Andover Electrical

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Andover Electrical can provide you with over 25 years of experience of Agricultural installation, maintenance and repair. We have extensive knowledge of old and new systems adopted in farming electrical systems. We can provide advice and practical assistance to ensure your electrical projects and systems run efficiently when you need them most. We can provide a callout service to provide piece of mind or you can arrange for a yearly maintenance program. (All available upon request) Motor control, replacement and motor rewinds are no problem we can arrange a service that suits your needs and demands. Oil burner servicing, control and repair for most makes of drier are also available. We are happy to help you integrate your new Barn Owl System in to you existing installation/s and provide you with the care and support to enable you through your transition period. Gary Rayner Andover Electrical

Martin Lishman

Barn Owl Wireless

3 *Part of the Crop Monitoring and Automatic control range*

The most advanced automatic fan control and crop monitoring system available

Wireless and Remote Monitoring and Automatic Fan Control with Data Storage

Martin Lishman Professional Crop Storage Systems

Barn Owl Wireless

The most advanced automatic fan control and crop monitoring system available

What can Barn Owl Wireless do?

Many types of remote monitoring, including:

- temperature
- humidity and moisture
- weather
- levels
- motion
- gas

Automatic control of many types of equipment, including:

- cooling and drying fans
- ventilation systems
- generators
- crop stirrers
- irrigation pumps
- alarm systems

.....the possibilities are virtually endless.

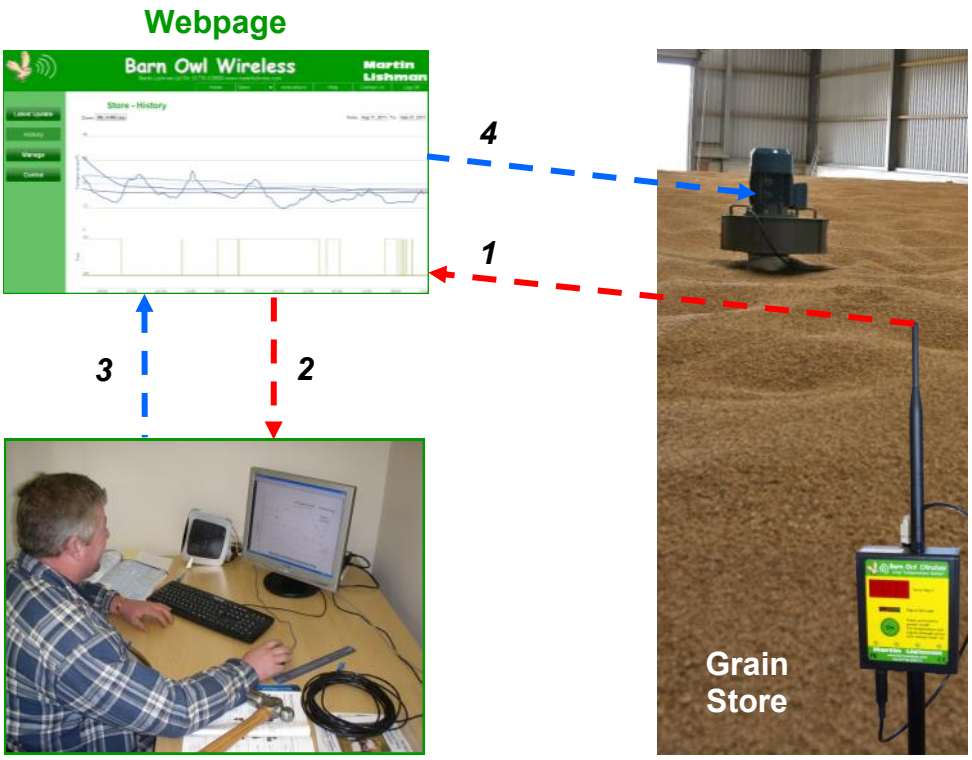
Where can Barn Owl Wireless be installed?

- Flat floor stores
- Drying floors
- Driers
- Silo or bin complexes
- Potato stores
- Livestock buildings
- Compost production
- Fuel tanks

..... and many other types of monitoring and control situations

How Does Barn Owl Wireless Work?

