(12) UK Patent Application (19) GB (11) 2 435 338 (13) A

(43) Date of A Publication 22.08.2007

(21) Application No: 0702944.0

(22) Date of Filing: 15.02.2007

(30) Priority Data:
(31) 0603208.0 (32) 17.02.2006 (33) GB

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(51) INT CL:
G06K 5/00 (2006.01)

(52) UK CL (Edition X):
G4M MB4 MCF
G4H HJ

(56) Documents Cited:
US 5729001 A **US 4860226 A**

(58) Field of Search:
INT CL **G06K**
Other: **Online: WPI, EPODOC**

(54) Abstract Title**: Bar code verifier**

(57) A bar code verification system comprises a bar code scanning device 8 for scanning a bar code label 6 as it is printed or on a production line and outputting a series of readings of each barcode scanned. One or both of: a number of readings in the series; and a number of consecutive readings in the series, is representative of the quality of the bar code label. The system also comprises a generator for deriving a grading for the barcode label based on the number or numbers. The scanned head of the scanning device may be located at a less than optimum focal distance from the barcode in order to make the output more difficult to decode. Consequently, the time taken to decode a reading from the scanner head becomes directly related to the quality of the barcode.

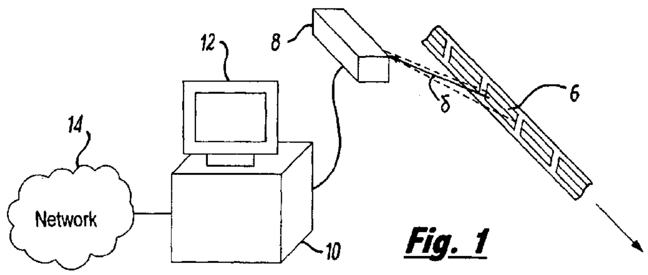

Fig. 1

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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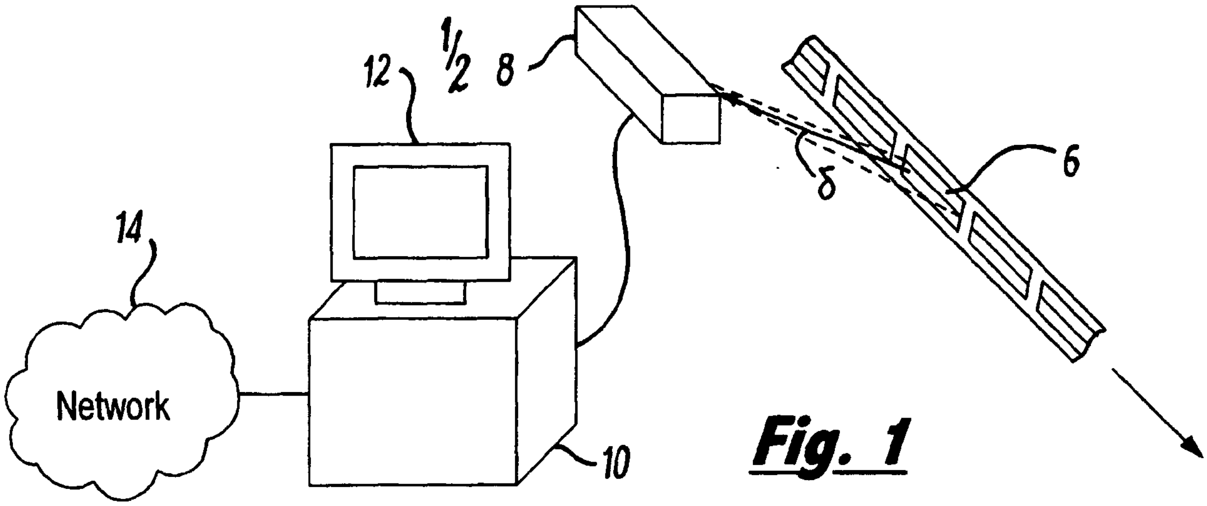

