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Search history

Search FT=(magnet and distance) and PN=(US2013113472) (Results 1)

1:

Search PN=(WO2017035591) (Results 1)

2:

Search [SP]: 1. a method of detecting a material discontinuity in a magnetisable article comprising: traversing a magnet along the article so that lines of magnetic flux from an active magnetic field of the magnet loop through the article and magnetically couple the magnet to the article placing at least one magnetic field coupling sensor at a fixed position relative to the magnet and in the active magnetic field of the magnet wherein the at least one coupling sensor traverses along the article with the magnet to sample magnetic coupling between the magnet and the article and analysing the measured magnetic coupling in the active magnetic field for a change in the magnetic coupling during the traversing of the magnet and using the change in magnetic coupling to detect a discontinuity in the article. 2. the method according to claim 1 wherein analysing information comprises making a determination of a size of the discontinuity. 3. the method according to claim 1 wherein the at least one coupling sensor is arranged to sense at least direction of the magnetic flux looping through the article. 4. the method according to claim 1 wherein the at least one coupling sensor is arranged to sense at least density of the magnetic flux looping through the article. 5. the method according to claim 1 wherein the article is a rail for a rail transport vehicle. 6. the method according to claim 1 further comprising acquiring longitudinal samples of the magnetic field along the rail simultaneously with acquisition of samples of magnetic coupling from the one or more coupling sensors between instants at which the samples are acquired, moving: the magnet, the coupling sensors and the displacement sensors in a fixed juxtaposition relative to each other along the article and using the samples from the displacement sensors to provide an estimate of the displacement of the magnet along the article between successive sampling instants. 7. the method according to claim 6 wherein using the samples from the displacement sensors to provide an estimate of the displacement of the magnet comprises cross correlating the samples acquired from the displacement sensors at successive sampling instants. 8. the method according to claim 7 comprising combining the samples from the coupling sensors and the displacement sensors to provide an indication of magnetic field coupling across a discontinuity in the displacement domain. 9. a system for detecting a material discontinuity in a magnetisable article comprising: a magnet capable of being traversed along the article so that lines of magnetic flux from an active magnetic field of the magnet loop through the article and magnetically couple the magnet to the article and at least one magnetic field sensor located at a fixed position relative to the magnet and in the active magnetic field of the magnet wherein the at least one sensor traverses along the article with the magnet and is arranged to measure magnetic coupling between the magnet and the article. 10. the system according to claim 9 further comprising a magnetic flux analysis system arranged to analyse information pertaining to the magnetic flux provided by the at least one sensor to provide an indication of a characteristic of the surface penetrating discontinuity. 11. the system according to claim 9 wherein the at least one magnetic field coupling sensor is one of a plurality of coupling sensor arranged in an array in a direction transverse to a direction of traverse of the magnet along the article. 12. the system according to claim 9 comprising a displacement sensor acquiring samples of the magnetic field at multiple locations spaced longitudinally along the rail simultaneously with acquisition of samples of magnetic coupling from the one or more coupling sensors. 13. a method of estimating spatial displacement with respect to a magnetic field response of an article comprising: acquiring multiple samples of magnetic field coupling between an article and a magnet at a known sampling frequency wherein the magnet is capable of being moved in a direction to traverse a length of the article and wherein the multiple samples are simultaneously acquired at each of a plurality of locations that are spaced from each other in the direction of the length of the article in a period between successive sampling instants moving the magnet and the an apparatus capable of acquiring the samples in a fixed spatial relationship with each other along the article and processing the acquired multiple samples to provide an estimate of the displacement of the magnetic along the article between successive sampling instants. 14. a method of facilitating characterization of a material discontinuity in a ferromagnetic article comprising: applying a magnetic field to the article acquiring multiple samples of magnetic field coupling between the magnet and the article at a known sampling frequency in a period between the successive sampling instants moving an apparatus capable of applying the magnetic field and acquiring the samples in a fixed spatial relationship with each other along the article processing the acquired multiple samples to provide an estimate of the displacement of the apparatus along the article between successive sampling instants using the estimates of displacement to facilitate characterization of the feature in the article. 15. the method according to claim 14 wherein acquiring multiple samples of magnetic field coupling comprises acquiring a first multiple of samples at each of a plurality of locations that are spaced from each other in the direction of motion of the article and a second multiple of sample at each of a plurality of locations that are spaced from each other transverse to the direction of motion of the article. 16. the method according to claim 13 wherein processing the acquired multiple samples to provide an estimate of the displacement comprises cross correlating the samples acquired at successive sampling instants from the plurality of locations that are spaced from each other in the direction of the length of the article or the direction of motion of the article. 17. a method of detecting a break in a railway track, the method comprising: acquiring one or more samples of magnetic field coupling between a magnet and a rail in a railway track to facilitate an estimation of depth of a crack in the rail simultaneously acquiring longitudinal samples of the magnetic field coupling along the rail between instants at which the samples are acquired, moving an apparatus capable of acquiring the samples along the rail using the longitudinal samples to provide an estimate of the displacement of the apparatus along the rail between successive sampling instants to facilitate an estimation of width of the crack and processing the depth and width estimations to enable the surface penetrating feature to be characterised as one of a plurality of features including a break in the rail. 18. a system for estimating spatial displacement along a magnetisable article with respect to a defect sufficient to cause a detectable change in natural polarization boundary of an active magnetic field couple with the article comprising: an apparatus supporting a magnetic field measuring system arranged to sense magnetic field strength at multiple spaced locations in a length direction of the article at each sampling instant of a known sampling frequency, the apparatus being capable of being moved in the length direction along the article and a processor arranged to process the measured magnetic field strength at the multiple locations at successive sampling instants to provide an estimate of displacement of the apparatus at each sampling instant along the article in the vicinity of the defect. (Results 4)