- Sensors are fitted with radio transmitters
- Data is transmitted to a Gateway (hub) located nearby
- The Gateway sends the data by mobile phone signal to the internet
- The data is accessed on the internet from any location

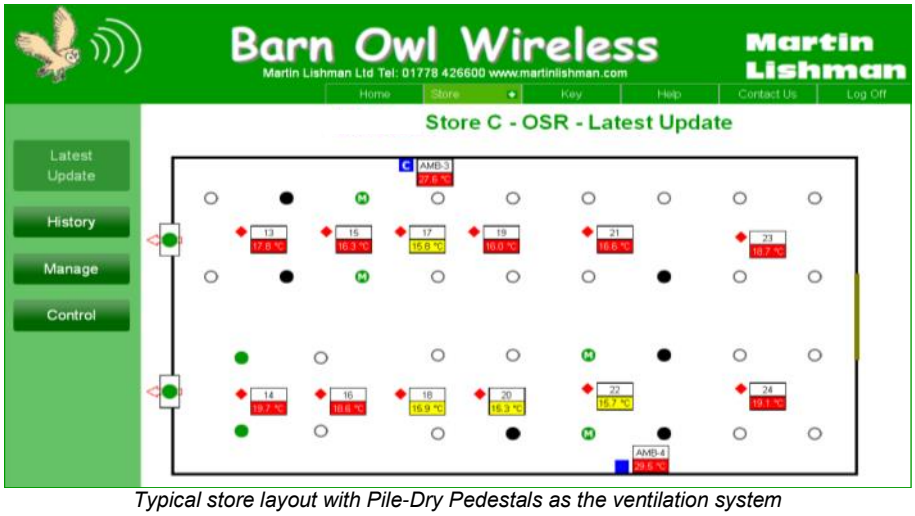


Barn Owl Wireless step by step

1. *Temperature data is sent from the store to the webpage*
2. *Data on the webpage is accessed via the internet*
3. *Fan controls are selected on the webpage*
4. *Fans are controlled automatically by the webpage*

Wireless Automatic Crop Cooling, Drying & Monitoring

Barn Owl Wireless in Flat Floor Stores and Drying Floors



Typical store layout with Pile-Dry Pedestals as the ventilation system

Every time you log on to Barn Owl Wireless:

Get live colour-coded grain temperature updates from your Pedestal store, identify which areas need further cooling or drying and select the fans required

Barn Owl Wireless can be configured for all types of under -floor ducts and drying floors:

To give grain temperature updates and control the fans required for further cooling or drying

Key Features of Barn Owl Wireless for crop storage:

- **Entirely web-based system - no software to install**
- **Wireless radio transmitters attached to sensors in grain stores or silos**
- **No manual crop temperature measurement or driving to remote stores to switch fans on or off and to record temperatures**
- **All store or silo locations managed from the same webpage**
- **Verifiable quality assurance records, with read-only online access for storage customers**
- **Modular system with no limit to the quantity of sensors or automatic fan controllers**
- **Independent control of ventilating fans provide significant energy cost savings**

Wireless Monitoring Components

Wireless Gateway

The Gateway is a gsm-internet link to handle all sensors and controllers in one location. It should be located in the highest point of the store or a high point on the storage site.

If there is more than one building on the site a wireless Bridge unit will be needed for each one. This will enhance sensor data transfer between them. The Gateway and Bridge require a 240v power supply.

Wireless Sensors

Flat Store Crop Temperature Sensors

A battery powered radio transmitter attached to a 2 or 3m rigid crop sensor, ideally placed at the mid-point between Pedestals or ventilation ducts. This is the best monitoring point since it is the last to be cooled when fans are operating. More sensors can be added at any time if closer spacing is required.

Ambient Sensors

Ambient sensors read air temperatures which are compared with crop readings for temperature differential control. For drying control a combined ambient temperature and RH sensor is available. Both require connection to a 240v power supply.

