

# Pitch and Resolution Explained



# Pitch and Resolution Explained

## Pixel Pitch

When you are considering buying an LED display there are many options to consider. Not only the type of display that you require and the budget that you allocated but also the size of the display and the pitch and resolution of the LED sign. LED pitch and resolution are industry terms that you will come across when you are researching LED display technology and we thought that we would explain it to you as it's not the simplest thing to understand!

### Pixel Pitch

Pixel pitch is the distance from the centre of an LED pixel or cluster to the centre of the next pixel / cluster measured in millimetres. When it comes to buying your LED display finding the right pixel pitch that's right for your application is vital to the success of your display.

Pixel pitch typically ranges from 1.5mm to 10mm for indoor LED displays and 6mm to 20mm for outdoor displays although further options are indeed available, even up to 100m pitch for specific outdoor applications.

The pixel pitch is a defining factor of a large screen's viewing distance: the closer the pixels are the closer the minimum viewing distance will be and also the higher quality of the image displayed and the cost per sq. metre. A larger pitch will cost you less but you risk losing the clarity of the image.

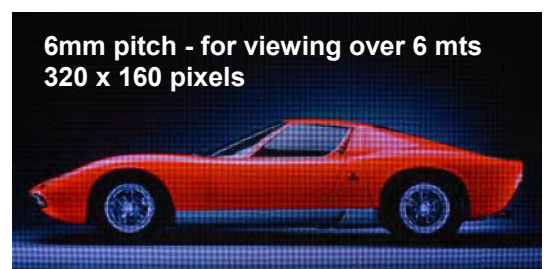
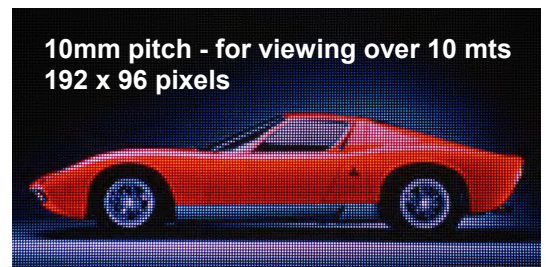


### Why is Pixel Pitch important?

Pixel pitch directly correlates your display resolution and optimal viewing distance. The smaller the pixel pitch the more pixels are used to make up the image of your display. This will improve the resolution of your display and optimal viewing distance. In basic terms this means that the lower the pitch, the closer you can stand to the display and still have good resolution.

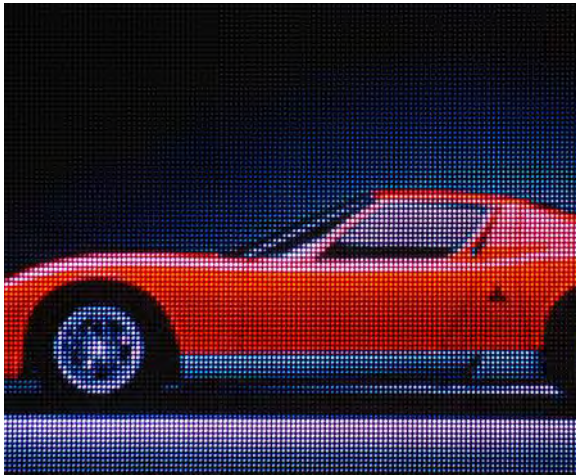
Obviously, you get a much better quality image from a lower pitch display, but of course this comes at a cost! By having a smaller pitch you increase the number of LED pixels or clusters in your screen and the more you have the greater the cost. So it becomes a bit of a balancing act between budget, pitch and screen size whilst considering where the display will be installed and the typical distance that people will be viewing it. The key is to buy the highest resolution that you can afford.

**Shown right** is a **2 x 1 metre display** at three different pitch, hence different resolutions and quality of image. The higher the pitch value the further the viewing distance in metres.



# Pitch and Resolution Explained

## Pixel Pitch



The picture here shows approximately how your eyes will perceive the image, below left, and how it will appear the same at their minimum viewing distance:

**20mm pitch at 20 metre** viewing distance

**10mm pitch at 10 metre** viewing distance

**6mm pitch at 6 metre** viewing distance

When deciding which pixel pitch is right for your application, it is dependent on a combination of factors, which include the viewing distance or range of distances of your primary audience, the content you intend to put on the display (i.e. text only, animation or video, etc), the size of your sign and of course your budget. Each application is different so please contact us so that we can make sure that you are looking at the right screen.

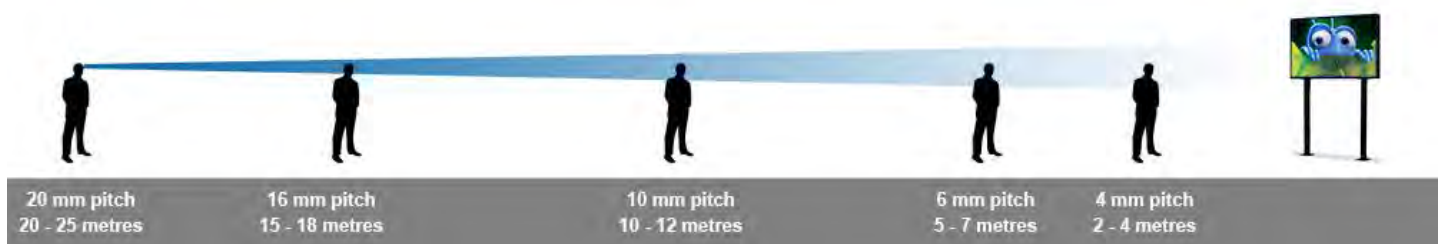
### Viewing distances for various LED pitch displays

One of the primary factors in deciding on what pitch size will be right for you is considering what the viewing distance will be of your primary audience. The viewing distances are somewhat subjective and depend on the distance type, content and the physical size of the screen. But essentially a good rule of thumb is to say that the minimum distance is measured by **taking the pitch and converting it into metres**, i.e. a 10mm pitch has a minimum viewing distance of 10 metres. If you stand too close to a display you will see pixelation and the image will not be clear. That is to say, there is a minimum distance beyond which a human eye with natural or corrected vision of 20/20 can no longer discern individual pixels on a particular display. The maximum distance depends on the screen's dimension but it can roughly be calculated by multiplying the screen's height by 30. For example a 4 x 3 metres screen (3 m x 30) can be viewed from 90 metres.

When it comes to reading text on a display the basic rule is that 1 cm of text can be read from a distance of 5 metres, therefore 10 cm high text can be read from approximately 50 metres.



Shown below is a guide to viewing distances.



# Pitch and Resolution Explained

## Screen Resolution

### LED Screen Resolution

Your LED display screen will be made using thousands of LED pixels or clusters. The image can be seen on the screen by the software changing the colours of the thousands of LEDs to form pictures, text and videos.

Resolution is the number of LED pixels contained in the physical area of the LED display. The more pixels you have per square metre, the more detail you will have which gives you a higher resolution.

For a set screen size, the closer the LEDs are, (i.e. smaller LED pitch) the more LEDs you have in that area, hence the higher the screen resolution. This means, of course, the overall quality of the image will be better and your viewing distance will be reduced, but this comes at a cost as the price per square metre goes up.

The screen resolution tells you how many LED pixels / clusters there are horizontally and vertically thus allowing you to calculate the overall LEDs. It is usually written in the form 512 x 256 resolution. This means that there are 512 pixels wide and 256 pixels high.

Each square metre of an LED screen usually contains anywhere between 25,600 pixels (160x160 pixels) down to 9,216 pixels (96x96 pixels) depending on the models – there are many varieties. The pixel pitch is a defining factor of a giant screen's viewing distance: the closer the pixels are the closer the minimum viewing distance and also the higher quality of the image displayed and, of course, the cost per sq. metre.

