The visual appearance and surface texture of materials according to the old masters

Carinna Parraman

Centre for Fine Print Research, University of the West of England, Bower Ashton Campus, Kennel Lodge Road, Bristol, BS3 2JT, UK

ABSTRACT

Primary components in the colour reproduction of textured materials are firstly, the accurate rendering of the appearance of texture, and secondly the ability to print a surface topology that moves towards 2.5D printing. However, in order to render surfaces that contain no discernable pattern structure, unlimited variations in pattern can result in enormous file sizes. The paper explores how painters from the 15th to 21st century were absorbed in creating convincing representations of the attributes of materials. However, on close inspection, these paintings demonstrate a gestural, almost abstracted approach to capturing the appearance of the material, surface and object. The evolving question is: what are the key elements in paintings produced by artists that through the application of coloured brush marks, are able to create a verisimilitude of the material qualities of wood, metal, glass and fabric? The paper suggests that in order to create both a convincing visual appearance, a high level of detail is not necessary, and, that too much information possibly hinders the final appearance. It suggests that by using a more gestural approach, whereby the relationship of mark and colour, and by modulating the fluid dynamics of a mark through a textured surface, a more convincing rendering of texture can be achieved. Finally, by exploring analogue approaches to image making, and by addressing the complex way digital images are constructed, new methods could assist in reducing huge memory and image processing requirements.

Keywords: artworks, texture, colour, material reproduction, 2.5D printing, material qualities and characteristics, surface topology

1. INTRODUCTION

Primary components in the colour reproduction of textured materials, are firstly, the accurate rendering of the appearance of texture, [1] and secondly, the ability to print a surface topology that moves towards 2.5D texture and vector-based printing. [2] The line of enquiry is based on the author’s interest in the relationship between the ‘direct manipulated’ mark [3, 4] that is digitally generated (mouse, drawing tablet’s, iPads); compared to the analogue mark (produced by a brush, a charcoal smudge, an etched or hand drawn line) and its surface tactility or gonio characteristics; [5, 6] compared to its printed reproduction (for example an inkjet, electrostatic, four-colour separation).

There is an emerging area of interest in the accurate reproduction and application of texture in additive layer manufacturing (ALM, 2.5D and 3D printing). Novel materials, decorative printing inks, textures and embellishments are now being incorporated to enhance the surface qualities of packaging and prints. Printed textures are considered acceptable where the surface is purely decorative (i.e. repeat patterns for wallpaper). However where a low relief texture is applied to photographic images, there has to be a correlation to the subject, and so far, convincing naturalistic rendering of texture has proven to be more difficult. The conflict between texture and image is more apparent where there are contrasts, edge contours, or attempts are made to distinguish relief from a flat picture plane. The appearance of false shadows and edges tends to amplify these problems.

As demonstrated in inkjet printed artworks, such as paintings and drawings, the textural and surface qualities of the inkjet prints rely on the optical mixture of colour halftoning. Digitally reproduced texture is implied through the use of dense areas of ink to suggest shadow and non-inked areas to suggest high points or highlights. Whereas, texture in analogue paintings and prints is generated through the physical relief of brush strokes, palette knives, pencils and charcoal, or printed surfaces through building and overprinting multiple layers of colour. In artistic practice, where paint
is over-layered onto canvas or paper, the paint has a multi-dimensional quality, the varying translucency and opacity of
the marks can be seen, as can gloss and matte differential between oil on canvas and watercolour on paper.

The difference between an artist’s approach to drawing using paint on an iPad and drawing on paper can be loosely
described as the difference between digital (graphical user interface, pixels, colour picker tools, vector, raster) and
analogue (autographic, pigments, brushes, fluid dynamics, materials, texture). In the emerging 2.5D and 3D print market,
there is now a requirement to develop methods that are a verisimilitude of real materials [7, 8] towards the reproduction
of textures that have the look and feel of, for example, brushstrokes or textured surfaces. In a previous paper the author
considered how by observing the brush strokes of painters, the images are generated through a repetitive over layering of
paint. [9] The objective is to work towards the application of colour through surface deposition, by which an image is not
transferred onto a pre-textured surface, but where texture and colour are integral to the mark, that like a brush, delineates
the contours in the image. By re-addressing these historical methods and the ways images were painted, the potential
implications for 21st century digital technologies could assist in the development of new rendering methods that
incorporate vector and analogue approaches through the overlayering of different colour, pigments and decorative paints.

