

INNOVATIVE M&E INSTALLATION REPORT

David Wilson



ACT 9/2000

INNOVATIVE M&E INSTALLATION REPORT

David Wilson

BSRIA Limited
Old Bracknell Lane West,
Bracknell, Berkshire RG12 7AH
Tel: + 44 (0)1344 426511 Fax: + 44 (0)1344 487575
e-mail: bsria@bsria.co.uk www.bsria.co.uk

The logo for BSRIA, consisting of the letters 'BSRIA' in a large, bold, serif font.

ACKNOWLEDGEMENTS

This work was performed under contract to the Department of the Environment, Transport and the Regions, under the 'Partners in Innovation' programme. BSRIA acknowledges the financial support of the Department of the Environment, Transport and the Regions and would like to thank the following sponsors for their contribution which has led to the production of this Report.



Department of the Environment,
Transport and the Regions

Bovis Lend Lease	Lindapter
BM Stainless	Mace
BSS Group	Mapress UK
Durapipe	NG Bailey & Co
EC Harris	SAV UK Ltd
Environmental Engineering Ltd	Shepherd Engineering Services
FC Foreman	Stanhope
Gripple	Unipipe
George Fischer Sales	Victaulic
Hilti	Waterloo Air Management
HVCA	

The research project was undertaken under the guidance of a project steering group drawn from industry representatives and BSRIA staff. The Steering Group contributors were:

Mr Guy Butler	Mr Jim Hart	Mr Eric Ostrowski
Mr Philip Cartwright	Mr Greg Hayden	Mr Anthony Palgrave
Mr John Dalkin	Mr Rod Hickmott	Mr Nigel Pavey
Mr Andrew Davies	Mr John James	Mr Terry Pope
Mr Darren Doyle	Mr Michael Knight	Mr Arthur Reader
Mr Richard Edmonson	Mr Martin Long	Mr Paul Sims
Mr Tony Eyles	Mr John Manning	Mr Mark Whettall
Mr Lars Fabricius	Mr David McKenna	Mr David Williams
Mr Andrew Ford	Mr Peter Mender	Mr Jon Willox
Mr Martin Forster	Mr Peter Morley	
Mr Tony Harrison	Mr Roy Nutley	

Contributing from BSRIA were: David Wilson, Cary Donaldson, Marcus Dicks and Glenn Hawkins.

Every opportunity has been taken to incorporate the views of the editorial panel, but final editorial control of this document rests with BSRIA.

EXECUTIVE SUMMARY

In the late 1990s BSRIA published two reports entitled *Improving M&E Site Productivity* (TN14/97) and *Prefabrication and Preassembly* (ACT 1/99). The research underlying these reports led to the recommendation that alternative systems, components, materials and innovative methods should be thoroughly evaluated to identify opportunities for productivity gains on M&E projects. This report contains the findings of such an evaluation. It identifies the barriers to and solutions for promoting the adoption of innovative M&E installation techniques and products. Product specific information on innovative systems and equipment has been produced separately in the form of a series of data sheets entitled *Innovative M&E Installation Data Sheets* (ACT 5/2000).

In the process of researching the data sheets and collating the information BSRIA carried out site visits to 52 construction projects and attended 9 international trade shows. They also held in-depth discussions with a wide cross section of construction professionals from within the UK, Europe and the United States.

Why innovate?

Innovation combined with performance measurement and feedback will act as a catalyst for change in the UK construction industry. This will drive forward a new approach that will reduce inefficiency and waste. Examples include:-

- Removing unnecessary process steps
- Eliminating unnecessary installation items
- Reducing the unnecessary movement of people and materials
- Eradicating goods or services that do not meet customer needs.

Benefits of innovation

In addition to the improvements in productivity, the use of innovative M&E installation techniques and products produces many other benefits for the whole construction team. These benefits include:

- 34% to 90% reduction in installation labour
- 5% to 70% reduction in installation cost
- Increased client satisfaction - improved value for money and areas of added value
- Simplified design and specification
- Improved working practices and buildability
- Easier route to multi-disciplinary installation
- A more efficient, well trained and motivated workforce via staff training in innovative working methods
- Recognition as an innovative company.

Potential barriers

The commitment of the project team was seen to be of paramount importance to the decision making process and for the successful uptake of innovative ideas and products. Other factors that create barriers were identified as:

- Fear of change at all levels
- No-one wants to be the first to use a new product or approach
- Individuals do not want to carry the risk that accompanies innovation
- Clients are not educated and informed about the advantages that innovation can have for their business
- Buyers purchase on component costs rather than on the total installed system cost.