The picture shown on the right here shows an LED display with two different screen pitch and resolution. The upper screen has a 10mm pitch, 10mm is small enough to show the content required, however the lower screen is a 6mm pitch which will give greater detail.



Now, different size screens can still have the same resolution, but the different pitch size means that the screens will be different sizes. You can see in the example below, the resolution on all four screens is 128 x 96 and the pitch varies from 3mm to 10mm. This means that you will get the same picture on each of the screens but the overall screen size is different. The screens below are viewed at 4 metres so the 3mm and 4mm pitch screens look crisp but

### Different Size Screen but the same Resolution All viewed at 4 metres



Call us on 01264 303030 for more information

# Pitch and Resolution Explained

## Screen Resolution

### Size

When deciding on an LED screen it's not the size that you should consider first, it's the viewing distance and your budget, buy the highest resolution that you can afford. As an example both of these screens shown below are 3 by 2 metres but one is 20mm pitch (lower resolution) and one is 6mm pitch (higher resolution). Depending on how far they will be viewed determines whether they will be suitable or not.

The 20mm pitch screen shown on the right would be suitable if the viewers were approx. 20 metres or more away, any closer and you will see pixilation. As you can see the image is not as crisp as the higher resolution board, but at 20 metres it will look fine, the image below is shown being viewed at the same distance as the 6mm screen which of course wouldn't happen in reality. The smaller image is how it would appear at the correct viewing distance, 20 metres. The screen shown on the left is a 6mm pitch and therefore, can be viewed from 6 metres away as it has a much higher resolution but of course costs considerably more than a 20mm pitch screen.

**Once you know your viewing distance you can then decide on the pitch size and resolution within the constraints of your budget.**



6mm pitch  
500 x 333 resolution  
3 x 2 metres  
Viewed at 6 metres



20mm pitch  
150 x 100 resolution  
3 x 2 metres  
Above viewed at 6 metres - Too Close!

Shown right at 20 mts  
- Correct distance



### Resolution - Why does it matter?

As we've mentioned, the key to a quality image on a large-format video LED screen is to buy the highest resolution you can afford. The video signal that the LED screen will be reproducing has a native resolution of about 486/576 (NTSC/PAL) vertically and anywhere from about 240 to 720 horizontally (depending on the quality of the source). To reproduce these signals with no loss of image resolution, you want a minimum LED screen resolution of about 648 x 486 (NTSC) or 768 x 576 (PAL). If you use an LED screen with fewer pixels than the input source, the images will have less resolution than the source.

However if the LED screen is designed properly it can still give an acceptable appearance for video images. LED screens of approx. 1/3 of VGA resolution can provide a very acceptable video image, so around 200x150 pixels are OK.

# Pitch and Resolution Explained

## Screen Resolution

### Get the Right Pitch for the Viewing Distance

The illustration below shows you the same size screen, 1.5m x 1.5m, but with varying pitch and resolution. With a 20mm pitch and lower resolution, 75 x 75, the image is far less crisp and the viewing distance increases as opposed to the 6mm pitch which is much clearer and can be viewed at a closer range.



How the eyes perceive the image at these correct viewing distances:

**20 metres - 20mm pitch**  
**10 metres - 10mm pitch**  
**6 metres - 6mm pitch**



**20mm pitch**  
**75 x 75**  
**Too Close**



**10mm pitch**  
**150 x 150**  
**Too Close**



**6mm pitch**  
**250 x 250**  
**Correct distance**



All these are Screen Size: 1.5m x 1.5m viewed at 6 metres

### Correct Viewing Distance

The illustration right shows you the same size of display with different resolutions and pitch but shown at the correct viewing distance so the image appears to the eye to be the same. Obviously, the 20mm pitch screen costs much less than the 6mm screen but will only be suitable for viewing distances over 20 metres.

