933%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=7TfKLZSiZZj87DiuTVVWIP6jSEQYxb1MSXTRgyRz%2BNM%3D&reserved=0)

X Ren, W Sun, Z Sheng, M Liu, H Hui, Y Xiao - Nanomaterials, 2023

… in the **coating**, the wear mechanism was transformed into **abrasive** wear.   
Compared with the HEA **coating**, the HEA/WC **coating** had better … As seen in   
Figure 10j–l, the morphology of the HEA/WC + CeO 2 **coating** was the best after wear …

[Component Demonstration and Engine Validation of Solution Precursor Plasma Spray (SPPS) Yttrium Aluminum Garnet (YAG) Thermal Barrier Coatings: Part II](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Flink.springer.com%2Farticle%2F10.1007%2Fs11666-023-01572-8%26hl%3Den%26sa%3DX%26d%3D13160630318892489129%26ei%3DKxsVZJxt14CYAcP1hpAH%26scisig%3DAAGBfm1z0xyI1FjgbZ87Dhspo7y_5uM--Q%26oi%3Dscholaralrt%26html%3D%26pos%3D0%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7C67afcf7f160a424ac9e408db27548425%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638147016599116678%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=YwoHDMg7TVh4fdQDGLusjXekSiIu%2B6E0aKgMRjhNAaM%3D&reserved=0)

B Cottom, R Kumar, C Jiang, M Gell, EH Jordan - Journal of Thermal Spray …, 2023

… The solution precursor plasma spray (SPPS) process has been successfully used   
to **coat** fuel nozzle injectors, an annular inner combustor liner and **abradable** outer   
air **seals** with tailored microstructures of SPPS YAG. Fuel nozzle injectors in a rig test …

[Effect of MoO3 Content on Ni3Al-Ag-MoO3 Composite **Coating** Microstructure and Tribological Properties](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Fwww.mdpi.com%2F2079-6412%2F13%2F3%2F624%2Fpdf%26hl%3Den%26sa%3DX%26d%3D145033940537623622%26ei%3DKxsVZJxt14CYAcP1hpAH%26scisig%3DAAGBfm02lqMver0bwl6GEwlsdAJmzMDjzA%26oi%3Dscholaralrt%26html%3D%26pos%3D1%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7C67afcf7f160a424ac9e408db27548425%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638147016599116678%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=2dDxpjM9CynyouFlhRFv2DrkatrbQ%2BNKhgpzKu7jUcE%3D&reserved=0)

X Fan, W Li, J Yang, S Zhu, S Cui, B Cheng, H Zhai - Coatings, 2023

… **coating**, the scratches on the worn track are significantly reduced (Figure 5(a3)). It   
implies that the **abrasive** wear is reduced for NAM20 **coating**. At … MoO3 in the   
feedstock powder minimizes the deposited NAM **coating** **abrasive** wear. At 600 C to …

[Phase Evolution and Properties of AlxCoCrFeNi High-Entropy Alloys Coatings by Laser Cladding](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS2352492823004919%26hl%3Den%26sa%3DX%26d%3D8534784274908375156%26ei%3DWSISZPu9FNGNywTRvoiwAQ%26scisig%3DAAGBfm0a9XveIHXQ4j2QBvXM6SmTKLd7_A%26oi%3Dscholaralrt%26html%3D%26pos%3D6%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7C287e421467b94754192d08db258f08da%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638145068768795076%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=Of41Q5bhs%2Bjk8AUioMhaz5onf89LwHy4qCb7oTys3jM%3D&reserved=0)

Z Li, C Jing, Y Feng, Z Wu, T Lin, J Zhao - Materials Today Communications, 2023

… It can be seen that the form of wear of H13 steel is mainly **abrasive** wear, the form   
of wear of Al 0.5 **coating** is the interaction of **abrasive** wear and adhesive wear, and   
the form of wear of Al 1.0 **coating** is adhesive wear. The internal microstructure of …

[Wear mechanism of a laser cladded Fe-based self-lubricating composite **coating** for protecting counter-**abrasive** parts](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS0257897223001779%26hl%3Den%26sa%3DX%26d%3D10983835874375223003%26ei%3DQpsPZLOGI4z5yASy-6TYDw%26scisig%3DAAGBfm0q32-ItTuYQDu_tYk3EhWKRRafWQ%26oi%3Dscholaralrt%26html%3D%26pos%3D0%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7Cf20ad99ad70f43abad0e08db240d56c0%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638143411949214373%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=yLVkIxEpiXtwmjFFiZjoqeu8gnSVbSGvfhGWsWeV2dE%3D&reserved=0)

C Li, R Sun, Y Li, Z Zhao, X Qi, M Pei, F Li, J Li - Surface and Coatings Technology, 2023

