



Pitch Line Marking Case Study and Cost Comparison

Doncaster Metropolitan Borough Council
Streetscene Department

Author Darren Bisby
Assistant Team Leader

Introduction

Over recent years the Streetscene department of Doncaster Council has provided a host of grounds maintenance services to both internal departments, such as schools and also to external clients including Parish Councils, Leisure centres and Churches.

The services provided are recharged, using what has now become an out dated schedule of rates and prices that were calculated during the times of compulsory competitive tendering, and have then been adjusted on an annual basis by using the rate of inflation.

Due to the original competitive nature of this pricing structure, many of the calculations did not reflect the true cost of the work and subsequently the department carried out certain operations at a loss and incurred a budget deficit.

As a result of cuts in funding directly from central Government, the Council undertook an investigation into a range of possible efficiency savings and how these could be implemented.

The review of the schedule of rate prices indicated that that they did not reflect current labour rates, as some of the jobs that were being carried out did not generate sufficient income to cover the labour rates alone. In addition to this there were also other hidden costs involved with the operation such as the rising price of fuel and the variation of materials prices.

Generally speaking many of the works carried out can incur a large material cost; this can either be the fuel for vehicles and machinery or items such as top soil and paving slabs for landscaping works. With the continuing rise in the price of such items it has become more and more important to seek out new products and achieve the best possible deal from suppliers.

Working closely with the Head of Service, areas were identified that could be improved, both in the level of service provided and the cost effectiveness of the operation.

Such improvements could be either in the form of smarter working or, more suitable and cost effective materials. As a result of analysing work schedules one specific area of operation was identified that, through changes, could result in a considerable budget savings.

Current Practice and Analysis

Doncaster Council Streetscene provide a service of maintaining white lines for sports pitches to Schools, Parish Councils and also to all the public use sports pitches in the Doncaster Borough. As part of this work, research was undertaken into all the various products that were on the market for the provision of white line marking.

The findings of this research is detailed as follows:

The Council was purchasing linemarking paint from a nationally known, well-established supplier that offered a range of line marking products. The paint came in the form of a concentrate liquid which was diluted with water in various ratio dependent upon the quality, brightness and durability of the white line required. The product 'B' used was a well-known 'high-end' brand used by many of the top professional football clubs in the country to mark out their pitches.

Following earlier trials with this product, it was established that the concentrate could be diluted down to a ratio of 15 parts water and 1 part concentrate paint (15:1). At this dilution rate, the amount of paint to fully mark the pitch was 0.75 litres. This figure was calculated by using an average of 20 minutes taken to mark each pitch.

As part of the arrangement with the marking paint supplier, the Council purchased their spray line marking machines. These machines were pressurised sprayers, which could be calibrated to achieve differing levels of output depending upon the type of spray nozzle fitted. For example, the type of nozzle fitted will either increase or decrease the cost of the operation due to the quantity of fluid that is discharged from the marking machine.

The nozzle used was a blue (03) Flat Fan nozzle (*Appendix 1*) that will achieve the lowest output, therefore keeping the cost of the operation as low as possible.

In addition to the cost of the paint concentrate, the added cost of labour has to be added for the time taken by the operator to carry out the work. This is the true cost of the labour to the Council, not just how much the operative gets paid.

Working closely with Council colleagues over a number of days, it was established that the average time taken to over-mark a football pitch is 20 minutes. In addition, as this is a mobile operation, there will always

be a vehicle involved which is used for the transportation of both the operative and the materials. Calculated within the Council pricing structure is the charge for the use of a vehicle.

The figures below provide the initial costing as a percentage.

	% of cost
Line marking Paint:	29.68%
Labour:	48.13%
Vehicle:	22.19%

Once the initial cost of the actual operation was established, it was necessary to look further into the work and determine if there were any hidden costs not accounted for that would have a detrimental effect on the efficiency of the operation.