Fig. 1

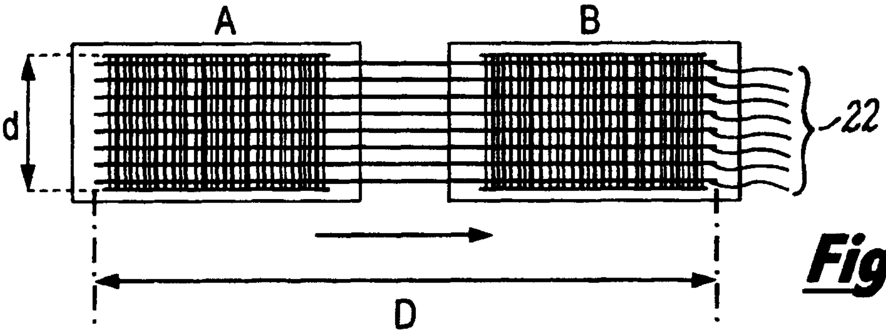

Fig. 2

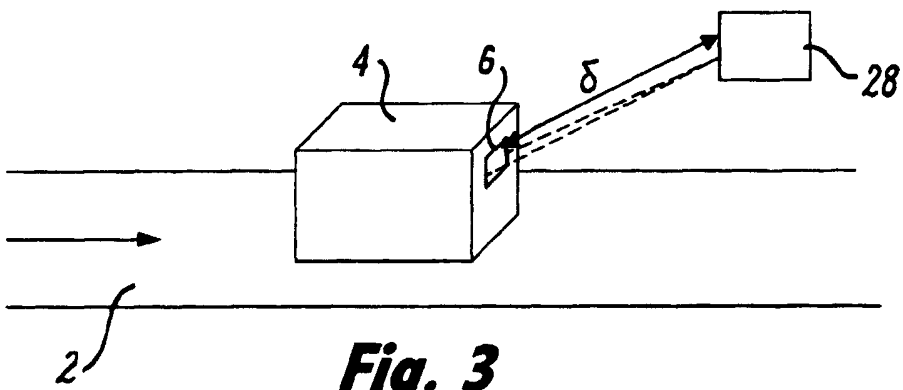

Fig. 3

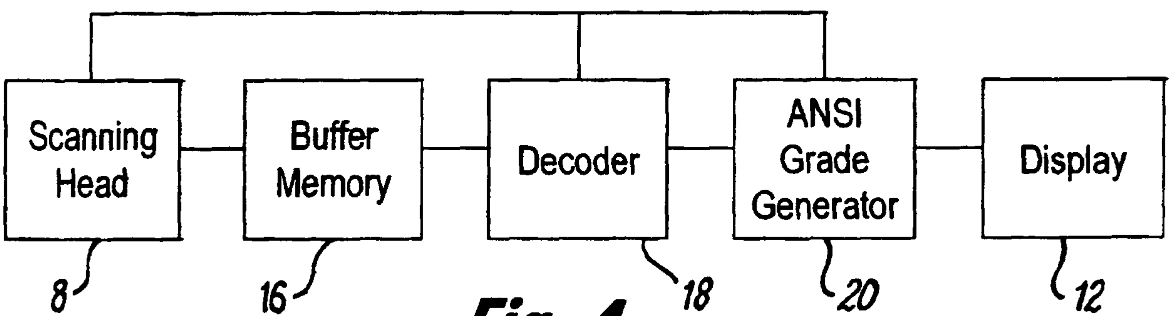

Fig. 4

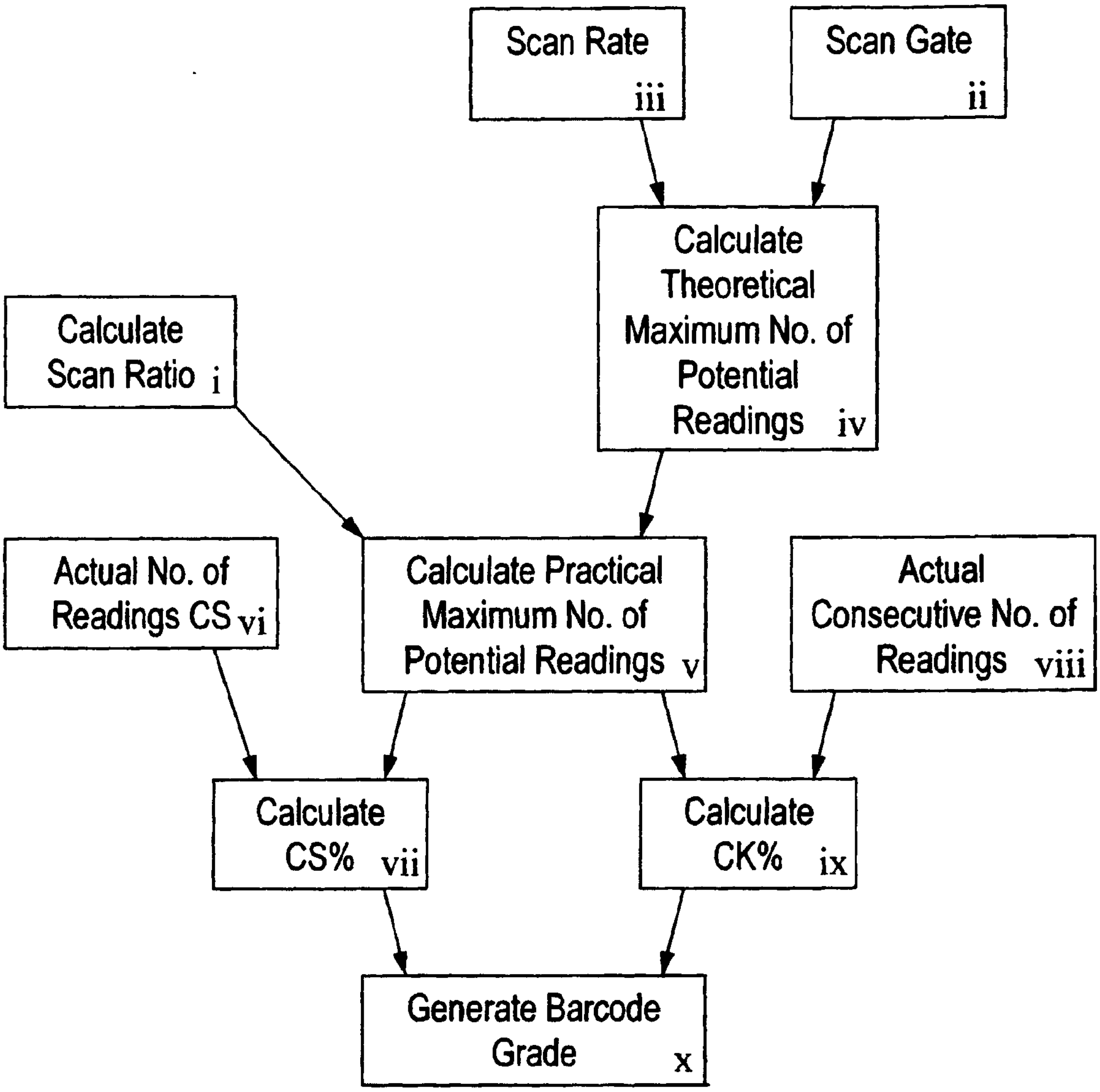
Scan Rate iii
Scan Gate ii
Calculate Theoretical Maximum No. of Potential Readings iv
Calculate Scan Ratio i
Actual No. of Readings CS vi
Calculate Practical Maximum No. of Potential Readings v
Actual Consecutive No. of Readings viii
Calculate CS% vii
Calculate CK% ix
Generate Barcode Grade x

Fig. 5

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BAR CODE VERIFIER

The present invention relates to a bar code verifier device and in particular to a device for verifying bar codes for retail packs and traded units (hereafter referred to generically as units) during production.

Bar code quality can be affected by a number of factors, for example, print quality, label material quality and label application consistency.

High quality bar codes are important to facilitate reliable supply chain logistics. Major retailers have fully automated distribution centres where efficient handling can only be achieved if every unit and pallet barcode is readable. Manufacturers of units are responsible for the quality of the bar codes on the units they supply and so ensuring that barcode quality is maintained is an important part of the production process.

Barcode quality is currently measured as an American National Standards Institute (ANSI) rating from A to D, with A being the best quality. Ratings of C or below on a unit are likely to result in barcode reading problems in the distribution channel.

At the moment crude read/no-read checking is carried out on the production line, in real time, with barcode scanners. However, this checking procedure only recognises a barcode read failure and cannot detect, for example, a gradual degradation in barcode quality over time. If such a gradual degradation can be detected on the production line in real time then steps can be taken, for example during scheduled line shut downs, to reverse the degradation process before the bar code quality degrades sufficiently to cause problems further down the supply chain.