Wireless Monitoring Components

Multi-sensor Transmitter

A 230v powered multi-sensor transmitter unit, IP rated for outdoor use, sited on the silo gantry or similar location. The unit will accept sensor inputs from up to 160 sensing points.

The unit displays sensor temperatures at the push of a button and transmits the crop temperature at each sensing point to the Gateway every 10 minutes. Temperatures will be displayed on the user's webpage.

Silo Sensors

A robust silo pendant with digital sensors at 2 or 3m intervals, which can be up to 60m long. The pendants are suspended from a suitable anchoring point and tethered at the base to prevent them moving during silo fill.

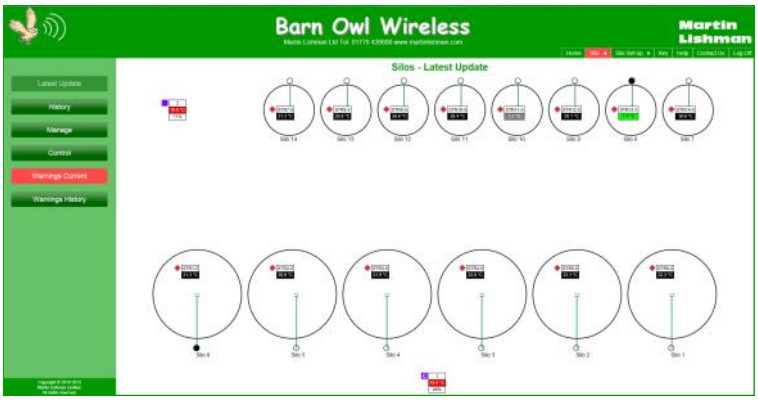
Of durable antistatic construction for high loads, and certified for ATEX Zone 20/21/22, up to 8 pendants with a total of 160 sensing points can be hard wired to a single multi-sensor transmitter.

Sensor pendants are supplied fitted with heavy duty securing hook, IP rated connection housing and cable for connection to the multi-sensor transmitter.

Barn Owl Wireless in Silo and Bin Storage

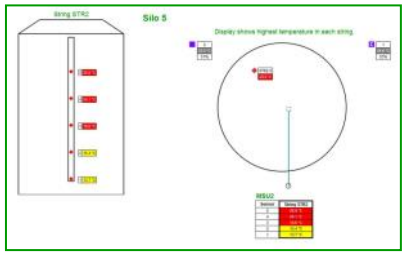
Silos of any size can be monitored using Barn Owl Wireless:

To display accurate temperature readings deep in the silo, highlight any hot spots and control ventilating fans



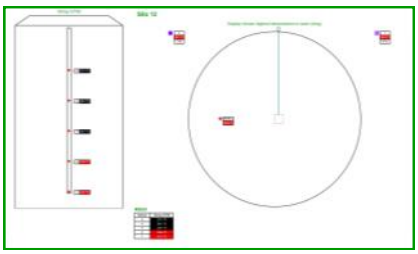
Typical display of grain silos fitted with silo strings containing multi-level temperature sensors.

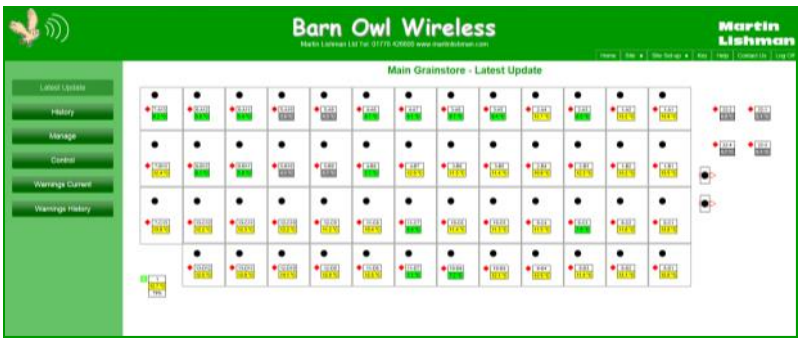
Aerial view shows highest temperature in the string.



Clicking on the circle displays a side view showing the temperature at each level in the string.