Practical action

In order for the UK construction industry to increase the uptake of innovative ideas and techniques the following key areas need to be addressed:

- Increased education and demonstration of the benefits of innovation
- Development of partnerships throughout the supply chain to create an environment in which innovation can thrive.

Recommendations

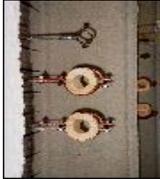
Improving the uptake of innovative ideas and products and making innovation happen requires the following culture changes:

- Commitment and perseverance from top to bottom within an enterprise
- Equitable sharing of the risks and efficiency gains of innovation between all the project partners
- Development of designs, specifications and contractual arrangements that maximise the benefits of innovative solutions. These should focus on products not functions.

In conclusion

The UK construction industry must replace outdated components and processes if it is to remain competitive in a global marketplace. This research project has found that the UK construction industry can realise a significant gain in installation performance through the adoption of innovative components and systems. A summary of the potential benefits is shown in Table 1.

Table 1 Benefits of labour saving systems and components

	Evaluation of traditional approach	Evaluation of innovative approach	Benefits of innovative approach	Savings of innovative approach	Relevant data sheet
Setting out	<ul style="list-style-type: none"> Manual measurement and setting out Tape measure, chalk line, marker pen 	<ul style="list-style-type: none"> Laser distance measuring devices Infra-red setting out levels and lasers 	<ul style="list-style-type: none"> Increased productivity Fewer errors Less labour required 	<ul style="list-style-type: none"> Labour saving: 23% Total installed cost saving: 6% 	Data sheet 1.1
Connection to the structure	<ul style="list-style-type: none"> Drill hole, knock in anchor 	<ul style="list-style-type: none"> Shot fixing system Integrated supports Adhesives 	<ul style="list-style-type: none"> Increased productivity Integrated system 	<ul style="list-style-type: none"> Labour saving: 47% - 65% Total installed cost saving: 20% - 36% 	Data sheet 2.1 - 2.3
Method of support / suspension	<ul style="list-style-type: none"> Heavy, labour intensive channel systems and drop rod assemblies 	<ul style="list-style-type: none"> Wire hangers Integrated supports 	<ul style="list-style-type: none"> Increased productivity Reduced material handling and storage 	<ul style="list-style-type: none"> Labour saving: 25% - 50% Total installed cost saving: 10% - 28% 	Data sheet 3.1 - 3.3
Means of connecting the service to the support	<ul style="list-style-type: none"> Labour intensive supports using multiple components 	<ul style="list-style-type: none"> Lightweight, fast assembly channel systems 	<ul style="list-style-type: none"> Increased productivity Material savings Ease of installation 	<ul style="list-style-type: none"> Labour saving: 25% Total installed cost saving: 10% 	Data sheet 4.1
System installation	<ul style="list-style-type: none"> Traditional materials for pipework, ductwork and electrical installations Traditional methods of jointing Single feature components 	<ul style="list-style-type: none"> Innovative M&E materials New jointing techniques Advanced component manufacture – multiple features 	<ul style="list-style-type: none"> Increased productivity Improved working practices 	<ul style="list-style-type: none"> Labour saving: 50% - 90% Total installed cost saving: 5% - 70% 	Data sheet 5.1 - 5.17
Tools and equipment	<ul style="list-style-type: none"> Manual lifting and manoeuvring of materials 	<ul style="list-style-type: none"> Mechanised lifting devices - motorised working platforms † Cordless power tools † 	<ul style="list-style-type: none"> Increased productivity Improved working practices 	<ul style="list-style-type: none"> Labour saving: 50% - 65% 	Data sheet 6.1

† Based on previous research as part of the 'Improving M&E Site Productivity' project

CONTENTS

1 INTRODUCTION	1
1.1 Background to the project	2
2 WHY INNOVATE?.....	4
3 BENEFITS OF INNOVATION.....	5
3.1 Examples	5
3.2 Additional benefits of adopting innovative systems and techniques	6
4 BARRIERS TO INNOVATION.....	7
5 PRACTICAL ACTION TO OVERCOME THE BARRIERS TO INNOVATION.....	10
5.1 The strategy	10
5.2 The action.....	10
5.2.1 Increased education and demonstration	10
5.2.2 Development of project partnerships throughout the supply chain	12
6 RECOMMENDATIONS - MAKING INNOVATION HAPPEN.....	15
6.1 Improving the project process	15
6.2 Components - adding value	15
6.3 Improving site activity.....	16
6.4 Critical success factors for sustained innovation	17
6.5 Action points for the construction industry.....	18
7 CONCLUSIONS.....	21