Currently, the type of ANSI quality grading described above can only be achieved by analysing barcode labels on a selected sample of units. This is achieved off-line with an ANSI approved of barcode rating device. The device takes controlled measurements of various barcode characteristics for a sample barcode and calculates an ANSI rating. However, in automated processing plants an infrequent sampling process cannot adequately ensure that barcode quality is continuously maintained. Poor quality bar codes are likely to be missed in the manufacturing process and may only be picked up when failed barcode readings occur later in the supply chain. This results in manual correction, rework, rejection and fines at distribution centres and retailers. Accordingly, there is a requirement for an in-line bar code verifier which can generate an ANSI rating in real time as units pass by it in the production line.

According to the present invention there is provided a bar code verification system, comprising a bar code scanning device for scanning bar code labels in real time as they are printed or on units travelling along a production line and outputting a series of readings of each barcode scanned, wherein one or both of:

a number of readings in the series; and

a number of consecutive readings in the series;

is or are representative of the quality of the bar code label read. The system uses the number of readings in the series and/or the number of consecutive readings in the series to generate a grading for the scanned barcode in real time, preferably, an ANSI equivalent grading. For example, the system may additionally comprise a grade generator for calculating as a ratio the number of readings in the series as compared to a maximum potential number of readings in the series and deriving a primary grading for the barcode label scanned from the ratio. The maximum potential number of readings can be derived by using the scanning device in relation to a high quality bar code label and determining from that the maximum number of possible readings.