If the colour is black this means there is no grain covering the sensor - and also gives a guide to the depth of grain in the silo.





Bin stores can be monitored to display individual temperatures in each bin - valuable, as in the case above, when storing different varieties of seed.

Wireless Automatic Crop Cooling, Drying & Monitoring

Barn Owl Wireless in Potato Storage and Compost Production

Every time you log on to Barn Owl Wireless:

Get live colour-coded temperature updates from potato boxes or bulk stored potatoes, identify where further cooling is needed and select the fan control program required

A representation of a 4-way multi-input wireless unit with flexible cable temperature sensors inserted into potato boxes.

Barn Owl Wireless waterproof sensors attached to stainless steel temperature probes are ideally suited for monitoring both indoor and outdoor compost production facilities.

Accurate verifiable records of temperature over time can prove that quality standards have been fulfilled. Remote monitoring avoids unnecessary testing and ensures that turning takes place at the correct time.

Using Barn Owl Wireless

- **Monitoring temperatures throughout the storage period ensures efficient use of cooling and drying fans and conforms to quality assurance schemes**
- **As cooling and drying progress, monitoring indicates which areas of the store require further attention and which ventilating ducts and fans need to be used**
- **The user configures automatic fan controllers remotely via the internet from the Barn Owl Wireless webpage**
- **Fans are controlled independently and automatically according to the stored commodity temperature and ambient conditions using a selection of cooling and drying programs**
- **The programs control the fans so that only air good enough to cool or dry the commodity is used for ventilation**
- **The fans automatically start if ambient conditions fall below pre-set limits**

Wireless Monitoring Components

Multi-input Wireless Sensors

Multi-input sensors comprise a battery powered radio transmitter attached to up to 4 flexible cable or rigid crop sensors.

The sensors can be placed in potato boxes or in bulk stored potatoes. Any quantity of transmitters and sensors can be used. The flexible sensors can be any length; the rigid sensors are 2m or 3m long.

Waterproof Wireless Sensors

The Barn Owl Wireless waterproof sensor comprises a battery powered radio transmitter in an IP65 rated enclosure with digital temperature display.

Shown here attached to a 2m stainless steel compost temperature probe, it can be connected to up to 3 flexible cable or rigid crop sensors.

Other Wireless Sensors

The possibilities for sensing using the Barn Owl Wireless system are virtually unlimited. Any sensor which produces a measurable electric output, whether battery or mains powered, can be re-configured to transmit this information to the webpage where it would be presented in a useable form. This means that functions such as soil moisture measurement, gas detection, motion detection and weather recording can be linked to Barn Owl Wireless.

Wireless Control Components

Wireless Automatic Fan Controllers

From the Barn Owl Wireless webpage the user selects from drying and cooling programs to control each fan individually. Fan overload warnings are displayed automatically on the webpage. Manual control is also possible.

Wireless fan controllers are available as static units for control of up to 12 fans or portable units for up to 5 fans. Larger quantities are controlled by more control units.

Ambient temperature and RH sensors can also be built in.

Static Wireless Controllers

Static controllers can be connected to StoreVent building air extraction fans, large crop drying fans, fan control panels or other static installations. An automatic starter is required for each fan being controlled.

Portable Wireless Controllers

Portable controllers work well with Pile-Dry Pedestal Fans. The portable board mounted unit is supplied with all plugs, sockets and automatic starters for control of up to 5 single or 3 phase fans, so avoids extensive electrical installation work. All that is required is a 32 amp power supply socket.