As a result of this analysis it was identified that one of the major problems with using the current paint through its marking machine was it only had a maximum capacity of 15 litres of marking fluid. Based on the output calculations that were established using the blue (03) Flat Fan nozzle, a discharge 12 litres of mixed liquid would be achieved per football pitch. Such an output meant that the machine had to be refilled after the marking of each pitch due to there being insufficient mixture to complete the next pitch.

To carry out this mixing of paint concentrate and water, pouring it into the spray marking machine and then returning in readiness to mark next pitch would add an additional 15 minutes to the task.

Therefore, as a result of the time spent for this process the full labour time for the pitch marking operation now in reality takes 35 minutes. In addition, there would be an extra 15 minutes allocated against the vehicle cost.

<i>Example:</i>	% of cost
Line marking Paint:	19.42%
Labour:	55.12%
Vehicle: £1.66 + £1.25	25.46%

As part of the operation analysis, it was evident that although the actual process of applying the paint only takes 20 minutes, there was an additional 15 minutes spent mixing paint with the correct amount

of water to refill the spray marker for each pitch being marked. This was essentially non-productive time.

Evaluation and Opportunity

As highlighted at the start of this review, the key to providing cost effective operations is efficiency savings. With this in mind contact was made with other industry suppliers who supply paints used for white line marking. As a result of this product/supplier appraisal, It became possible to identify a particular product which provides the opportunity to reduce the costs incurred, increase flexibility of the operation and, in return, make significant savings on this one operation alone.

A company named **Rigby Taylor** is an established supplier of amenity products that have been used by the Council for a number of years; such products include fertilisers and pesticides. In addition, they supply white line marking products and the product identified is a paint marketed under the name of **Impact**.

This product is of a completely different composition to the concentrate previously used. What makes it so different is that it does not require any dilution, mixing or pouring to enable it to be applied.

Incorporating integrated paint technology, this paint is a highly concentrated, ready to use formulation, which is applied directly from its container through an **iGO** spray marking machine (*Appendix 1*). As no water is required to dilute the paint the diluting, mixing, and pouring is eliminated from the operation and more importantly this means that there are 15 minutes of non-productive time saved on every pitch marked.

As with other products the paint is applied through a pressurised line marking machine and output is regulated by a range of different nozzles. By using the Rigby Taylor red cone (04) type nozzle (*Appendix 2*), an output of 1.5 litres per pitch can be achieved.

The **Impact** paint is supplied in 10 litre containers of concentrate allowing, with the output of 1.5 litres per pitch, 6 pitches to be marked before there is the need to change over to a new container. This result's in a time saving of 15 minutes on each pitch marked and, as 6 pitches can be marked from one container of Impact, a total of 1.5 hours will be saved which is time that would otherwise have been

spent measuring mixing and pouring if using the current concentrate. This reflects a significant labour cost saving of 23.62% on the 6 pitches that can be marked from a single 10 litre container.

From the analysis of studying current schedule of works, it has been established that the Council is contracted to carry out 3,267 individual markings of football pitches throughout Doncaster each financial year. By eliminating the lost time incurred for measuring, mixing and refilling, this equates to a total labour saving of £8,820 for the financial year.

From the results of the research and cost analysis, an evaluation of the **Impact** product and its performance was carried out in a true working environment.

The Evaluation

An initial purchase of 170 litres of the **Impact** paint was made and **Rigby Taylor** provided the loan of an **iGO** marking machine. It was agreed that if we entered into a permanent supply agreement, the machine would be supplied and serviced by them at no cost to Doncaster Council.

The initial trials were established following a visit to the factory where the paint is manufactured. As part of the visit I was invited to take along a sample of our current product 'B' to enable us to compare the two products side by side.

The company that manufactures the paint for **Rigby Taylor** is **Linemark UK** and they supply the company with a range of other products as well as **Impact**. However, the manufacturer was very keen to demonstrate how well it performs against other products on the market and our current 'B' product.

The **Impact** paint system won the Queen's Award for Innovation in 2011 and it offers a high level of sustainability in that it vastly reduces the amount of water required to carry out line marking operations. With the current 'B' product, 11.25 litres of water is used on every pitch so, given the fact that the Council undertakes 3,267 pitch markings per year, a saving of up to 36,753 litres of water can be made.