The bar code scanning devices can scan, in real time a succession of bar code labels which travel past the bar code scanning device.

In one embodiment of the present invention the bar code scanning device comprises: a scanning head; a buffer memory; and a decoder. The buffer memory is preferably a first in first out buffer memory.

The scanning head is preferably set up to generate an optimum reading only for high quality bar code labels. This can be achieved, for example, by locating the scanning head at a focal distance from the bar code label to be scanned which is different from, for example less than, the optimum focal distance for the scanning head.

Preferably, the buffer memory has a limited size, so that it can become full and thereby delay transmission of the scanning head readings. For example, the buffer memory may be arranged to pass a reading to the decoder only after the decoder has decoded a previous reading. Thus, when poor quality bar code labels are scanned and the decoder takes longer to generate a bar code read out, there will be longer time periods between the decoder requesting the next scanning head reading from the buffer memory. This will lead to the buffer memory more quickly becoming filled up. When the buffer memory is full it may be arranged to reject readings from the scanner head. This limits the maximum number of barcode readings in the series of readings generated when the barcode label is scanned by the scanning device.

Preferably, the decoder is a non-intelligent decoder which uses extended decode routines so that there is a direct relationship between the quality of the barcode reading from the scanning head and the length of time it takes the decoder to generate a barcode reading. Thus, it is preferred that the time it takes for the decoder to generate a bar code reading is dependent on the quality of the bar code label scanned.

In a preferred embodiment of the present invention, the buffer memory and decoder co-operate to delay or reject readings or generate no-read readings such that the maximum number of consecutive readings (not delayed or rejected and excluding no-reads) in the series without a delay or a no-read reading between them is representative of the quality of the bar code label scanned and the generator is arranged to calculate as a ratio the maximum number of consecutive readings in the series as compared to a maximum potential number of readings in the series and to derive from the ratio a secondary grading for the barcode label scanned. The secondary grading can be used to validate or moderate the primary grading. Preferably, the generator is arranged to moderate the primary grading downwards if the primary and secondary grading do not correspond.

The generator, the buffer memory and/or the decoder may be implemented using a signal processor, microprocessor or other computing device.

The present invention also provides a method of real time verification of a bar code label, comprising the steps of: scanning bar code labels in real time as they are printed or on units travelling along a production line to generate a reading; outputting a series of readings of each barcode scanned wherein one or both of:

a number of readings in the series; and

a number of consecutive readings in the series;

is or are representative of the quality of the bar code label scanned; and generating a grading for the bar code label from the number or numbers.

The method preferably comprises the steps of; calculating as a ratio the number of readings in the series as compared to a maximum potential number of readings in the series; and deriving a primary grading for the barcode label from the ratio.

The method may also comprise the steps of: generating a series of readings from the bar code label scanned; and passing the readings to a buffer memory of limited size. The method may include the steps of decoding each reading output from the buffer memory to generate a bar code reading and releasing a reading from the buffer memory to be decoded after decoding of a previous reading has been completed. In addition the method may comprise the step of the buffer memory rejecting readings whenever the buffer memory is full. Preferably, the method comprises the step of decoding a reading to generate a bar code reading in a time which is dependent on the quality of the bar code label scanned. It is preferred that the method includes the steps of: the buffer memory and decoding process co-operating to delay readings, reject readings or generate no-read readings such that the maximum number of consecutive readings (not delayed or rejected and excluding no-reads) in the series without a delay between them is representative of the quality of the bar code label scanned; then calculating as a ratio the maximum number of consecutive readings in the series as compared to a maximum potential number of readings in the series; and then deriving from the ratio a secondary grading for the barcode label scanned. The method may then include the additional step of moderating the primary grading downwards if the primary and secondary grading do not correspond.

The first and second embodiments of the present invention can be used in relation to bar code labels as they are printed and/or in relation to bar code labels affixed to units on a production line.

The invention will now be described by way of example only and with reference to the accompanying schematic drawings, wherein:

Figure 1 shows a barcode verification system according to the present invention operating on a strip of bar code labels on printing of the lablels;

Figure 2 shows a raster scan frame of the type which is used by the scanning head of the barcode verification system of Figure 1;

Figure 3 shows a different design of scanning head utilised in relation to bar code labels affixed to units on a production line which can also be utilised in the barcode verification system of Figure 1;

Figure 4 shows the components making up the barcode verification system of the system of Figure 1; and

Figure 5 shows a flow diagram of the processing steps which can be utilised in the barcode verification system of Figures 1 to 4.

