

CONSTRUCTING EXCELLENCE

BRE



CONSTRUCTION LEAN IMPROVEMENT PROGRAMME

Profit from process improvement

dti

FUNDED BY THE DTI

INTRODUCTION TO CLIP

the Construction Lean Improvement Programme

The Egan report 'Rethinking Construction' recommended a national knowledge centre for the industry. Construction Best Practice, under the DTI, has fulfilled this role. Now, with the other post-Egan initiatives, it is part of the larger movement of 'Constructing Excellence'. Its role is to drive improvement by disseminating knowledge about good practices, innovations and the performance of companies and projects. During the past year CBP have been adapting lean tools and techniques for use in the construction industry. This new approach aims to boost performance by targeting inefficiencies in site operations and other related activities. It is called the Construction Lean Improvement Programme, or CLIP for short.

CLIP is based on the theory of 'lean construction'. It works by focusing companies on achieving high levels of customer satisfaction by improving the quality, cost, efficiency and delivery of a product or service. CLIP allows construction companies to take the highly theoretical topic of lean construction and turn it into a practical tool that they can effectively implement.

However, 'lean construction' is not about trimming everything to the bone and squeezing more out of what's left. It's about working smarter, not harder. Lean is about achieving a balanced use of people, materials and resources. This allows companies to reduce costs, eliminate waste and deliver projects on time.

Other industries applying lean principles regularly achieve productivity improvements in excess of 20%. It became apparent that the concepts of lean thinking could be successfully applied to the construction industry. There are three key concepts to focus on, all of which appear in the seven pilot projects in this booklet:

■ **Processes** – these transform the form, fit and function of the material or information to meet the customers' requirements. Processes can be one off or repeats, but they all have costs attached to them

■ **Value** – something is only valuable if the client cares that it is being done

■ **Waste** – if it's not valuable to the client it's called waste, and should be reduced.

By focusing on these areas a company can start to remove all non-essential wasteful activities, and minimise non-value adding activities.

CLIP focuses on changing the behaviour of people at the 'sharp end' of construction. These people operate the industry's processes, and are the ones closest to adding value and meeting the needs of the customer more effectively. A CLIP engineer, with world class expertise in lean construction methods, works with your team to make practical improvements and to train them by example; it is not learning in the classroom. In this way, results are immediate and directly related to needs.

For participating companies, CLIP begins with two start-up activities: input diagnostics and a management awareness workshop. These are followed by an individually tailored programme built up from four core modules (Lean Processes Masterclass, Lean Relationships, Leadership and Communications, Teamwork and Team Leader Training).

The central feature of CLIP is the 'Process Improvement Masterclass'. This delivers short yet intensive training sessions to enable behaviour modifications and to enhance the skills of personnel at the working level. The classes encompass a range of topics that can be applied to any process in construction – specification, design, procurement or site operations.

The results of the seven pilot projects based on real construction projects around the UK have been excellent, with most achieving productivity improvements of up to 50% in key processes.

CONTACT DETAILS – GETTING HELP

Martin Watson
CLIP Programme Manager
PO Box 147
Bucknalls Lane, Garston
Watford WD25 9UZ
email: watsonm@bre.co.uk
[www.constructingexcellence.org.uk/
service/clip](http://www.constructingexcellence.org.uk/service/clip)
01923 664638

FOREWORD

In the global economy, all UK industry is under pressure to continuously improve to maintain competitiveness and attract investment. The construction industry in particular has started to recognise that greater efficiencies are possible.

Lean Production was identified in the Egan report 'Rethinking Construction' as a transferable approach, to improve the project process and deliver target outcomes in key areas.

The Construction Lean Improvement Programme (CLIP) was sponsored by the Department for Trade & Industry to take the principles of lean thinking from the aerospace, automotive and petrochemical industries and adapt them to construction.

The first phase of CLIP took the principles of working smarter, not harder to seven different construction projects. The process was kept deliberately straightforward and has proved to be hugely successful for the participants. The results of these case studies are presented in this booklet.

The findings from these diverse situations show that cost savings & efficiencies can be found from improving the productivity of people and adding value per person. The better delivery performance has, in turn, increased customer satisfaction.

CLIP works through masterclasses with a common approach and the DTI has now committed five years' funding support to cover half of the cost of a masterclass.

I commend these case studies and the learning points that arise from them. They will help any organisation in the construction supply chain to see what is in it for them. It shows the process benefits and how important the behavioural issues can be.