In addition to the technical information regarding the composition of the products, being explained, it was established that one of the major factors influencing the manufacture of line making paints is the

addition of an ingredient called Titanium Dioxide. This pigment is used to provide the whiteness in the formulation and is present in many day to day products such as toothpaste and household white emulsion paint. In addition to this ingredient, there are various adjuvants that are used in the process to enable it to bond with the water in the solution.

A practical demonstration was undertaken by Assistant Team Leader Darren Bisby, comparing **Impact** in a parallel trial alongside the current product 'B' to compare the quality of the paint coverage when applied to the leaf of the grass and also to highlight the brightness of the white line when sprayed. To carry this out a Council supplied sample of the 'B' paint concentrate was mixed by Darren Bisby and applied alongside the **Impact** line using a dual nozzle line marking machine.

As is clearly visible from the picture in *Appendix 3* the **Impact** paint produced a much brighter line than the current 'B' product. It was highlighted by the manufacturer of **Impact** that their line would last longer than the 'B' line due to the different adjuvants and bonding agents contained in the paint. These bonding agents adhere more effectively to the grass leaf making it more resistant to rain and will reduce the surface 'washing out' of the paint.

At the conclusion of the trial, additional photographic evidence of the paints durability was emailed to Darren Bisby showing the paints visual longevity after one week and again after two weeks following treatments (*Appendix 4*).

Summary

Given the additional benefit of increased durability of the **Impact** paint following its application this now provides the scope to be more flexible and adjust the scheduling of marking operation. This allows more scope to undertake other work on the days when normally labour would be taken up carrying out the operation.

Historically, paints used have always been in the dilute concentrate form and as result of this the operation has always been carried on the last day of the working week.

This timing was to give the marked line the best possible chance of maintaining its colour for football fixtures that are scheduled for the weekend period. By moving over to the Impact system the operation can be schedule to be carried out on any day of the working week with the knowledge that a line applied on a Monday or Tuesday will still be of the quality required for football fixtures to be played at the weekend.

The added benefit to this level of flexibility is that staff levels are usually reduced on Friday's as a result of requests for leave but now there is security in the knowledge that the operations required at the end of each working week will always be completed.

As an added bonus, further investigation carried out into the quality of the pitches has identified that 25% of the pitches are subject to light use only and suffer less from wear and tear than others. By using Impact, these pitches only now need to be marked once a fortnight rather than weekly providing even greater savings. Evidence of this is shown in *Appendix 5*.

Through the use of **Impact** the number of individual pitch marking per year have been reduced from 3,267 to 2,465, a 25% saving. Efficiency savings of £18,090 per annum have been achieved and the amount of water used in the line marking operation has been reduced by 36,753 litres.

By eliminating the time spent mixing paint and filling the marking machines we are freeing up 816 man hours each year of otherwise unproductive time.

A full cost analysis of this is shown in *Appendix 6*.

Appendix 1



*iGO spray
marking
machine*

Appendix 2



Red (04) cone nozzle

Appendix 3



Linemarking application comparing product 'B' with Impact

Appendix 4



Linemarking application comparing product 'B' with Impact, assessed 2 weeks following application

Appendix 5



Typical pitch experiencing light wear throughout the season

Appendix 6

	'B' Dilutable Concentrate 15:1	Impact Ready-to-use
% Cost per litre	100%	-42.75%
Cost of paint per pitch	-12.94%	100%
Labour per pitch	100%	-57.94%
Vehicle	100%	-57.4%
Total cost per pitch	100%	-43.57%
Cost per 3,267 scheduled overmarks	£37,341.81	£21,080.32
Financial saving		£16,261.49
Litres of water used per pitch	11.25	0
Litres of water <i>saved</i> on 3,267 markings		36,753.75
Gallons of water <i>saved</i> on 3,267 markings		8,084

By using the Impact paint a financial saving of £16.2K is achieved and water consumption reduced by 36.75k litres