Figure 1 shows a barcode verification system according to the present invention operating in real time on a strip of bar code labels (6) just printed by a printer (not shown) and moving in the direction of the arrow. The system of Figure 1 can also be used in real time on a unit, for example a retail package to which a barcode label (6) has been applied. The system shown in Figure 1 includes a raster scanner scanning head (8), a microprocessor (10) connected to and responsive to an output of the scanning head and a display screen (12) connected to and responsive to an output of the microprocessor. The microprocessor (10) may be connected to or as part of a network (14), which network may comprise, for example, a local area network (LAN) or a company intranet. The network (14) may, for example, include local processor devices which control other parts of the production line or remote processor devices which are part of a distributed logistics network.

Figure 4 represents schematically, the components of the barcode verifier device shown in Figure 1. The device of Figure 4 comprises a scanning head, for example the raster scanner scanning head (8) for scanning barcode labels. The scanner is connected to a first in first out buffer memory (16) of limited buffer size, which receives an output from the scanning head (10). The buffer memory is connected to a decoder (18), which receives an output from the buffer memory (16). The decoder (18) decodes the barcode reading from the data it receives from the scanning head, via the buffer. An ANSI grade generator (20) generates an ANSI equivalent rating for the quality of the barcode label (6) scanned by the scanning head (8) based on the data it receives from the decoder (18). The ANSI generator (20) also receives some data direct from the scanning head (8). This data includes the scanning time, which is the time taken to scan each bar code and the scanning speed, which is the speed at which the scanning head (8) reads each bar code. The display (12), is connected to the ANSI grade generator (20) and an ANSI equivalent rating output from the generator (20) can be displayed on the display (12).

The buffer memory (16), decoder (18) and ANSI grade generator (20) may be implemented either in hardware or software and for example, they may be implemented by the microprocessor (10) shown in Figure 1.

A raster scanner scanning head (8) can be used, in real time, on a strip of labels as they are printed, as shown in Figure 1 or on bar code labels affixed to units travelling along a conveyor on a production line. The bar code label (6) travels past the scanning head (8). The scanning head generates a raster of wide angle laser beams which have a footprint on the barcode label (6) shown by the scan lines of laser light (22) as shown in Figure 2. In the arrangement in Figure 2, the barcode label (6) is passing the scanner head in a direction of travel shown by the arrow. The scanning head (8) is switched on to scan the barcode label (6) just after the entire label has passed into the range of the light beams of the scanner head (8), ie. when a barcode label (6) is in the position (A) shown in Figure 3. The scanning head (8) is switched off from scanning the barcode label (6) just before the leading edge of the label passes out of the range of the light beams, ie. when a barcode label (6) is in the position (B) shown in Figure 3. This results in a scan frame represented by distance D in Figure 3. This scan frame distance (D) is selected to be shorter than that which is used conventionally. Conventionally, the scanner switches on as soon as the leading edge of a barcode label comes within the range of the scanner and switches off only after the trailing edge of a barcode label has left the range of the scanner. The raster of beams is selected to allow a minimum of between 70% and 90% and more preferably around 80% of the total bar code dimension (d) to be evaluated.

As an alternative to the raster scanning head (8) of the configuration shown in Figure 1, a line scanning head (28) can be used in the configuration of Figure 3, in which a unit (4) is travelling towards the scanning head on a conveyor (2) and the barcode label (6) is located on the front of the unit. A similar configuration can be used in relation to just printed labels. The line scanner transmits a single wide angle beam of laser light, which passes upwardly through the barcode, as the unit (4) approaches the scanner. The scanning head (28) is turned on to scan where the scan line (the line footprint of the light beam on the unit) passes through the bottom of the barcode and is turned off from scanning when the scan line passes through the top of the barcode. Again, the switching on and off of the scanning head is selected to allow a minimum of between 70% and 90% and more preferably around 80% of the total bar code dimension (d) to be evaluated. The scanning head (28) of Figure 3 can be used in the systems described above in relation to Figures 1 and 4, in place of the scanning head (8).

The scanning head (8, 28) takes multiple readings from each barcode label (6) at a predetermined rate. These readings are stored in the buffer memory (16). The decoder (18) extracts a reading from the buffer memory (16), decodes it to generate a bar code read out and passes it on to the ANSI grade generator (20). Once is has completed this, the decoder (18) extracts the next reading from the buffer memory (16). Where the barcode cannot be read, the decoder (18) sends a 'NO READ' string to the ANSI generator (20) in place of the parameters normally generated when a barcode can be read.