Figure 1. A selection of material textures created by 15th to 18th century artists

The evolving question is, what are the elements of paintings produced by old masters that capture the qualities, texture,
grain, reflection, translucency and absorption of a material, that through the application of coloured brush marks,
demonstrate a convincing likeness of the material qualities of wood, metal, glass and fabric?

The paper considers the photoreal painting methods developed by artists working from the 15th to 21st centuries who
were interested in creating a convincing representation of the attributes of a material. These paintings on close inspection
demonstrate a gestural almost abstracted interpretation of the material and surface. The paper suggests that in order to
create both a convincing visual appearance, a high level of detail is not necessary, that too much information possibly
hinders the appearance. It suggests that by using a more gestural approach, whereby the relationship of mark and colour,
and by modulating the fluid dynamics of a mark through a textured surface, a more convincing rendering of texture can
be achieved.

Artists have been long aware of the psychological aspects of the juxtaposition of colour in exploiting the optical qualities
and arranging visual effects in artworks. The artists, such as Velázquez, Goya, Holbein, Raphael, Raimondo de Madrazo,
Gainsborough, Reynolds (fig.1) demonstrated their mastery of texture by juxtaposing velvet with fur, satin alongside
stiff silver embroidery. [10] (See also a selection of pictures listed according to materials at the end of the document) In
order to better understand the convincingness of the visual appearance of texture, in this instance, this study has
concentrated on the accurate rendering of textiles and metal, and the range of material qualities were they able to convey
to the viewer through the medium of paint.

This approach could also reduce the processing of digitally complex and memory hungry images towards reducing the
reliance on hardware. Research into the impact of technological and innovation has begun to explore ways of improving
a circular economy. [11] This means not only circular thinking and methods - of science, application and theory, but also
how to address concerns over lessening raw materials, limited or monopoly supply, and reducing the impact of hardware
we use. This approach requires a greater fluency between disciplines of information about both old and new colouration
possibilities. The above examples, which demonstrate the increasing computing power required to render increasingly
complex images, highlights how demands on energy are increasing, not lessening.

Understanding the composition of materials used by artists, fashion makers and designers, in particular pigments and
dyes is important for choosing the suitable compounds for the specific application as well as for curatorial and art
conservation purposes. The literature in this field includes many treatises on artists’ pigments. [12, 13] The challenge at
present is how we make use of old and overlooked knowledge, for example paint recipes, pigments, compounds and lustres; carrier solutions, varnishes and methods for application of glazing, which might be used to inform new methods for colour mixing, application and printing.

2. THE APPLICATION OF NATURALISTIC RENDERING OF TEXTURE IN GRAPHICS

There is an established field of research into the accurate image-based rendering and synthetic application of texture for the rendering of digitally generated objects. [14, 15, 16] In computer graphics in order to apply texture patterns to objects, the traditional approach has been to wrap a texture around an object by using a small patch that is then tiled, repeated and morphed to the surface of an object. The problem arises where there are obvious overlaps in the boundaries of the texture and the elements within the patch become obviously pattern-like in appearance. Recent activities have concentrated on the generation of more naturalistic textures [17] that wraps to the object seamlessly.

Textures contain a wide range of variables and similarities, for example, the manufactured (e.g. bricks in a wall), elements that are similar (e.g. stitches in a knitted garment), or the more organic (e.g. blades of grass in a lawn). In order to obtain a realistic texture, materials must look convincing to the viewer. Natural textures contain a complex geometry, and in order for the overall appearance to be convincing and not perceived as a repeat pattern, there must be a balance of regularity and anisometric synthesis. [18, 19] Therefore each of the individual elements is recognizably similar but may differ, for example in size, colour, distortion, spatial frequency, orientation, or location to the other.