Search 3 and displacement (Results 1)

4:

Search [SP]: a method and system for detecting a material discontinuity in a magnetisable article a system 10 and associated method for detecting a material discontinuity in a magnetisable article 12 has a sensor unit 16 which includes a magnet 18 and at least one magnetic field coupling sensor s. the magnet 18 is supported a distance above the rail 12 so that the lines of magnetic flux 22 loop through the rail 12. the magnetic field of the magnet 18 causes the surface 14 of the rail 12 directly below the magnet 18 to become polarised opposite to the facing pole of the magnet 18 and the regions distant from the magnet 18 to become inversely polarised. the coupling sensor s is placed and held at a fixed position relative to and in the active magnetic field of the magnet 18. the coupling sensor s measures the flux coupling between the rail 12 and the magnet 18. (Results 542)

Search 5 and displacement (Results 89)

6:

Search 6 and magnet (Results 29)

7:

Search 7 and PD<20150831 (Results 27)

8:

Search 8 and (rail or railway) (Results 5)

9:

Search FT=(magnetic field and rail and article) and PN=(US2013113472) (Results 1)

10:

Search PN=(US2013113472) (Results 1)

11:

Search 12: [SP]: 1. a method of maintaining a magnetisable component in which cracks are induced due to fatigue, the method comprising: subjecting the magnetisable component to a magnetic field after application of the magnetic field, determining a measure of remnant magnetic flux leakage for a section of the component using the determined remnant magnetic flux leakage to calculate a damage index representative of a predicted crack depth for that section of the component and dependent on the damage index, determining a maintenance action for that section of the component wherein the maintenance action is one of: taking no action removing surface material from the section and replacement of that section. 2. the method according to claim 1 further comprising: empirically determining a relationship between damage index and crack depth and utilising this relationship to predict crack depth for a calculated damage index. 3. the method according to claim 1 wherein determining remnant magnetic flux leakage comprises: obtaining at least one signal representative of remnant magnetic flux leakage at multiple sampling points along the section of the component and processing the at least one signal to determine remnant magnetic flux leakage. 4. the method according to claim 3 comprising applying a magnetic field in one direction along the section of the component to produce the remnant magnetic field in the section of the component and wherein the at least one signal is representative of magnetic flux leakage from the remnant magnetic field. 5. the method according to claim 4 wherein obtaining the at least one signal comprises obtaining respective signals for each of a plurality of mutually adjacent strips of the section of the component at each sampling point where the strips extend transverse to the direction of application of the magnetic field. 6. the method according to claim 3 wherein processing the at least one signal comprises filtering the at least one signal. 7. the method according to claim 6 wherein filtering the at least one signal comprises filtering the at least one signal through a high pass filter to remove signal components having a wavelength greater than a first wave length. 8. the method according to claim 7 wherein filtering the at least one signal comprises passing the at least one signal through a digital high pass filter in opposite directions. 9. the method according to claim 6 wherein the filtering comprises passing the at least one signal through a low pass filter to remove signals of a wavelength less than a second wave length. 10. the method according to claim 9 wherein the at least one signal is passed through the low pass filter prior to passing through the high pass filter. 11. the method according to claim 3 wherein processing the at least one signal comprises conditioning the signals on the basis of distance between each sensor and an underlying surface of the component for each of the sampling points. 12. the method according to claim 11 wherein conditioning the signal comprises multiplying each signal by a factor:
$$1 \pi \left[\arctan \left(\frac{ab^2 h a^2 + b^2 + 4 h^2}{a^2 + b^2 + 4 (h+c)^2} \right) - \arctan \left(\frac{ab^2 (h+c) a^2 + b^2 + 4 (h+c)^2}{a^2 + b^2 + 4 (h+c)^2} \right) \right]$$
 where a, b and c are constants dependant on the geometry of the component and h is the perpendicular distance of the or each sensor from the underlying surface of the component at each sampling point. 13. the method according to claim 12 wherein processing comprises analysing the one or more signals and providing an indication of major damage to the section of the component when the signals have a characteristic of low frequency and high amplitude. 14. the method according to claim 13, wherein providing an indication of major damage comprises subsequent to the high pass filtering, calculating respective sums of data points from the high pass filtered signals above and below respective positive and negative thresholds for all of the sensors, comparing the sums with a pre-calculated severe damage indicator, and reporting the existence of major damage when either sum exceeds the pre-calculated severe damage indicator. 15. the method according to claim 6 wherein processing further comprises calculating a maximum peak to peak amplitude for each filtered signal for the section of the component. 16. the method according to claim 15 wherein processing further comprises integrating the peak to peak amplitude for each signal for the section of the component to provide the measure of remnant magnetic flux leakage for the section of the component. 