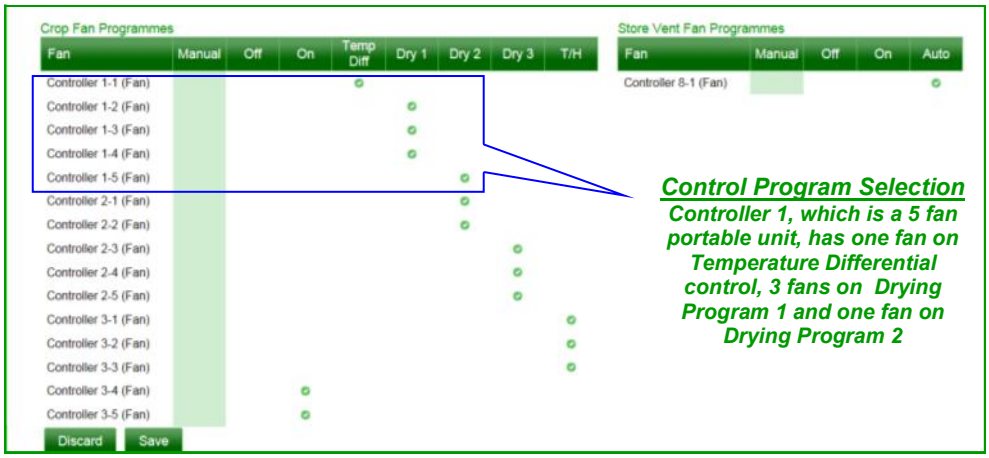
Barn Owl Wireless Automatic Controllers

All fans are controlled independently by the Barn Owl Wireless Automatic Fan Controllers:

To make significant energy savings and reach target temperatures and moistures more quickly

Barn Owl Wireless Control Programs

Shown below is a typical webpage display of control program options demonstrating how each fan can have its own separate program. StoreVent building ventilating fans are also controlled in the same way so that they also operate whenever a ventilating fan is turned on automatically.



Control Program Selection
Controller 1, which is a 5 fan portable unit, has one fan on Temperature Differential control, 3 fans on Drying Program 1 and one fan on Drying Program 2

Control Program Options

Temperature Differential Control *- to cool grain after drying*
Fan will turn on if a temperature reading of the nearest crop sensors is more than 5°C above the temperature of the nearest ambient sensor.

Drying Program 1 *- to dry grain that is less than 16% moisture content*
Fan will turn on if the nearest ambient RH sensor reads less than 62%RH.

Drying Program 2 *- to dry grain that is 16-18% moisture content*
Fan will turn on if the nearest ambient RH sensor reads less than 72%RH.

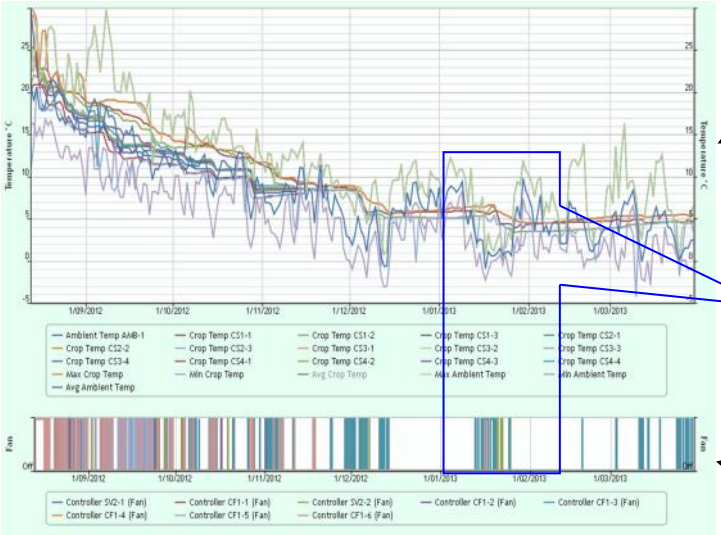
Drying Program 3 *- to dry grain that is more than 18% moisture content*
Fan will turn on if the nearest ambient RH sensor reads less than 83%RH.

Thermo-humidistat *- for user-set control settings*
Fan will turn on if the temperature and RH measured by the nearest ambient sensor are less than the levels set in the program by the user.

For all programs fan start is delayed until conditions are stable for 10 minutes.
On-screen guidance is provided to help when choosing the most suitable control program.

Wireless Automatic Crop Cooling, Drying & Monitoring

Barn Owl Wireless Data Monitoring and Storage



Interactive graph can display selected individual ambient or crop sensor records or a minimum, maximum or average across all sensors.