**6mm pitch view from 6 metres**  
**10mm pitch view from 10 metres**  
**20mm pitch view from 20 metres**



Image above is a  
**20mm pitch screen,**  
**150 x 100 resolution**  
**viewed at 20 metres**



Image right is a 6mm  
**pitch screen, 500 x 333**  
**resolution viewed at 6**  
**metres**

# Pitch and Resolution Explained

## Screen Resolution

### Different resolutions

Shown here are some examples of how the same image changes with differing resolutions. As you can see from the images there is a difference in the crispness of the images with a low resolution and a higher resolution. The low resolution will not be seen up close like this it would be for a larger viewing distance.

**Lower resolution** is suitable for a **larger viewing distance** and the **higher resolution** for a **close viewing distance**.



96 x 64 resolution  
viewed at 20 metres



224 x 160 resolution  
viewed at 10 metres



500 x 333 resolution  
viewed at 6 metres

# Pitch and Resolution Explained

## Screen Resolution

### Different resolutions - Different Viewing Distances

Shown here are some more examples of how the same image can look with differing resolutions, 150 x 100 resolution, will be suitable for your application if the viewing distance is over 20 metres with a pitch of 20mm as shown below left. And at the other end of the spectrum, 500 x 333 which is a high resolution screen suitable for close up viewing with a pitch of 4mm or 6mm as shown bottom right.



150 x 100 resolution  
As viewed at 20 metres



500 x 333 resolution as viewed at 6 metres



# Pitch and Resolution Explained

## Screen Resolution

Get the Right Resolution for the Viewing Distance and your Budget



**(150 x 100 resolution)**  
 Longer Viewing distance, Lower resolution,  
 Larger Pitch = Lower Cost

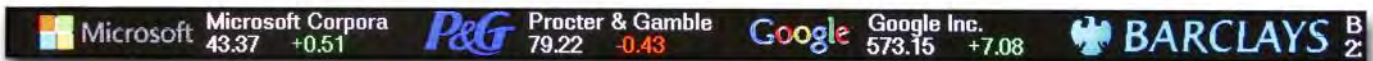
**(500 x 333 resolution)**  
 Shorter Viewing distance, Higher resolution,  
 Smaller Pitch = Higher Cost

### Text and Logos

Of course there is a difference in viewing video and text or logos on an LED screen. The logos right are on a 96 x 64 resolution board and is certainly clear enough for most promotional use. The Tickers below are 32 pixels high and can clearly show text and logos.



96 x 64 resolution, viewed at approx. 20 metres



# Pitch and Resolution Explained

## Screen Resolution



**96 x 64 pixels**  
Long viewing distance  
Over 20 metres



**250 x 166 pixels**  
Mid viewing distance  
10 metres



**500 x 333 pixels**  
Close viewing distance  
4 to 6 metres



The images show three different resolutions at their correct viewing distance.

The image at the top shows how the top image looks close up.

# Pitch and Resolution Explained

## Screen Resolution

### Getting the best out of your Resolution

**Adopt good design practice:** If you have a good designer that understands LED design rules, your piece should stand out among your competition. An LED screen is usually a significant financial investment and so often the final implementation is let down by poor or overly complicated design treatments. Ensure that you budget for ongoing content development and a good designer is an absolute worthwhile expenditure. And don't forget to check and test your content.

Review existing content on the LED display every week to ensure it's working properly and nothing looks dated. Also seeing the content as your spectators do provides an essential perspective and should help create future content and the right experience for them.