17. a method of maintaining a magnetisable component of a first geometry in which cracks are induced due to fatigue, the method comprising: subjecting the magnetisable component to a magnetic field after application of the magnetic field, determining a measure of remnant magnetic flux leakage for a section of the component converting the remnant magnetic flux leakage to a predicted crack depth for that section of the component using an empirically determined relationship between remnant magnetic flux leakage and crack depth for a previously tested in service component of the first geometry and dependent on the damage index, determining a maintenance action for that section of the component wherein the maintenance action is one of: taking no action removing surface material from the section and replacement of that section. 18. the method according to claim 17 wherein determining remnant magnetic flux leakage comprises: obtaining at least one signal representative of remnant magnetic flux leakage at multiple sampling points along the section of the component and processing the at least one signal to determine remnant magnetic flux leakage. 19. the method according to claim 18 comprising applying a magnetic field in one direction along the section of the component to produce the remnant magnetic field in the section of the component and wherein the at least one signal is representative of magnetic flux leakage from the remnant magnetic field. 20. the method according to claim 19 wherein obtaining the at least one signal comprises obtaining respective signals for each of a plurality of mutually adjacent strips of the section of the component at each sampling point where the strips extend transverse to the direction of application of the magnetic field. 21. a method of magnetic crack depth prediction for a magnetisable component comprising: determining a measure of remnant magnetic flux leakage for a section of the component by obtaining at least one signal representative of remnant magnetic flux leakage at multiple sampling points along the section of the component and processing the at least one signal to determine remnant magnetic flux leakage wherein processing the at least one signal comprises conditioning the at least one signals on the basis of distance between each sensor and an underlying surface of the component for each of the sampling points wherein conditioning the signal comprises multiplying the or each signal by a factor:
$$1 \pi \left[\arctan \left(\frac{ab^2 h a^2 + b^2 + 4 h^2}{a^2 + b^2 + 4 (h+c)^2} \right) - \arctan \left(\frac{ab^2 (h+c) a^2 + b^2 + 4 (h+c)^2}{a^2 + b^2 + 4 (h+c)^2} \right) \right]$$
 where a, b and c are constants dependent on the geometry of the component and h is the perpendicular distance of the or each sensor from the underlying surface of the component at each sampling point and, using the determined remnant magnetic flux leakage to calculate a damage index representative of a predicted crack depth for that section of the component. 22. the method according to claim 21 wherein processing comprises analysing the one or more signals and providing an indication of major damage to the section of the component when the signals have a characteristic of low frequency and high amplitude. 23. the method according to claim 22, wherein providing an indication of major damage comprises subsequent to the high pass filtering, calculating respective sums of data points from the high pass filtered signals above and below respective positive and negative thresholds for all of the sensors, comparing the sums with a pre-calculated severe damage indicator, and reporting the existence of major damage when either sum exceeds the pre-calculated severe damage indicator. 24. the method according to claim 21 wherein processing further comprises calculating a maximum peak to peak amplitude for each filtered signal for the section of the component. 25. the method according to claim 24 wherein processing further comprises integrating the peak to peak amplitude for each signal for the section of the component to provide the measure of remnant magnetic flux leakage for the section of the component. (Results 0)

Search 13: [SP]: method and apparatus for magnetic crack depth prediction a method of magnetic crack depth prediction for a magnetisable component of a first geometry comprising determining a measure of remnant magnetic flux leakage for a section of the component and, converting the remnant magnetic flux leakage to a predicted crack depth for that section of the component using an empirically determined relationship between remnant magnetic flux leakage and crack depth for a previously tested in service component of the first geometry. (Results 44)

Search 13 and (flux w10 direction) (Results 11)

14:

Search 14 and PD<20150831 (Results 10)

15:

Search 15 and (rail or railway) (Results 1)

16:

1) Family number: 59002791 (GB2535151A)

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Title: **RAIL** HEAD PROFILING DEVICE

Abstract: A **rail** track measuring device may use a plurality of Hall Effect sensors 2 arranged in horizontal and vertical axes around a **rail** 3. The arrays act to determine the distance between themselves and the **rail** by measuring the corresponding magnetic flux density. Due to the curved profile of the **rail** 3 the values differ, they are sent to a processor (not shown) and software plots the position of the measured values [Fig 3, 1 and 3]. A profile of a train wheel [Figure 3, 2] may be superimposed on the plotted value [Figure 3, 3] to determine contact points between the **rail** and wheel. It is thus possible to determine if safety warnings should be issued relating to **rail** wear. **Rail** head and side wear can also be determined.

Classifications:

International (IPC 8-9): B61K9/08 G01B7/02

G01N27/83 (Advanced/Invention)

CPC: B61K9/08 G01B7/02 G01B7/10 G01N27/83 G01B7/28



1/3

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