According to the present invention, the scanning heads (8, 28) are not located at their optimum distance from the barcode labels they scan. That is, they are not located at the focal distance from the barcode labels specified by the manufacturer of the scanning head. At the prescribed focal distance the barcode can be read at the optimum magnification for the scanner head. At the optimum focal distance, the scanner is able to efficiently read bar code labels which are of poor quality, for example at least ANSI grade B and C labels. Instead, according to the present invention, the scanning heads (8, 28) are located at a shorter focal length than that recommended so that the reading output from the scanner head (8, 28) is degraded and so becomes more difficult to decode. The more difficult it is to decode the reading from the scanner head, the longer it takes for the decoder to generate a bar code read out (decode time) and the longer it takes the decoder to decode, the quicker the buffer memory (16) fills up. By choosing a shorter focal distance in order to make a reading output from the scanning head (8, 28) more difficult to decode the time taken to decode a reading from the scanner head becomes directly related to the quality of the bar code label. It is this principle which is used according to the present invention to generate the ANSI equivalent grade.

As described above, each bar code label (6) is scanned by the scanning head (8, 28) multiple times at a pre-determined rate, and each reading from the scanning head is stored in the memory buffer (16). When the buffer memory (16) is full, scans are skipped and are therefore not decoded. The scans continue to be skipped until room is again available in the buffer memory (16). Thus, the poorer the quality of the bar code, the longer the decode time, the quicker the buffer memory (16) fills up and fewer of the total number of possible scans of the barcode are decoded.

The scan gate (time over which scanning occurs), the frequency of scanning and the distance (δ) between the bar code label (6) and the scanning head (8, 28) are factors which can be adjusted to make the scanner head (8, 28) read performance good only for perfect (ANSI grade A) bar code labels. The consequence is that clearly defined gradations can be detected by the bar code verifier described herein between the reading of ANSI A, B, C and D grade, in addition to a fail grade.

As an example, where the scanning head is a SICK 410 scanner, comprising a scanning head, limited memory buffer and decoder and which is manufactured by SICK UK Ltd, the recommended focal distance is 170mm, however according to the present invention the scanning head is placed at a distance (δ) of 80mm from the bar code label to be read. This is the point at which the scanner can only be efficient reading a perfect ANSI code. In this position, the scanner is less tolerant to any imperfections in poorer codes and can therefore distinguish variations between poorer quality codes.

According to the present invention, the scanning gate (time over which scans are made for each barcode label) can be limited. The scan gate is limited by scanning only for the time in which the entire bar code is within the range of the scanning head (8, 28), ie. when the bar code is wholly within the scan frame (D) as described above for a raster scanning head in relation to Figure 2. The scanning gate can be limited, for example, to between 50 and 200ms depending on the number of characters in the barcode and the speed at which the bar code label (6) is travelling on the production line. Barcodes with more characters (ie. longer barcodes) fill the scan frame more fully and so give a smaller scan gate. Similarly, barcodes travelling at faster speed result in a smaller scan gate.

It is preferred that the decoder (18) uses extended decode routines in order to read the poorly defined characters of the barcode. This limits the number of readings it can successfully decode in a given time and reduces the number of consecutive good readings it can decode. Therefore, it is preferred that the decoder does not employ intelligent decoding routines.

The Bar code verifier device is first calibrated by calculating a scan ratio (SR) [box i of Figure 5]. A verified ANSI A grade bar code label, is located statically at the optimum focal distance from the scanning head (8, 28) and the % evaluation function on the scanner is run. This is the time (T) in ms that it takes for the ANSI grade generator (20) to receive 100 consecutive readings from the decoder (18). This time is recorded. In the example with the SICK 410 scanning head, the following readings have been taken:

T = 540ms for EAN raster; and

T = 290ms for ITF raster;

Where EAN and ITF are the names of different barcode formats. These two types of barcode have different sizes and formats and the data they represent differs.

This is then repeated, but with no bar code label positioned for the scanning head (8, 28) to read. The time (t) in ms is recorded that it takes for the ANSI grade generator (20) to receive 100 consecutive readings from the decoder (18). In the example with the SICK 410 scanner, the following readings have been taken:

t = 280ms for EAN and ITF raster.

The scan ratio SR = T/t, is then calculated. The scan ratio represents the relationship between 100 good reads and 100 no reads and is generally different for each barcode format. In the example with the SICK 410 scanning head, the following readings have been calculated:

SR = 350Hz using raster scanning head (8); and

SR = 700Hz using line scanning head (28).

The ANSI grade generator (20) calculates the potential number of bar code read outs (AMS) that the scanning head (8, 28), buffer (16) and decoder (18) should be able to generate for a perfect bar code label, based on the barcode symbology and the number of characters in the bar code.

The scan gate [Box ii of Figure 5] for the production line set up is calculated in ms, for example based on the length of the bar code and the speed at which the bar code passes the scanning head. A theoretical maximum potential number of scans (MPS) is then calculated [Box iv of figure 5] by multiplying the scan rate [Box iii of Figure 5] by the scan gate. From this a practical maximum potential number of scans (AMS) [Box v of Figure 5] is calculated according to the following equation:

AMS = MPS/SR.

Then, with the bar code labels (6) passing the scanning head (8, 28), the ANSI grade generator (20) receives an actual number of read outs (CS) generated when a bar code label (6) is read by the scanning head (8, 28) [Box vi of Figure 5].

From this the ANSI grade generator (20) calculates a percentage (CS%) of the number of actual read outs as compared to the potential number of readings [Box vii of Figure 5]. This percentage is calculated as follows:

CS/AMS x100 = CS% = Scan%

This percentage is then equated to an ANSI grade for the bar code label (6) currently being read [Box x of Figure 5]. The percentage is equated to an ANSI grade of A, B, C or D or to a fail. In the example described above using the SICK 410 scanner, the percentages of actual readings to potential readings equate to the ANSI grading as follows:

ANSI grade A – more than 91%

ANSI grade B – 57 to 90%

ANSI grade C – 30 to 56%

ANSI grade D – 7 to 29%

FAIL – 6% or below.

Simultaneously, the ANSI grade generator (20) calculates the maximum number of read outs without a break (CK) which have been produced by the decoder (18) [Box viii of Figure 5]. Then it calculates a percentage (CK%) of the maximum consecutive number of read outs, as compared to the potential number of readings [Box ix of Figure 5]. This percentage is calculated as follows:

CK/AMS x 100 = CK% = Code%

This percentage is also equated to an ANSI grade for the bar code label (6) currently being read [Box x of Figure 5]. The percentage is equated to an ANSI grade of A, B, C or D or to a fail. In the example described above using the SICK 410 scanner, the percentages of the maximum number of consecutive readings to potential readings equate to the ANSI grading as follows:

ANSI grade A – more than 60%

ANSI grade B – 14 to 59%

ANSI grade C – 3 to 13%

ANSI grade D – 2%

FAIL – 1%.

If the two ANSI grades agree then the ANSI grade generator (20) outputs the ANSI grade to the display unit (12). If the ANSI grades do not agree then the

CS% ANSI grade is reduced by 1 grade and the reduced grade is output to the display unit (12).

In order to equate the calculate CS% and CK% percentages to an ANSI grade equivalent, the calculated values are compared against the pre-set percentages, using the following logic [Box x of Figure 5]:

Grade A

If Scan% >= CS%A, ie. 91% return stage 1 A grade;

Else if go to grade B

If Code%>= CK%, ie. 60% return overall A grade;

Else if Code% < CK% reduce overall grade by 1 grade to B and

End

Grade B

If Scan% >= CS%B, ie. 57% return stage 1 B grade;

Else if go to grade C

If Code%>= CK%, ie. 14% return overall B grade;

Else if Code% < CK% reduce overall grade by 1 grade to C and

End

Grade C

If Scan% >= CS%B, ie. 30% return stage 1 C grade;

Else if go to grade D

If Code%>= CK%, ie. 3% return overall C grade;

Else if Code% < CK% reduce overall grade by 1 grade to C and

End

Grade D

If Scan% >= CS%B, ie. 7% return stage 1 D grade;

Else if go to grade F

If Code%= CK%, ie. 2% return overall D grade;

Else if Code% < CK% reduce overall grade by 1 grade to D and

End

Grade F

Return overall grade F and End.

The operation of the ANSI grade generator (20) with the scanning head (8, 28), buffer memory (16) and decoder (18), as described above creates an accurate ANSI grade at very high speeds, not achievable by other current verification devices. Because, the system described above can work in real time on a production line, gradual degradations of the bar code label quality can be detected over time, and corrective action can be taken before the bar code quality drops to a level where it is likely to cause problems further down the supply chain. Often the corrective action can be taken during scheduled shut downs of the production line so as not to increase production line down time.

The microprocessor (10) of Figure 1 may be configured with the functionality of at least the ANSI code generator (20) of Figure 2. For each unit (4) which is read by the scanning head (8, 28), the microprocessor (10) can log the grade of the code generated by the ANSI code generator (20), the product detail (read from the bar code) and the time and date. All this information can be displayed simultaneously on the display unit (12). This information can be logged locally, or passed to the network (14) for logging in a centralised location.

This type of information is sometimes required for compliance with standards in the food or pharmaceutical industries.

For easier recognition that the bar code labels are degrading, a green light can be displayed by the verification system when an A grade label is detected, an amber light when a B grade label is detected and a red light when C grade labels and below are detected.

As discussed above, the micro-processor (10) may be connected in to a network (14). The network can relay messages to microprocessors controlling other parts of the production line, for example to direct units into reject lanes of the production line should the ANSI grading fall below a predetermined minimum acceptable level, for example ANSI grade B. Alternatively, if the ANSI grading drops below the predetermined minimum the microprocessors within the network can be set up to bring the production line to a controlled halt.