There are definite and realisable benefits available for anyone who engages with CLIP and discovers how a simple application like lean thinking can eliminate waste and make the value flow.



Nigel Griffiths MP
Minister for Construction

SUMMARY OF THE FINDINGS

This is a study of seven successful projects, where construction contractors used the Construction Lean Improvement Programme (CLIP). The purpose of the research was to see if there were any common features or processes that could be passed on to others, in the form of best practice. Each project had a different set of circumstances surrounding it, and lean construction was used in a different way in each of the projects.

We are classifying a successful project as one where the company using CLIP makes improvements to their business processes. Any benefits, such as cost savings, can then be shared by the client and other supply chain members involved with the project.

The simple yet effective process improvements made during the projects have produced a number of common benefits. By focusing on processes and removing waste from them, the companies involved were able to offer clients cost and time savings, fewer defects, and a more open, effective working environment. To put it simply, greater customer satisfaction.

The companies recognised that inefficiencies in their processes were ultimately costing them money, but the problem was knowing where and more

importantly why. They recognised that by matching the benefits made in other industries to their own processes, real improvements could be made.

However, it took a big step and a lot of hard work to question, analyse and then start to improve the way they did things.

Lean construction is a relatively new concept, and it needs to be approached in the right way if it is to be used effectively in the construction industry. Its success relies heavily upon the support of top management. All the projects had directors who look for innovative best practice ideas, and are driving to develop a culture of business improvement in one form or another.

It became obvious that having the right team, and giving them the training and tools for the job is important. In all of the projects, the hard work of the team on site made the process work. By engaging the teams early on in the project, they were able to identify where the waste was occurring. This allowed alternative working methods to be developed, which improved productivity.

It is not uncommon for a company to try and apply a new idea to every area of the business, in a hope that it will bring results. The trick is to keep it

simple, and focus on one process at a time. The projects were so successful because the teams had clearly defined aims from the start of the process, and chose to improve processes that their company regularly used.

The best way to manage the process is to keep track of your productivity. The use of visual displays keeps the whole team involved and focused, and helps to create an environment where communication and regular discussions drive the process forward.

The improvements made have been recorded as 'best practice', and are held within the company as 'blue prints' for success. In a time when knowledge of your industry and clients' needs drives successful projects, all the companies realised that recording and sharing best practice was the best way to drive future improvements.

Other specific learning points from the case studies are covered in the checklist for success.



CHECKLIST FOR SUCCESS

The project team: the CLIP process needs the backing and support of top level managers to succeed. The appointment of a committed team champion is also vital. CLIP does put an extra burden on staff, and it is important that the champion understands, supports and is actively involved in the whole process.

Having a clear aim: have clearly defined aims of what you want to achieve from the outset, and ensure that everyone on the team understands these from the start. Don't try to fix everything at once. Begin by focusing on one or two processes and then go from there.

Choosing the right project: choose a project that will enable you to easily measure and track any changes during the project. It is worthwhile picking one that contains a process, such as partnering, which is common to your company's projects. This way future projects can benefit from any improvements made.

Establishing a tool for change: be prepared to challenge your company's culture and the way its processes are run. Managing and implementing lean construction often requires people to adopt a different mindset. Ensure your team has the right tools and information available to help them adjust and make changes.

Communication and teamwork: the need for communication and discussion across the whole project team is important. Have regular meetings to keep the whole team up to date and focused on what you are trying to achieve. Having a small team of around 10-15 people assists this process.

Overcoming the barriers: transferring ideas from other industries can often meet with scepticism, from both office and site personnel. Use the experience of the CLIP engineers to work closely with the team, and drive home the benefits to them. If you can make quick wins, people can see the advantages and they will start to respond.

Measuring the process: use effective measurement tools such as KPIs to record and monitor how well the project is going. The use of visual charts can be used to highlight improvements and problem areas to the whole team. Clearly display them on a large board, so that the whole project team has easy access to them. Review the performance of the project on a regular basis, as a way of prompting improvements.

Closing the loop: CLIP shows up many areas of your business where you can make improvements. Once you have decided how to improve your processes, allocate responsibility to team members, and make sure that they close the loop. This ensures that the action points raised are put into place, and that the whole organisation learns from it. Workshops and knowledge management can help control and improve your processes.

