SeedCount

Rapid Seed Analysis System

Quality Assessment of Grains by Digital Image Analysis. Rapid, non-destructive, analysis of grain samples. Essential for: growers, dealers, millers, brewers, breeders, malsters, food processors.

SeedCount SC6000 Image Analyser

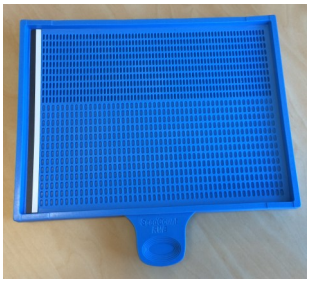
SeedCount...Seed Imaging Analysis

Image Analysis Systems

The **SeedCount SC6000** mage Analyser is designed to scan seeds on a tray and to measure the physical characteristics such as colour, size, shape, defects, inclusions, etc. **SeedCount** uses a modified flatbed desktop scanner, sample trays and a touch screen personal computer to create a digital image of grains and seeds. The **SeedCount** software then analyses the image to calculate the number of seeds that exhibit each parameter. SeedCount software use a parameteric approach to determines other characteristics of the seeds including Black Point, Black Tip, Cracked Seeds, Broken Seeds and others. The **SeedCount SC6000TR** scanner operates in both reflectance and transmission modes. Reflectance scans are made by illuminating the grains or seeds from above the tray and collecting the reflected images using a line scan camera mounted on the transport system. Transmission scans are collected by illuminating a sample of grains or seeds placed in a tray with a glass window under the grains or seeds. The sample is illuminated from below and the image is collected using the same line scan camera. The transmission image can show the internal characteristics of the grains or seeds if the light passes through the seeds. Transmission images are only useful for transparent seeds.

Features:

- Analyse up to 1300 seeds in less than 60 seconds
- Analyses small samples - down to 40 seeds
- Applications for Wheat, Durum, Barley, Rice, Corn, Lentils, Oats, Coffee, Canola, Flour, Sorghum.
- Measures length, width, thickness, colour, defects, stains, broken grains and more
- Simple Touch Screen Operation
- Customised Results Screen for the parameters required
- Zoom in to display detail in full colour
- Multi tray use for larger samples
- Permanent storage of images and data.



Reflectance Tray

Transmission and Reflectance Tray

The grain is not damaged by the scanning process and can be retained for retesting or used for other purposes. This non-destructive testing is especially valuable to grain breeders who may only have small samples of grain available.

Principle of Operation:

SeedCount is a unique image analysis system designed specifically for measuring the physical characteristics of seeds, grains, beans and powders. SeedCount rapidly scans up to 1300 seeds spread out over a patented sample tray. The image of each seed is masked so that each seed is analysed separately.

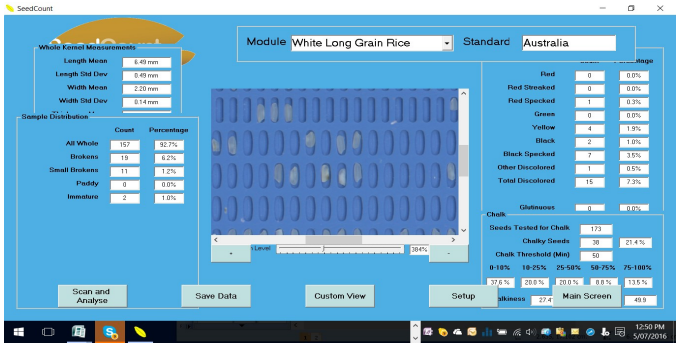
For each seed the following basic parameters are measured;

- Length, breadth and width
- Colour
- Shape

The patented sample trays are designed to orientate the seeds on the flat side and the edge. This allows a portion of the seeds to be used to measure length and breadth and the others to measure width or thickness.

Parametric Software:

Once the mask has been draw around the seeds, then specific measurements can be made. The image analysis software is referred to as “Parametric”. As such, the software works much like the human brain. Measurements are made according to a logical thought process. For example, to determine “chalk” in rice, the colour of each pixel that lie within the mask for a grain of rice are measured. If the whiteness of the pixel is above a certain value, ie, threshold, then it is considered as “chalk”. By summing up all the pixels that exceed the threshold, the degree of “chalk” or “chalkiness” of the grain is computed. If the sum of the pixels exceeds the set percentage, then the seed is classified as being “chalk”. The software counts the



number of seeds that are considered “chalk” and expresses this as a percentage of the total number of seeds counted.

Other parameters or characteristics can be measured by combining several logical steps. For example, “Blacktip” and “Blackpoint” are determined in wheat and barley grains based on identifying seeds that have one end darker than the other. The first step in the decision is to identify those seeds which are seam down, then to determine the tips, ie, ends, of the seeds. If the tips of the seed have pixels that on aggregate are darker than a middle of the seed then the seed is recorded as having “Blacktip” or “Blackpoint”. The “Blacktip” impact is then determined as the percentage and intensity of the seeds which exhibit “blacktip”.

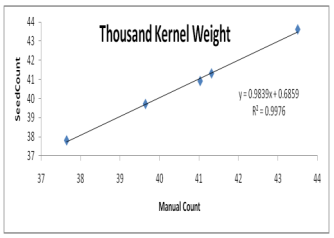
Grains and Parameters Measured:

SeedCount modules include:

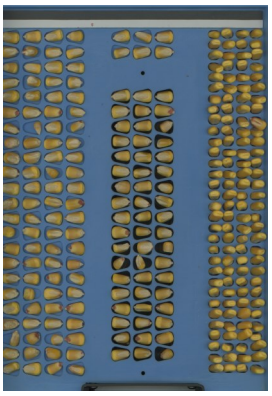
- Wheat and Durum Wheat
- Barley: Malt and Pearled
- Oats and Groats
- Long Grain Rice
- Medium and Arborio Rice
- Parboiled Long Grain Rice
- Corn and Popping Corn
- Lentils
- Coffee

SeedCount image analysis software measures the following parameters:

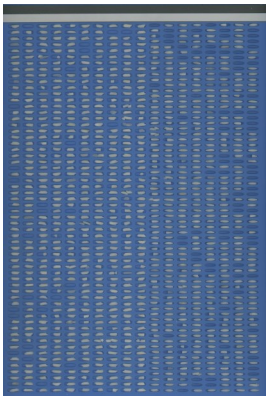
Cereal grains: **Wheat, Durum, Barley, Oats**



- Number of seeds in sample
- Grain Size - Length, width, thickness, area, aspect ratio, roundness
- Thousand kernel weight, dry and as is
- Dockage percentage
- Screening equivalent weights corresponding to standard screen fractions
- Blackpoint (in wheat), Blacktip (in barley) percent severe, percent mild



- **Corn: Corn, Maize, Popping Corn**
- Size measurements as above
- Horneous Endosperm (by transmitted light)
- Stress Cracks (by transmitted light)
- Red Streaks
- Dent Size
- Colour
- Crown



Rice: Long Grain, Medium and Arborio, Parboiled

- Size measurements as above
- Head count
- Chalk, Chalk Impact, Binning based on Chalk
- Green, Red and Yellow Streaks
- Rice Standards: Australian, USA, Thailand, India, Indonesia, Korea, Malaysia

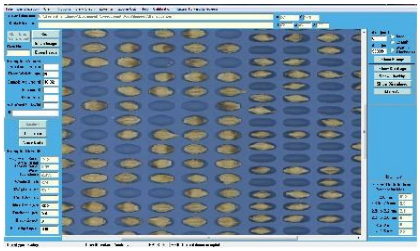
- **Lentils:**
- Size as diameter
- Grade by colour
- Counts for broken and chipped seeds
- Colour of pearled lentils

Coffee: Green Beans, Roasted Beans

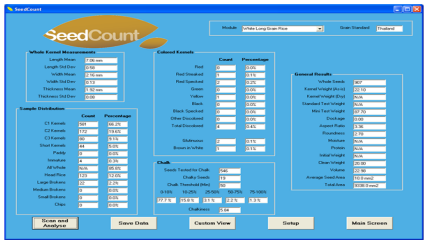
- Colour distribution
- Size distribution
- Counts for broken and defective beans

Data and Reports:

SeedCount software runs on a touch screen PC in a Windows™ 7, 8 or 10 environment. SeedCount has two screen formats, ie, Main Screen and Results Screen.

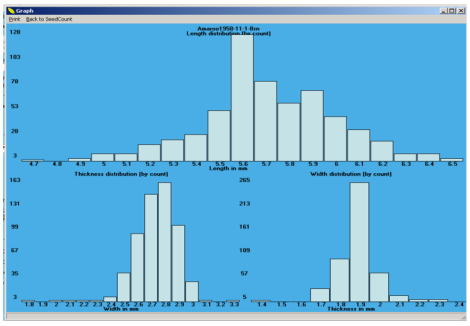


Main Screen: Presents all the information and data collected by SeedCount. The image of the seeds can be zoomed in or out and a hand tool allows manipulation around the image. Individual seeds can be touched and the data for the seed is shown in a table on the right hand side. All setup parameters are accessible through the Main Screen.



Results Screen: A user customisable screen that permits the operator to display only the parameters of interest. A single button stroke initiates the scan and analysis. Saving data and printing reports is done directly in this screen.

Graphs: SeedCount provides a range of distribution graphs including, length, width and thickness, area, blacktip impact, blackpoint impact, broken, kernel weight, chalk impact and more.



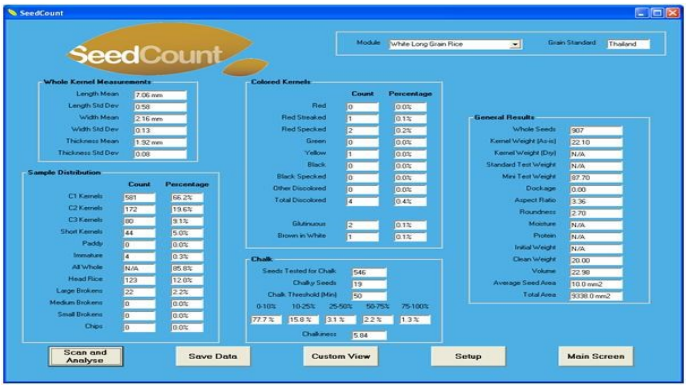
SeedCount Procedure

- Use sampling spear to obtain a subsample
- Transfer subsample to a volumetric cup
- Load measured volume onto the patented sample tray

- Weigh the loaded tray, subtracting tray tare to get subsample weight

- Enter subsample weight
- Clean subsample, reweigh and enter clean weight (optional)
- Place tray in SeedCount cabinet, scan and analyse image

· Display all results on screen, save data, save image



Typical analysis takes less than 60 seconds.

Manufactured by:
Next Instruments Pty Ltd
B1 366 Edgar Street, Condell Park, NSW, 2200, Australia
Tel: 612 9771 5444, fax: 612 9771 5255
Email: sales@nextinstruments.net Web: www.nextinstruments.net