A sudden drop in ambient temperature triggers automatic fan operation and a sharp drop in crop temperature

All automatic fan use can be shown or individual fans can be selected.

Barn Owl Wireless can provide historical grain temperature data in graph or table formats:

To provide verifiable records of cooling progress and fan usage for the user and, if required, for contract storage customers

Date	Crop Sensor Temperature (Deg C)									
	Max	Min	Ave	1	2	3	4	5	6	7
20/08/2012	32.10	27.56	29.07	27.40	30.20	29.40	27.00	25.70	29.60	31.90
21/08/2012	31.90	26.93	28.06	27.10	27.00	26.90	26.90	27.40	29.40	26.80
22/08/2012	28.00	24.52	25.68	22.80	26.00	25.80	24.40	26.80	27.00	23.10
23/08/2012	25.60	22.67	23.52	21.30	23.40	22.70	22.30	24.40	24.60	22.30
24/08/2012	24.00	21.40	22.14	20.20	22.00	21.50	21.30	23.00	22.60	21.00
25/08/2012	22.40	20.61	21.00	18.80	20.90	20.10	20.50	22.20	21.50	20.20
26/08/2012	21.40	19.94	20.26	18.70	20.30	19.40	19.30	21.00	20.30	20.50
27/08/2012	21.30	19.65	19.88	19.20	19.40	18.80	18.90	20.50	19.70	20.60
28/08/2012	21.00	19.60	19.70	19.20	19.30	18.80	19.10	20.00	19.30	20.50

Crop Temperature Data (°C)

Barn Owl Wireless temperature data can be downloaded in Excel table format to show every temperature reading for every sensor, every period of fan operation and the cost of running the fans.

Date	Fan run time (Hours)			
	1-1	1-2	1-3	1-4
09/05/2012	0.00	0.00	0.00	0.00
10/05/2012	0.00	0.00	0.00	0.00
11/05/2012	0.25	0.92	0.92	0.58
12/05/2012	6.00	7.50	7.50	6.67
13/05/2012	5.58	6.08	6.07	6.07
14/05/2012	1.08	1.75	1.75	1.58
15/05/2012	6.17	9.50	9.50	9.00
16/05/2012	1.75	3.67	3.65	3.32
17/05/2012	0.00	2.75	2.75	2.75
18/05/2012	0.00	0.00	0.00	0.00

Fan Run Time (Hours)

Date	Fan run cost (£)			
	1-1	1-2	1-3	1-4
09/05/2012	0.00	0.00	0.00	0.00
10/05/2012	0.00	0.00	0.00	0.00
11/05/2012	0.10	0.37	0.37	0.24
12/05/2012	2.43	3.04	3.04	2.70
13/05/2012	2.26	2.46	2.46	2.46
14/05/2012	0.44	0.71	0.71	0.64
15/05/2012	2.50	3.85	3.85	3.65
16/05/2012	0.71	1.49	1.48	1.34
17/05/2012	0.00	1.11	1.11	1.11
18/05/2012	0.00	0.00	0.00	0.00

Fan Run Cost (£)

Secure Data Transmission, Storage and Retrieval

- **An important feature of Barn Owl Wireless is robust data transmission. Unique programming ensures no data or control signal is lost.**
- **If the GSM network is out of action, the Gateway retains all data, continues automatic fan operation and transmits the data when communications are restored.**
- **All data is stored and backed up in secure web servers on the Microsoft cloud network. Loss of data from such a storage system is virtually impossible.**
- **Data can be retrieved and downloaded at any time in both graphical and tabular formats to suit quality assurance needs.**
- **The data service is provided under a flexible contract basis. Additional benefits include an on-line alert facility, additional log-on facility for multiple users (such as contract storage customers) and access to data from any PC, laptop, tablet or smartphone (not Blackberry) anywhere in the world.**

Wireless Monitoring Results

Reduced crop cooling time

HGCA guidance is that grain should be cooled to 15°C within 14 days of harvest and below 5°C by the end of December. This ensures insect activity is suppressed and maintains grain quality.