Engaging the workforce: the people best placed to make improvements to working methods and improve productivity are the personnel on site. Try to create a comfortable environment where all the team members feel involved in the process. Use brainstorming and problem solving sessions to get to the root of any

problems. By energising the workforce, you can release creativity. The answer to the problem is often sitting right in front of you.

Recording and sharing best practice: the whole process can be a waste of time, unless the ideas and improvements made are put back into the business. Have a mechanism such as a best practice document or guide, so that others can benefit from the lessons learned. Develop a team that will manage this process. Give it a name and a direction.

We would like to thank the following people who gave us their time and explained their experiences for this publication:

PROJECT: New six-floor accommodation block – Wolverhampton. Contractor: Terry Bilsbrough for NG Bailey & Co Ltd

PROJECT: Unicorn Primary School – Bromley. Contractor: Neil Quaife for Denne Construction

PROJECT: Modernisation of community housing – The Wyre Forest District. Contractor: Bill Munn for Thomas Vale Construction plc

PROJECT: Interior shop fitting. Contractor: Ron Gatenby for Simpson (York) Ltd

PROJECT: Local authority housing refurbishment – Preston Road, Hull. Contractor: Nathan Brough for Keepmoat plc

PROJECT: St Duke's Terrace – Liverpool. Contractor: Stephen Morris for Cruden Construction Ltd

PROJECT: New childcare facilities at Swindon and Milton Keynes. Contractor: Jim Smith for Stepnell Ltd

PUBLISHED: October 2003

COPYRIGHT: Requests to use any part of this document should be sent to martin.watson@constructingexcellence.org.uk

RESEARCH & AUTHOR: Leading Edge Management Consultancy Ltd
www.lead-edge.co.uk

DESIGN: Allan & Company Ltd
www.allandesign.co.uk

THE PROJECTS

INTRODUCTION TO CLIP &
GETTING HELP

2

FOREWORD

3

SUMMARY OF THE FINDINGS

4

CHECKLIST FOR SUCCESS &

ACKNOWLEDGEMENTS

5

NEW SIX-FLOOR ACCOMMODATION
BLOCK – WOLVERHAMPTON

7



UNICORN PRIMARY SCHOOL –
BROMLEY

10



MODERNISATION OF COMMUNITY
HOUSING – THE WYRE FOREST DISTRICT

13



INTERIOR SHOP FITTING – ARGOS

16



LOCAL AUTHORITY HOUSING
REFURBISHMENT – HULL

19



ST DUKE'S TERRACE – LIVERPOOL

22



NEW CHILDCARE FACILITIES AT
SWINDON & MILTON KEYNES

25



JARGON BUSTING BOX

27

An M&E contractor used CLIP to make cost savings by improving the productivity of their workforce



THE PROJECT

New six-floor accommodation block, Wolverhampton

CLIENT:

Wolverhampton University

CONTRACTOR:

NG Bailey & Co Ltd

Terry Bilsbrough of NG Bailey tells how one of his team used CLIP to improve their workforce's productivity by altering their working methods and processes.

BACKGROUND TO THE PROJECT

NG Bailey is one of the largest mechanical and electrical contractors in the UK, and we directly employ the majority of our electrical labour. We have a large number of clients in both the public and private sectors.

We now offer a one-stop shop solution to our clients' needs, and the company has a strong focus on business improvement.

What attracted us to CLIP

I was actively involved in the Construction Best Practice (CBP) mentoring programme, which is where I met Martin Watson. He told me about CLIP and the benefits that it could bring to us.

I know about the gains made in the automotive industry from using lean methods, and I was sure we could improve our own productivity. I strongly believe that business improvement can improve productivity & reduce costs and I study this in our projects. I saw CLIP as a natural progression in the company's development in this area.

What our aims and expectations were

We used CLIP on phase 1 of the new six-floor accommodation block at Wolverhampton University, as our contracts manager Gary Heitman was keen to give it a go. The building has a portal frame structure, with traditional brickwork and a plaster finish. It has a



Working with the gang members to implement the new improved work method

mixture of concealed and exposed services, and we looked at both during the project.

The main aim was to improve the productivity of the mechanical and electrical first fix, and to remove waste. We also aimed to reduce the amount of activities that did not add any value to the project.

The team was tasked to meet three key company expectations

- To reduce the amount of identified waste, with a focus on productivity and site processes
- To demonstrate the improvements made using CLIP to the rest of the group
- To establish a measurement and improvement process that NG Bailey could adopt and refine for the future.