APPENDICES

Appendix A.....	23
-----------------	----

FIGURES

Figure 1 Data sheet extract	5
Figure 2 Barriers identified.....	9
Figure 3 Barriers to innovation.....	13
Figure 4 Overcoming barriers to innovation.....	14
Figure 5 Potential solutions for the installation process.....	25

TABLES

Table 1 Benefits of labour saving systems and components	v
Table 2 Productivity time composition.....	24

1 INTRODUCTION

As we enter the new millennium, the UK construction industry requires significant change in response to the continuing pressure to increase productivity, reduce costs and improve the quality of its product. It has been highlighted that the construction industry should adopt new working practices and procedures if it is to meet client expectations and deliver them with increased speed of construction, lower costs and zero defects. A principal factor in achieving this is through the greater uptake of innovation in the processes and in the products employed.

This report provides an overview of the key findings from the Innovative M&E Installation research project. The aim of this project was to stimulate the uptake of innovation in the building services industry. The project set out to achieve this target by:

- Identifying, highlighting and promoting the adoption of new techniques and procedures used outside of the UK (or not in common use in the UK) that have the potential to improve site productivity
- Assessing and highlighting the barriers that may restrict the use of innovative systems and procedures
- Recommendations to overcome these barriers
- Producing time, cost and quality analyses of a range of innovative solutions.

The report together with the *Innovative M&E Installation Data Sheets* (ACT 5/2000), which are a series of 23 A4 data sheets, provides independent information on a range of innovative systems and components. It is intended that this information will benefit all participants in the construction process by facilitating value judgements on cost and time savings to be made. These data sheets should be used at all levels within the construction process:

- Clients - To learn of the commercial benefits of new systems and techniques
- Consultants - To establish a greater understanding of the potential applications and performance of new systems
- Contractors - To evaluate time and cost savings of new systems and techniques
- Site operatives - To understand the watch points when installing new systems and techniques.

The data sheets and this report have been produced with the help and encouragement of a number of industry sponsors, together with the financial support of The Department of Environment, Transport and the Regions under the Partners in Innovation programme.

Definition of innovation

For the purposes of this report, the word innovation is defined as: “...something new hitting the market, world or industry which creates commercial value. It embraces new processes, new services and new business systems as well as what often comes to mind - new products.” (Grady, D. *Unlocking Innovation-Challenging Conventional Wisdom About What Leaders Do*, 1993.)

It is important to remember that innovation is not purely about products or gadgets but also the process by which they are applied. It is often the case that an innovative process may just simplify an existing method or a number of methods.

1.1 BACKGROUND TO THE PROJECT

In April 1997, BSRIA published a report entitled *Improving M&E Site Productivity* (TN 14/97). This report consisted of detailed site observations and analysis of M&E installation work on several ‘live’ construction sites in Europe and America. The report identified that the average level of productivity on UK construction projects was only 37% of observed best practice. The report suggested that a major contributory factor to the poor M&E installation performance was the reluctance to embrace innovative installation procedures. In contrast, the project found that other countries such as Sweden, Germany and the United States are maximising production through the use of improved installation procedures and by adopting innovative techniques. The report suggested that the performance of UK projects could also be maximised through the adoption of these innovative techniques and procedures.

More recently, a BSRIA project looking at prefabrication and pre-assembly of building services (*Report ACT 1/99 Prefabrication and Pre-assembly*) showed that substantial productivity improvements could be obtained through the adoption of prefabricated and pre-assembled solutions. The project also concluded that further improvements were likely through the incorporation of innovative products and processes and recommended that innovative solutions should be thoroughly evaluated. The ‘Innovative M&E Installation’ research project provides a thorough evaluation of a number of innovative solutions.

The ‘Innovative M&E Installation’ project was set up in response to the recommendations of these previous BSRIA projects and also in response to industry-wide calls for greater uptake of innovative techniques and products.

To understand why and how construction companies innovate, a fax-back questionnaire was devised and sent to a wide cross section of the UK building services industry. The results highlighted the major driving forces for innovation in UK construction companies. The driving forces behind adopting innovative M&E installation systems and techniques were their ability to offer:

- Time savings
- Better performance
- Environmental benefits
- Areas of added value
- Cost reductions.

To be able to make an informed decision, the questionnaire identified that construction professionals required the following information on innovative components and systems:

- Key benefits over more traditional approaches
- Typical time savings
- Overview of the system or product
- Typical applications
- Total installed system cost.

These main areas of interest were used as the 5 main headings on the Innovative M&E Installation data sheets. Further information on the research methodology can be found in Appendix A.