The ability to reach cooling targets depends entirely on ambient conditions and the efficiency of the cooling system. If air temperature doesn't reach 15°C within 2 weeks, the target is impossible to reach. Using Barn Owl Wireless, users have achieved the following cooling speeds:

Grain starting at 25-35°C -

- reached 15°C between 13-45 days after harvest.
- reached 10°C in 57-75 days
- reached 5°C in 110-160 days, and as early as the end of November.

Reduced energy use

Independent research has proved that Martin Lishman Temperature Differential Controllers can reduce the energy cost of cooling grain by 40%.

Using Barn Owl Wireless makes it possible to reduce energy costs even further. Since all fans are controlled independently in relation to each individual crop sensor, and only when ambient air is suitable, this means that fan use is as efficient as it is possible to be.

Some of the energy use results from Barn Owl Wireless users make for fascinating reading:

- Users spent between £370 and £700 to cool their grain to below 5°C.
- In the sample analysed, store sizes varied from 500 to 2500 tons, so this equates to between 28p and 40p per ton to cool grain to the target temperature.
- The largest store was the fastest to cool the grain and had the most efficient energy consumption.

Professional Crop Storage Systems

Four steps to improving your crop storage

1 Pile-Dry Pedestals & Fans

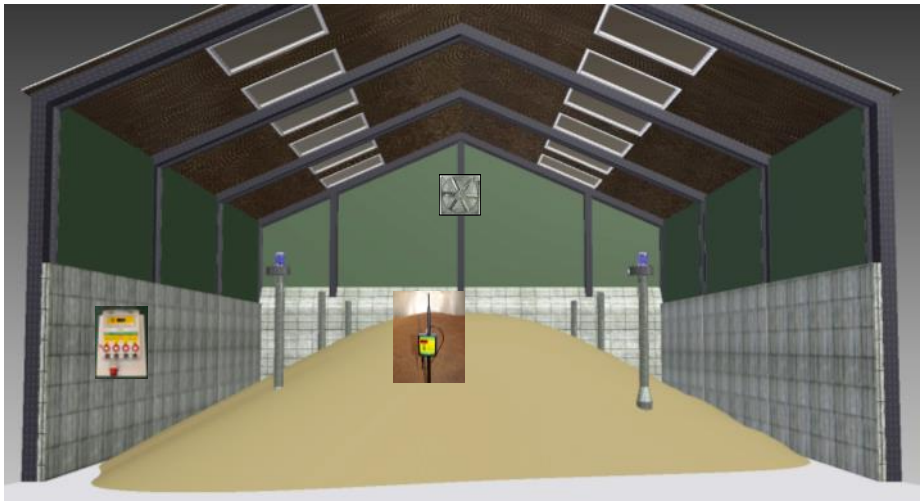
- ***The highest grain quality with the fastest cooling system***
- ***The only low volume system able to dry grain***
- ***Backed by research and 40 years experience***

- see the Martin Lishman Pile-Dry Pedestals and Fans brochure for further details.

2 StoreVent Crop Store Air Extraction System

- ***Building ventilation to maximise the efficiency of all crop cooling and drying systems - ensures sufficient air exchange to maintain cool, fresh air in the crop store at all times.***
- ***Can be linked to Martin Lishman automatic fan controllers.***

- see the Martin Lishman StoreVent brochure for further details.



3 Automatic Fan Control & Crop Monitoring

- ***Portable and Static Automatic fan controllers for energy efficient crop cooling and drying***
- ***Cost effective crop monitoring equipment to ensure the highest crop quality***







4 Trouble-Dry Hot Spot Spears & Fans

- ***Portable and economic cooling - a simple solution to a common problem***
- ***An emergency solution to hot spots where Pile-Dry Pedestals are not in use***

- see the Martin Lishman Trouble-Dry brochure for further details.

SPECIFICATIONS

Martin Lishman control and monitoring systems are available to suit different storage situations. Talk to your local dealer or contact Martin Lishman to discuss the best system to meet your requirements.

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Your Crop Monitoring and Automatic Control Supplier: