

# *C*grain VALUE<sup>TM</sup>

*The new standard for analysing grain quality*



***Save Time and Money***  
*using innovative AI Technology*

**Cgrain Value™** is an instrument developed for the objective analysis of the quality of grain. It carries out a visual inspection of samples, looking for foreign grains, foreign seeds and several types of damage to kernels, as well as measuring size distribution and thousand grain weight. Cgrain Value™ achieves this objective quality analysis by using a unique mirror design to obtain an image of every single kernel in the sample. This yields a very high degree of accuracy.

The manual, visual method for assessing grain quality is very subjective, time-consuming, and is highly dependent on trained personnel. The manual method also has ergonomic implications; it is strenuous on the neck, shoulders and wrists. Cgrain Value™ offers a wholly new standard for the analysis of grain quality. It is objective, easy-to-use, time-saving and can replace manual grading as well as sieves and counters.

### Users

Cgrain Value™ has a wide array of applications; it is useful for all businesses handling grain, including:

- Mills
- Malt houses
- Grain traders
- Grain laboratories
- Gluten-free oat producers
- Seed breeders
- Research & Development

### Applications

Quality analysis of barley, wheat, rye, oats and dehulled oats.

In: Grain receiving, Cleaning, Screening, Price / value calculation®

### Analyses

Cgrain Value™ can determine a number of quality parameters simultaneously, for example:

- Foreign grain
- Foreign seeds
- Foreign material
- Ergot
- Damaged, broken, skinned kernels etc.
- Screening (size distribution)
- TGW (thousand grain weight)

### Features and Benefits

- Easy to use
- Rapidly inspects the whole grain
- Completely objective analysis with good repeatability
- Replaces repetitive and monotonous manual labor
- Real improvement of the work environment
- Robust design for use in dusty environments
- Can replace several different steps in determining quality
- Network connected for support and calibrations





**Every kernel imaged from three angles**

Cgrain Value™ uses a unique, patented mirror design that provides three views of every kernel. This allows accurate measurement of the kernels as well as the inspection of almost the entire surface for defects, allowing for a high detection rate as well as good repeatability regardless of the orientation of the kernels.

**More objective than manual analysis**

When humans analyze quality visually, there is a high degree of subjectivity. Many of the methods described for visual grain analysis are very hard to quantify in a consistent way. This can be due to inconsistencies in staff training as well as differences in the perception of colors. The results can also vary depending on the time period over which the work is done.

Using Cgrain Value™, your results will be more consistent, since each kernel is inspected the same way every time at a speed of 8-12 kernels per second.



*Quotes from users of Cgrain Value™*

*"We have chosen Cgrain Value™ to improve the work environment for our staff"*

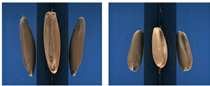
*"I find more foreign seeds using Cgrain Value™ than I was, analysing manually"*

*"You can analyse larger samples using Cgrain Value™ than time permits when analysing manually"*

*"Cgrain Value™ is easy to use"*

### Using Cgrain Value™ to ensure Gluten-Free Oats

In many circumstances, contamination with foreign grain can be a significant quality defect. For example, when producing or using gluten-free oats, the presence of foreign grains can ruin the product. Oats are naturally gluten-free, but a very low number of other kernels of wheat, barley, rye and triticale can contaminate the oats. Large samples need to be inspected to ensure that the oats are free of foreign grains and gluten-free. Doing this manually is very labor intensive but Cgrain Value™ identifies foreign seeds in oats and naked/dehulled oats with very high accuracy.

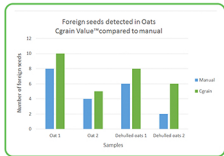


Oats

Naked Oats

### Higher accuracy than manual analysis

It is especially difficult to detect barley in oats manually, due to the similarities between them. It has been shown that when Cgrain Value™ is used, a higher number of foreign seeds are found than when it is done manually. Since Cgrain Value™ inspects every kernel, it detects the presence of foreign grains accurately and objectively. This means that every kernel is studied in a way that the human eye cannot. Hence, by using Cgrain Value™, very little manual labor is needed to ensure product quality.



Cgrain Value™ detects foreign seeds more accurately than the manual procedure and reduces the labor required by about 95%

### Cgrain Value™ – patented mirror design

Using Cgrain Value's unique mirror design, almost 100% of the kernel surface can be assessed. This is particularly important for Fusarium-affected barley, as the pink color of Fusarium might only be visible on one part of the kernel.

The image below shows how Cgrain Value™ can detect the pink color on one of the side views, i.e. on the back side of the kernel. This ensures a high detection rate and repeatability, regardless of how kernels are oriented.



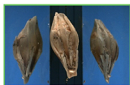
### *Fusarium fungus in malting barley*

Fusarium in malting barley significantly reduces its quality. It produces a variety of mycotoxins and is thought to be one of the causes of 'gushing' - beer spraying uncontrollably from the opened bottle. The most reliable sign of Fusarium-affected barley is pink coloring on the kernel.

Advantages of the Cgrain Value™ to flat-bed systems are that the detection of defects uses the entire surface of the grain and is independent of the orientation of the kernel in the image.

### *Damaged kernels in Malting barley*

Cgrain can be calibrated to detect several different defects and impurities, e.g., pink fusarium, skinned or broken grains. Images of these defects are shown below. Three images are obtained of every kernel by the unique mirror design inside Cgrain Value™.



### *Many quality defects analyzed at once*

Using Cgrain Value, many quality parameters for the malting industry are measured simultaneously, some of which can't be determined visually. One example is grain size distribution, a parameter impossible to measure in any other way. Quality parameters that are obtained simultaneously include:

- Foreign seeds
- Broken kernels
- Green seeds
- Pink kernels
- Skinned kernels
- Size distribution/Sieving analysis

### *Visual analysis is highly subjective*

The current method for analyzing properties such as color is visual inspection – this is a highly subjective method and it produces highly variable results.

The high variability of visual analyses for Fusarium is shown in Figure 1 below. Although generally this variability is estimated at 30%, it can be much greater depending on the samples.

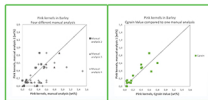


Fig 1

Fig 2

Figure 1 shows a comparison of 4 visual inspections of the same sample. Note the scatter of data points.

Figure 2 shows a comparison between Cgrain Value and a visual inspection. Note less scatter of data points compared to Figure 1.

### More data than manual analysis

Cgrain Value™ measures kernel size and color, unlike manual inspection which cannot do this. Below are examples of some of the statistics that are obtained by Cgrain Value™. Measurements can be shown either with mean and standard deviation or as a distribution diagram. These data can be of extra interest for seed breeders and grain scientists.

### Screening and size measurements

The traditional method for size measurement uses sieves with slotted holes. The technique is limited to documenting only part of the sample, depending on which sieve sizes have been chosen. The only measurement that is obtained is of the thinnest side of the seed.

Cgrain Value™ measures the size distribution of the sample with reference to thickness, width and length. This makes it a much better tool to determine the size and quality of grain than sieving.

### Unique mirror design allows for correct measurements

Our unique mirror design permits accurate measurement of the length of the kernel in the image as well as of its thinnest and widest dimensions.



Fig 1



Fig 2

Figure 1: An oat kernel oriented so that the thinnest side is shown the side view.  
Figure 2: Orientation of the kernel showing the thinnest side in the middle view.

In conventional flat-bed systems using image analysis, only the length and one measurement of the width is obtained. The width measurement is often the widest and is entirely dependent on the orientation of the kernel on the bed.

Investigations, based on a large number of samples, show very good correlation between Cgrain Value™ size measurements and sieving.

### Results depending on need

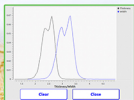
Results are presented as distribution data either as a table, a graph or as sample statistics, as shown in the pictures below.

Reference	100 (100)	Seed Count	100	Weight	100 (10)
Statistics	Count	Percentage	Weight		
Total	1000		100.70	498.05	
Sieving >1.0	33705	337.05	33.70	166.03	
Sieving >1.2	33705	337.05	33.70	166.03	
Sieving >1.6	3400	3.40	3.40	1.68	
Other	96	0.96	0.96	0.47	
Unseed	0	0	0	0	
Average count	11	0.44	1.10	0.54	
Average data	907	9.07	9.07	4.51	
Total	100000	100.00	100.00	49.80	

View Print Stats Export XML Finish

Sample ID	100 (100)	Count	Weight	Count	Weight
C:Area		10.00	0.25		
C:Length		9.17	1.53		
C:Thickness/Width		2.04	0.24	2.98	0.25
C:Volume		30.13	0.95		
C:Mass		60.48	1.54		
C:Perforation		69.31	1.84		
C:Height		57.32	5.41		

Graph Export XML Print Go Back



### Easy to use

1. The sample is poured into Cgrain Value™ and the analysis is started on the built-in touchscreen. A barcode scanner and/or a scale can be attached to enter reference information.
2. The grain is fed through the instrument using a vibrating bowl separating the kernels. Cgrain Value™ documents the kernels as they slide through the patented mirror design. Advanced image analysis is then used to classify the sample and detect defects.
3. The undamaged sample is collected at the end of the analysis.
4. The results are presented on the instrument touch screen.
5. Specific images can be selected and viewed on the external screen and, if wanted, reclassified.
6. The results are presented on the instrument's touch screen. Images can be viewed on the external screen for further scrutiny and possibility for re-classification. The results can be printed or transferred to the local LIMS.



### Cgrain Value™ is used by

- Mills
- Grain traders
- Seed breeders
- Producers of gluten-free oats
- Malt houses
- Grain Laboratories
- Grain researchers

## Specifications

Dimensions (WxDxH):	600x400x370 mm
Weight:	38 kg
Power usage:	110-160 W incl external monitor
Analysis principle:	RGB imaging
Interface:	3 USB-ports, RJ45 Network
Analysis speed:	8-12 kernels/second
Sample size:	25-500 grams
Sample particle size:	1- 5 mm width

## Installation requirements

Voltage supply:	100-240V AC, frequency 50-60 Hz, Class 1, protective earth
Mechanical environment:	Stable during use

## For more information please contact us

Webpage: [www.cgrain.se](http://www.cgrain.se)  
E-mail: [info@cgrain.se](mailto:info@cgrain.se)  
Phone: +46 18 15 55 60

Address: Cgrain AB  
Alsikegatan 4  
SE-753 23 UPPSALA  
SWEDEN

Distributor:



Available also from Cgrain:

## Cgrain SEEDSCANNER

- For determination of other seeds by number
- Sample size up to 1000 gram
- Runs up to 36 samples automatically
- Sorts each sample into two fractions, correct seed and a fraction containing the suspected foreign seeds.
- Only 5 to 10 % of the sample needs visual inspection.