In 1981, the concept of the Texton was presented by Julesz [20] as a way of describing the individual structural characteristics of a texture. He identified a list of image features including: size, orientation line terminations and line crossings. [21] A brushstroke Texton method has also been explored, which creates a representation of the different brushworks in a painting. This approach could be considered by art historians as way of identifying and authenticating artworks through the comparison of brushstrokes. [22, 23]

These individual structural characteristics have been an important component of texture rendering in computer graphics where objects and scenes require textural information to provide a more meaningful engagement with the viewer. This has been particularly successful in computer animation, where technical innovation has focussed on a specific a material attribute within in each film, for example reflective and translucent plastic (‘Toy Story’, Disney Pixar 1995), moving long hair (‘Monsters Inc’, Disney Pixar 2001), embroidered cloth, feathers (‘Up’ 2009) curly hair (‘Brave’, Disney Pixar, 2012), matted, dull multidirectional or bed hair (‘Monsters University’, Disney Pixar, 2013). These examples demonstrate the complex lighting, simulation and rendering requirements for an animated film. However in order to render complex textural information has required extraordinary computer processing power. For example in 1995 300Mbytes per frame and 800,000 machine-hours just to produce a final cut of Toy Story, whereas Monsters University (2013) required 100 million CPU hours to render, and the ‘biggest struggle’ was to keep each frame within 20Gbytes, where each frame (if rendered on a single computer) would take about 29 hours. Pixar's network of computers and processing units roughly doubled in size from what was used for Brave. [24, 25]

2.1 Visual perception of texture in artworks

The field of object perception is well documented both in the sciences and the arts [15, 26, 27, 28]. Objects, symbols of objects, even highly abstracted or badly drawn objects can be easily understood as a representation of the object. The new challenge is to render materials and objects whereby the textural attributes of the object are perceived to be convincing [15]. When looking at reproductions of photographs and artworks, the human visual system is more forgiving of halftoned images. However texture is problematic as our visual system is able to discriminate the difference between natural and patterned texture, and incorrectly rendered surfaces can hinder understanding. A natural texture appears homogeneous, but remains random - each element is similar but remains unique. However a patterned texture, although homogeneous is composed of the same repeatable and recognisable elements. Furthermore to render surfaces with no discernable pattern structure that comprises unlimited variations can result, as demonstrated by the Pixar animations, in exceptionally large file sizes.

The primary question when looking at the relationship between the object and surface is: does this surface look realistic to me? Adelson highlights the difference between things and stuff, and to make things look more convincing, the stuff of things requires closer attention. [8] This does not necessarily mean that more information (or computer power) is required, but a better study on the relationship between the intrinsic and organic relationship of material and texture.
The complexity in the creation of a convincing textural render is essentially due to the enormous range of physical components that are required to incorporate all the nuances of a texture, such as colour, fibre, grain, reflectance, specularity, weave, hardness, softness, glossiness, fluidity; and as demonstrated in the previous list, the range of descriptive adjectives, cultural and specialist terms that extend these more subtle characteristics of a texture. Furthermore, these multi-variables of textures tend to be stored as a visual taxonomy in the human memory, whereby subtle textures and surfaces can easily be identified and differentiated by our visual memory. In a real world scenario, planed wood can quickly be distinguished from paper (grain, surface, flexibility) and animal fur from human hair (direction, colour, smoothness, curl) for example a fashion designer would quickly be able to differentiate textural variation between cotton, poly-cotton, velvet, calico, hessian, linen, silk, felt.

3. ARTISTS’ APPROACHES TO THE STUDY OF TEXTURE APPEARANCE

Throughout the history of art, artists have demonstrated their mastery of representing the appearance of texture through the dynamic range of paint, by creating illusions of reality through perspective, colour and tone. By using chiaroscuro techniques the artist could convey the appearance of materials and texture by exploring how light behaved as it struck a surface. In order for the artist to understand the relationship of object and texture, by studying the functional aspects of materials, how material is used in giving shape to three-dimensional structures, provides the artist with a better understanding of the object. [29]

3.1 The development of painting techniques by artists to capture the appearance of texture

Painters working between the 15th and 21st century were interested in depicting convincing representations through close attention to material attributes of objects. Furthermore, they did not limit themselves to a generic representation of wood or metal or fabric, but explored the difference in appearance of how materials were manufactured, for example as shown in figure 2, the subtle differences between beaten and polished copper, or glazed and unglazed pottery.

Moreover, for the artist engaged in capturing the appearance of texture, also seemed to understand what to edit or leave out, or as Gombrich explains, where ‘there is less paint there to explain and disturb’. [16] Leonardo created paintings without lines or boundaries, or sfumato, which softened the overall appearance of a scene. This is particularly apparent in the Mona Lisa (c.1503), where the blending around the face has a translucent quality. Jan Van Eyck used rich glazes of pigment, and flicks of white highlights to increase dynamic range and texture. For example the handling of paint to describe the edges of a head-dress of Margaret van Eyck (1439), is described using deft twists and spirals of white paint, which at a distance coalesces to appear as a dense frill. [30] Diego Velázquez’s work is intriguing, when viewed at a distance the canvases present an opulent and detailed rendering of precious pearls, lace, metal, fur and feathers. However, close up, the information appears out of focus and gestural. Vasari described Titian as demonstrating a sophisticated understanding of material that was executed through loose brushwork, and knowing what components could be left out almost to the point of abstraction. [31] This is particularly highlighted in Portrait of Pope Paul III without Cap (1543) the Mozzetta – the large expanse of his red velvet cape is carefully rendered to convey the weight, texture, and highlights of the thick pile velvet.

The following section of this paper provides a visual survey of a selection of works by painters, who were engaged in observing and capturing the appearance of the visual tactility of the garments and objects. There is an extended list of
materials, artists and where the work can be accessed at the end of this paper. The objective is to increase the survey, to build a taxonomy of texture that can then be used as a benchmark for an alternative rendering of texture.

3.2 Jan van Eyck (c.1390 – 1441)

Visual comparisons could be made between the 15th century illuminated manuscript painting in which Jan van Eyck had trained, and the panel paintings in the Netherlands of the same time. His observant eye and meticulous attention to detail was a key element in van Eyck’s painting. Works such as the *Ghent Altarpiece* [32] and *The Annunciation* (fig.3) demonstrate van Eyck’s innovative approach to modelling the folds of clothing, the transparency of glass, colour and dynamic range, and his ability to transmute the medium of paint into gold, precious stones and pearls, and without the use of gold paint, “he no longer simply painted the proper colour of an object, he captured the mutability of its appearance” [33] The tiny flecks and dabs to describe the gilt stitching or the gleam of pearls is rendered in pale yellows and ochres in contrast to the deep reds and umbers in the background to create a high contrast. He also recorded the appearance of different materials, mimicking wood, marble and stone to create sculptures standing in shallow recesses. Painted panels of wood, today known as grisailles, they were rendered and modelled in a more subtle range of light and shade and conveyed a highly convincing three-dimensional effect and realism. The diptych *The Annunciation* (1435-1440) the illusion is extended still further where he has added a reflection behind the figure to create the impression of a highly glossy recess.

![Image of Ghent Altarpiece](image1.png)

![Image of The Annunciation](image2.png)

Figure 3. Details of gold embroidery, pearls and gemstone, by Jan van Eyck, *The Annunciation*, (c. 1434/1436), National Gallery of Art, Washington.
3.3 Hans Holbein the Younger (1497 –1543)

Holbein’s ‘Ambassadors’ demonstrates not only his mastery of portraiture, but deft skill in capturing the appearance of a range textures, including metalwork, silk, fur, wood, paper and leather. He is able to convey an experience of the weight of heavy textiles, such as the lynx-lined, black fur trimmed coat worn by Jean de Dintville (left) or the dark brown floor length coat of woven jacquard silk (possibly velvet). The dullish fur trim on the sleeve of Jean de Dintville (fig. 4, left) is similar to the matted computer generated fur by Pixar for *Monsters University*. Annotations on colour and texture are frequent in Holbein’s preparatory portrait drawings. He also excelled in monotone areas of colour but still managed to convey their essence of silk or velvet. (fig. 4, right) [34]

![Figure 4. Details showing the relationship of fur and silk, by Hans Holbein the Younger, *The Ambassadors* (1533), National Gallery, London](image)

When work began in 1993 to clean and restore the Ambassadors, a series of cross sections were taken to investigate Holbein’s painting technique, which clearly showed how the artworks were layered. According to Wylde in his technical Bulletin [35] Holbein’s approach was to build up the surface with a complex layering of different coloured pigment. For example the carpet which plays a prominent part of the composition, a black is applied to a chalk and mid grey ground, then an intense red consisting of vermilion, red lake and white on top. Although seemingly complex, the pattern is composed of small squares of red, yellow, blue and white, and grey to represent the knotted threads (fig.5) From the high resolution images, [10] one can gain a better understanding of the optical complexity of the brushwork to convey the appearance of rug fibres and threads.

![Figure 5. Details showing the knotted carpet, by Hans Holbein the Younger, *The Ambassadors* (1533), National Gallery, London](image)

3.4 Diego Velázquez (1599-1660)

Our appreciation of his work is based on his knowledge for the way he applied paint and his understanding of the optical appearance of materials at a distance. He demonstrates a sophisticated understanding of a range of surfaces including human skin, fur, metals and textiles. His highly gestural approach to brushwork, when viewed close up, appears abstract and impressionistic but seems to coalesce at a distance, “The degree of understanding of the optical act of viewing had never before been so spectacularly demonstrated”. [36] One hypothesis is that he used long handled paintbrushes to create the overall painting, and a short brush to add the highlights and detail. [37] X-ray photography of his work demonstrates very little overworking of his paintings, and therefore suggests careful preparation and composition. His primary painting method is thick and direct, with a limited earth pigments, black and white.
He used a broad square ended brush to load a stroke, sometimes with two semi-blended colours to achieve a thick-ridged texture. With a wide variety of handling of larger areas with thickly applied highlights often with a very fine brush. For his depiction of the embroidered fabrics, he used a high level of impasto, thickly applied highlights and shadows. The methods of application include, thin scumbles of wash, daubs of opaque pigment, dry dragging of paint. (fig.6) Velázquez also used glazing methods in his work, as demonstrated in the *Infanta Margarita in Blue* (1659), the layers are so dilute they have pooled into the texture of the canvas. [36]

*Figure 6. Detail by Velázquez, Juan Francisco de Pimentel, (1648) Museo Nacional del Prado*

*Old Woman Cooking Eggs*, (1618) one of the earliest documented works by Velázquez, demonstrates already a mastery of different metals, textures and through the shadows we are invited to explore the different tactile qualities. For example, the brass dishes are fabricated in different ways, or the pottery vessels are glazed, chipped and surfaces roughened through use. (fig.2)

*Figure 7. Details showing the difference between Velázquez’s handling of paint (left) Philip IV of Spain in Brown and Silver (1632) compared to the workshop handling (right) Isabella of Bourbon (1632) (Images reproduced from Larry Keith, “Velázquez’s Painting Technique” in: Velázquez, London: National Gallery, p. 86 (1996) [36]*
In order to undertake the rather laborious rendering of costumes, Velázquez attempted to systematize a method of painting so that his workshop could copy his handling technique. A study into the differences [36] between paintings made by Velázquez and his workshop demonstrate a superficial imitation of the master. Although the same materials and method are used, the result appears a little too laboured and less fluent. (fig.7)

3.5 Thomas Gainsborough (1727-1788)

Gainsborough’s paintings depicted the high glamour of the rich and fashionable in 18th century Bath and London. He was skilled in capturing the sumptuousness of the drapery and diaphanous and silvery qualities of silks and satins. He preferred to paint the costumes himself rather than use a workshop drapery painter. [38] His method of painting is highly distinctive, using translucent pigments over opaque, and strong hatching strokes to suggest highlights, bright scumbles of pigment for broader areas. The oil paint was treated almost like watercolour. At high magnification, the layers demonstrate a high proportion of colourless transparent filler, thus maintaining a maximum brightness to the colours to create an optical layering of colour. The fabrics, when viewed close up, are rendered with a loose brushstroke that is difficult to obtain a definition. However, the loose feathery rendering of the brushstrokes, complex combinations of pigments and overlayering of translucent colour combine to create a lightness and movement to his portraits.

Figure 8. Thomas Gainsborough Isabella, Viscountess Molyneux, later Countess of Sfetn (1769) Walker Art Gallery, Liverpool

3.6 Robin Eley (1978 - )

There is an interesting connection between the still life paintings by old masters and hyper-real methods developed by artists working in the 20th and 21st century. [39] These later artists were interested in creating life-like images, which on close inspection, are still created using oil paint and still demonstrate minute and detailed brush work and certainly lend themselves to a close inspection. The range of twenty first century material subjects are often highly challenging, and even to capture by photographic standards presents problems in colour rendering, tonal range and gamut. They demonstrate highly saturated colours, glossy or inter-reflective surfaces, different illumination points and colour temperature, highly textured or complex materials that contain a high degree of specular activity. Their chosen material subjects are often highly challenging to reproduce even by photographic standards.

Robin Eley is a contemporary artist who demonstrates a highly sophisticated understanding of the illumination and rendering of inter-reflective and complex surfaces such as crumpled paper, foil, (fig.9) polythene and coloured plastics. He also wraps human figures in the plastic and is interested in the differences in rendering the appearance of skin and hair as seen through semi translucent materials. In the 21st century, there are greater opportunities to gain insights into the practical methods of art making – for example You-Tube – and Eley demonstrates his method for rendering aluminium foil. [40] Eley begins by sketching out the foil in pencil, then applying light washes of colour and finally overworking the surface using a wider palette. The completed work is startling in its complexity and convincing appearance as the rendered material.

4. CONCLUSION

This paper has demonstrated how painters across the centuries were absorbed in creating convincing representations of the attributes of materials. The works of art viewed at a distance coalesce to convey an accurate verisimilitude of material and object, which as exampled by Velázquez, on closer inspection, demonstrate a much looser and gestural approach to painting. These works show that a high level of detail is not necessary to achieve a convincing visual appearance. These examples are selected from a larger database of samples that records paintings and prints according to
material (an extended selection is listed at the end of this paper). The objective is now to apply these marks as vector lines and study how the overlayering of inks and colour mixing approaches used by artists could increase the range of colours and effects achievable by colour inkjet technology and thereby increase the scope of digital colour printing methods.

Figure 9. Robin Eley, Veneration (2012) oil on Belgian linen, 190 x 130cm (reproduced with permission from the artist) www.robineley.com

REFERENCES

See also www.vision.ucsd.edu/kriegman-grp/papers/texture03.pdf
See also www.metmuseum.org/pubs/bulletins/1/pdf/3258523.pdf#hannered.pdf


A selection of pictures listed according to materials

**Velvet:** Titian, *Portrait of Pope Paul III without Cap* (1543) Museo di Capodimonte, Naples
http://cir.campania.beniculturali.it/museodicapodimonte/thematic-views/image-gallery/OA900118/?searchterm=portrait*

*Ruffled/pleated fabric:* Jan van Eyck, *Margaret, the Artist’s Wife*, oil on wood, 41.2cm x 34.6cm. Groeningemuseum, Bruges, (1439)


http://www.nationalgallery.org.uk/cid-classification/classification/picture/hans-holbein-the-younger,-the-ambassadors/271993/*moduleld/ZoomTool/x/152/y/0/z/1

*Pottery, brass, glass, woven rush:* Diego Velázquez, *An Old Woman Cooking Eggs* (1618)
http://www.nationalgalleries.org/collection/artists-a-z/V/5259/artist_name/Diego%20Velázquez/record_id/2476

*Gold embroidery, precious stones:* Jan van Eyck, *The Annunciation*, (c.1434/1436)
http://www.nga.gov/content/ngaweb/Collection/art-object-page.46.html


*Black robes, Silver embroidery:* Diego Velasquez, *Queen Margarita of Austria* (1635)
http://www.museodelprado.es/imagen/alta_resolucion/P01177_01.jpg

*Striped satin, lace:* Raimondo de Madrazo, *Second Marconesse of Manzenedo* (1875)
http://www.museodelprado.es/imagen/alta_resolucion/P02603.jpg

*Black satin with fur trim:* Hans Holbein the Younger, *Christina of Denmark, Duchess of Milan* (1538)
http://www.nationalgallery.org.uk/cid-classification/classification/picture/hans-holbein-the-younger,-christina-of-denmark,-duchess-of-milan/275721/*moduleld/ZoomTool/x/252/y/0/z/1

*Organza, silk, lace:* Thomas Gainsborough, *Mr and Mrs William Hallett (The Morning Walk)* (1785)
http://www.nationalgallery.org.uk/cid-classification/classification/picture/thomas-gainsborough,-mr-and-mrs-william-hallett-(the-morning-walk)/281662/*moduleld/ZoomTool/x/195/y/0/z/1

*Lace, woven satin, black satin:* Sir Joshua Reynolds, *Anne, 2nd Countess of Albermarle* (c. 1760)
http://www.nationalgallery.org.uk/cid-classification/classification/picture/sir-joshua-reynolds,-anne,-2nd-countess-of-albermarle/271537/*moduleld/ZoomTool/x/189/y/0/z/1