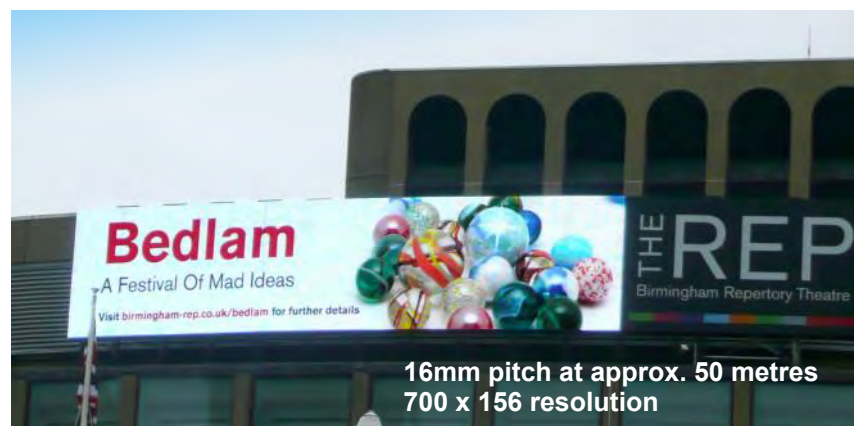
10mm pitch at 10 metres  
48 pixels high

**Content is king:** There must always be fresh, updated, curious or useful content on your LED display - not just advertisements - otherwise people will get accustomed to them and become bored with the LED screen and stop looking at it. You must constantly provide updated content – so if it's an information system, the content has to be up-to-the-minute; if in high daily footfall areas new, useful and interesting content should be uploaded every day or at least every time you expect the same audience will revisit the same location.

**Content balance:** Creative content may grab the spectator's attention but making a piece that is stunning or memorable without a clear call to action could fall short of your intent. This happens when people concentrate too much on creative content and forget the purpose of the content. Remember what you want anybody looking at your LED screen to do is act on whatever they've seen.



10mm pitch at approx. 5 metres  
160 x 112 resolution



16mm pitch at approx. 50 metres  
700 x 156 resolution

These LED screens show how good content can be informative and attractive. Images catch they eye then you can entice your audience to read the information.

# about us

As an established leader in the UK for electronic message display signs and with 40 years experience in the business of supplying programmable LED signs and LED displays, you can be sure that we'll give you the right advice and excellent service, these are the values that we hold dear.

We are a British company and we pride ourselves in our commitment to our customers, product performance and our quality of service. In the past 40 years or more we have installed in the region of nearly 20,000 LED screens and displays to a broad spectrum of clients. As a LED display LED screen manufacturer we are able to offer a complete bespoke solution from concept to commissioning offering you the most cost effective solution to your needs.

If you'd like to talk to us about how we can help you just call us. There's no obligation and we don't charge for quotations. We can work together to be sure that the LED sign solution we offer you is absolutely the correct solution for your requirements.

For demonstrations and to view our extensive range of LED displays please contact us to arrange a visit to our showroom at our base in Andover, Hampshire. Just call us on 01264 303030.

## accreditations

LED Synergy Electronic Displays have 40 years experience in the manufacture and supply of electronic displays to many companies and individuals worldwide. We have a wealth of experience and expertise and have been accredited with the following certifications:



ISO9001



WASTE ELECTRICAL and ELECTRONIC EQUIPMENT



RESTRICTION of HAZARDOUS SUBSTANCES



EUROPEAN COMFORMITY



UNDERWRITERS LABORATORIES



SAFE CONTRACTOR



We are also an approved Highways England contractor



- **Simple to operate products with bespoke software**
- **Value for money & satisfaction guaranteed**
- **Superb British manufactured products**
- **Excellent support & customer service**

We would have no hesitation in recommending LED Synergy to other clients".  
*Cole Mathieson, Founder and Owner of the Concorde Club, Southampton*



We accept most major credit and debit cards

"Well done, system all up and running for D-day, and very positive comments from all the staff." *Richard Aschough (Treasury) - Bank of England*

"The LED displays have proved invaluable in enabling us to direct large numbers of personnel quickly and efficiently throughout the building. Reliability is paramount in our facility and the led displays have performed faultlessly, I would not hesitate in recommending them."  
*Lez Smith (Head of Security) Citigroup*

**LEDsynergy**

Tel: 01264 303030 Fax: 01264 304030 [info@LEDsynergy.co.uk](mailto:info@LEDsynergy.co.uk)