CLAIMS

1. A bar code verification system, comprising:

   a bar code scanning device for scanning bar code labels and outputting a series of readings of each barcode scanned, wherein one or both of:

      a number of readings in the series; and

      a number of consecutive readings in the series;

   is representative of the quality of the bar code label; and

   a generator for deriving a grading for the barcode label based on the number or numbers.

2. A system according to claim 1 wherein the generator is arranged to calculate as a ratio the number of readings in the series as compared to a maximum potential number of readings in the series and to derive a primary grading for the barcode label from the ratio.

3. A system according to claim 1 or claim 2 wherein the bar code scanning device comprises:

   a scanning head;

   a buffer memory; and

   a decoder.

4. A system according to claim 3 wherein the scanning head is set up to generate an optimum reading only for high quality bar code labels.

5. A system according to claim 4 wherein the scanning head is located at a focal distance from the bar code label to be scanned which is less than the optimum focal distance for the scanning head.

6. A system according to any one of claims 3 to 5 wherein the buffer memory has a limited size.

7. A system according to any one of claims 3 to 6 wherein the system is arranged so that the buffer memory passes a reading to the decoder after the decoder has decoded a previous reading.

8. A system according to any one of claims 3 to 7 wherein the buffer memory is arranged to reject readings from the scanner head whenever the buffer memory is full.

9. A system according to any one of claims 3 to 8 wherein the decoder is a non-intelligent decoder which uses extended decode routines.

10. A system according to any one of claims 3 to 9 wherein the time it takes for the decoder to generate a bar code reading is dependent on the quality of the bar code label.

11. A system according to any one of claims 3 to 10 wherein the buffer memory and decoder co-operate to delay readings, reject readings or generate no-read readings such that the maximum number of consecutive readings in the series is representative of the quality of the bar code label and the generator is arranged to calculate as a ratio the maximum number of consecutive readings in the series as compared to a maximum potential number of readings in the series and to derive from the ratio a secondary grading for the barcode label.

12. A system according to claim 11 wherein the generator is arranged to moderate the primary grading downwards if the primary and secondary grading do not correspond.

13. A system according to any one of the claims 2 to 12 wherein the generator is implemented using a signal processor, microprocessor or other computing device.

14. A system according to any one of claims 3 to 13 wherein the buffer memory and/or the decoder is implemented using a signal processor, microprocessor or other computing device.

15. A method of real time verification of a bar code label, comprising the steps of:

scanning bar code labels to generate a reading;

outputting a series of readings of each barcode scanned wherein one or both of:

a number of readings in the series; and

a number of consecutive readings in the series;

is representative of the quality of the bar code label scanned; and

generating a grading for the bar code label from the number or numbers.

16. A method according to claim 15 additionally comprising the steps of;

calculating as a ratio the number of readings in the series as compared to a maximum potential number of readings in the series; and

deriving a primary grading for the barcode label from the ratio.

17. A method according to claim 15 or claim 16 wherein a scanning head is used for the scanning of the bar codes, and comprising the additional step of setting up the scanning head to generate an optimum reading only for high quality bar code labels.

18. A method according to claim 17 comprising the step of locating the scanning head at a focal distance from the bar code label to be scanned which is less than the optimum focal distance for the scanning head.

19. A method according to any one of claims 15 to 18 comprising the steps of:

generating a series of readings from the bar code label scanned; and

passing the readings to a buffer memory of limited size.

20. A method according to claim 19 comprising the steps of decoding each reading output from the buffer to generate a bar code reading and releasing a reading from the buffer memory to be decoded after decoding of a previous reading has been completed.

21. A method according to claim 19 or claim 20 comprising the step of the buffer memory rejecting readings whenever the buffer memory is full.

22. A method according to any one of claims 20 or 21 comprising the step of decoding a reading to generate a bar code reading in a time which is dependent on the quality of the bar code label scanned.

23. A method according to any one of claims 20 to 22 comprising the steps of:

the buffer memory and decoding process co-operating to delay, reject or generate no-read readings such that the maximum number of consecutive readings in the series is representative of the quality of the bar code label scanned;

calculating as a ratio the maximum number of consecutive readings in the series as compared to a maximum potential number of readings in the series; and deriving from the ratio a secondary grading for the barcode label scanned.

24. A system according to claim 23 comprising the additional step of moderating the primary grading downwards if the primary and secondary grading do not correspond.

Application No:	GB0702944.0	**Examiner:**	Mr Ben Widdows
Claims searched:	1-24	**Date of search:**	11 June 2007

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-4,6,7,9,10,13-17,19&20	US 4860226 A (MARTIN ET AL) see e.g. column 6 lines 18-34
X	1-4,6,8,13-17&19	US 5729001 A (SPITZ) see e.g. column 4 lines 28-60

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

Worldwide search of patent documents classified in the following areas of the IPC

G06K

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From
G06K	0005/00	01/01/2006