… the tire mold 40Cr nitrided layer (counter-**abrasive** parts) was carried out. Friction   
coefficients of … Fe-based self-lubricating composite **coating** that can effectively   
protect **abrasive** parts. … stress of the **coating** makes it difficult for the **abrasive** dust …

[Microstructure and Tribo-Behavior of WC–Cr3C2–Ni Coatings by Laser Cladding and HVAF Sprayed: A Comparative Assessment](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Fwww.mdpi.com%2F1996-1944%2F16%2F6%2F2269%26hl%3Den%26sa%3DX%26d%3D5138615166141778974%26ei%3DQpsPZLOGI4z5yASy-6TYDw%26scisig%3DAAGBfm0N3fw15a9mxbFwoF_p8DigEBkhOw%26oi%3Dscholaralrt%26html%3D%26pos%3D3%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7Cf20ad99ad70f43abad0e08db240d56c0%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638143411949370618%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=hSef9mqNNcKtXo9rUpxI%2B6up7vARcqcEfkCpggBs6G0%3D&reserved=0)

Z Zhang, W Li, R Yang, X Zhao, H Zhang - Materials, 2023

… Accordingly, wear mechanism of the HVAF-WC **coating** is mainly dominated by   
**abrasive** wear caused by hard phases, accompanied with … are the main material   
removal mechanisms, and **abrasive** wear and oxidative wear are the main wear …

[Improving knife milling performance for biomass preprocessing by using advanced blade materials](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS0043164823000972%26hl%3Den%26sa%3DX%26d%3D10489653671419030071%26ei%3DlX8JZLi6HoLYmgG3koOAAQ%26scisig%3DAAGBfm01PqmuTQ1pMEZtvaZs7m-AXSj3tg%26oi%3Dscholaralrt%26html%3D%26pos%3D2%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7C4b76a6099ef04c01bad408db2069507b%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638139409217102636%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=ffHYW0XW%2FiacMQSdKJYGBQucm7mO7X0pitceVYzOIng%3D&reserved=0)

T Grejtak, JA Lacey, MW Kuns, DS Hartley… - Wear, 2023

… By that moment, the DLC-**coated** blades had a similar wear rate to the iron-borided   
ones, which could be contributed to the DLC **coating** being partly present during that   
period. Since the **blade** **tip** was not protected by the DLC **coating** afterwards, the …

[Effect of pre-oxidation on the electrochemical corrosion behavior of Ni-based **coating** reinforced by ceramic particles](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS0272884223004704%26hl%3Den%26sa%3DX%26d%3D6270015790220131289%26ei%3DO7MGZLTcEcOymAHNxqjYAw%26scisig%3DAAGBfm0-_E-4FEbEV-hoK8NTcwKfM5OyGg%26oi%3Dscholaralrt%26html%3D%26pos%3D0%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7C1c8579b3a8814acb1bfb08db1ebe55cb%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638137575387754249%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=fGP2TyBN8hrl%2F%2BAshXBOHdUTe9DoG980a6uFuZnEXfM%3D&reserved=0)

L Li, T Huang, D Zhang, R Chen, C Hua, X Tan, K Ren… - Ceramics International, 2023

… **coating**, we investigated the electrochemical corrosion behavior of the NiCr   
**coating** reinforced by MoSi 2 and AT40 ceramic phases which has the potential of   
application in **seal** **coating**… new composite sealant **coating** for marine corrosion …

[Wear Mechanism of Fe/Cu Self-Lubricating Composite Coatings Fabricated by Electro-Explosive Spraying under Dry Friction](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Fwww.mdpi.com%2F2135934%26hl%3Den%26sa%3DX%26d%3D13165980486570795403%26ei%3D8VXwY6HeNoKAy9YPkd2N8Aw%26scisig%3DAAGBfm2Ine-bWKSsJewWaOC0WbFOrXQZSA%26oi%3Dscholaralrt%26html%3D%26pos%3D3%26folt%3Dkw&data=05%7C01%7Cjeff.barr%40linde.com%7C2eabd577f0384784a90008db1169cc46%7C1562f00709a44fcb936be79246571fc7%7C0%7C0%7C638122918718208300%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=LPjZsgxwp9FKZQhOgZ3RxAqGwZfbaX26jdpgwCxWlgk%3D&reserved=0)

K Huang, Q Song, P Chen, Y Liu, Y Jing - Metals, 2023

… circular scratches on the surface of **coating** P1, which are typical **abrasive** wear   
traces; the maximum … Friction reduction mainly depends on metallic oxide   
particles between friction pairs, **abrasive** … Adhesive wear and **abrasive** wear are …

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