We also wanted to make advances in other areas, such as

- Improving the work area layout and methods
- Looking at work sequence refinements
- Increasing efficiency gains.

‘I recognised the gains made in the automotive industry, and I knew we could improve our own productivity by using CLIP.’

Terry Bilsbrough of NG Bailey & Co

How the CLIP process worked for us

We started by assembling the project team. It included a contracts manager, electrical engineer, electrical foreman, mechanical engineer and mechanical foremen. I picked the people who would buy into the pilot project and do it justice.

Our Contracts Manager, Gary Heitmann, saw the advantages of using it and facilitated the workshops, with guidance from our CLIP engineer. However, some members of the project team thought that the process was an unwanted burden. The pipe fitters said they could not work any faster. The CLIP engineer told them that if he could not make any improvements in three days, he would not bother them again. The pipe fitters ultimately improved their productivity by 40%.

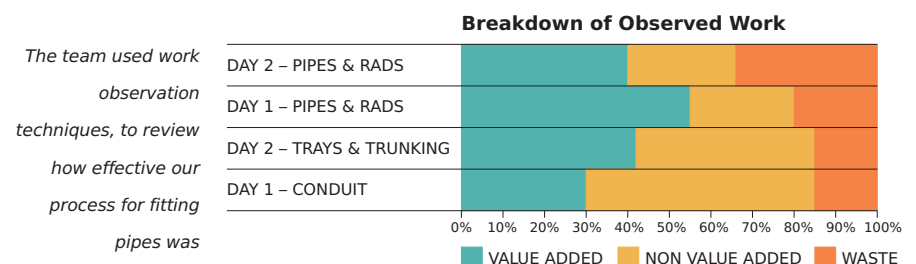
The team used work observation techniques, to review how effective our site processes were. We then asked ourselves why any delays and disruptions or snags were occurring. We used team brainstorming sessions to identify, and then countermeasure the ‘root cause’ of the issues.

We noticed that the way materials were stored led to cramped working areas, which affected the efficiency of the team. Fitters also had to walk to a room several times per day to get tools and/or materials. We studied our work processes to identify the activities that were adding value to the project and those that were not.

The Site Foreman used a log sheet to collect data on delays and disruptions. It revealed that a large amount of the time lost during electrical works was caused by late ‘materials delivery’. We also found that ‘on-site design’ problems during the mechanical works were causing much of the fitters’ time to be wasted.

The team discussed improvement opportunities and agreed to focus on a number of activities for both the electrical and mechanical work. We used a priority matrix to select them. We then produced a ‘standard’ layout for work areas, which used all the improvements we had made during the project. We now use this to set up our work areas before we start construction. The result is a safer, well-organised, workspace.

The data highlighted a number of areas where bottlenecks were occurring. We found the technique used to fit low level pipes was inefficient, with one out of a team of three men always standing idle. By getting one fitter to use the screwing machine and two men to fit the pipes, instead of one, we found that all three could work at once.





The project team looked at how the materials are laid out in one room ready for usage by fitters

We also used visual charts to plan various aspects of the process. The charts allowed the whole team to keep track of the work and to read about any improvements made. This helped to reduce waste, and improved productivity.

How we benefited from this initiative

By working with the workforce we have successfully implemented the new work methods. The workforce has increased the number of pipes they can fit in a day by 40%, and reduced the time taken to assemble electrical conduits by 16%.

The team has identified the 'best' method for each sequence of work, which has minimised waste and allowed effective working. We have now produced a number of method statements, which explain the best way to do a particular job. All the improvements made during the pilot project will be carried on through a further masterclass.

I am now using the results of the pilot project to show future project teams what can be achieved. We can now sell the idea to other teams and give them the tools and techniques to use CLIP effectively.

How we plan to use the skills and lessons learned

We let the site supervisors and workforce run the CLIP project. They are the ones who are best placed to understand how our processes can be changed to improve our productivity. The aim is to re-engineer our processes and develop a common approach to NG Bailey projects.

We are now re-assessing our site processes and running this in parallel with CLIP. A roll-out action plan is being developed, where we can show the improvements made to the rest of the company, through a series of workshops.

If I could start again, I would like to be more involved in the process. I would also divert more resources to the project, as it took 12 months to develop CLIP into a state where I could take it before the board. They are currently considering the results of the first CLIP project.

You cannot ignore a 13.8% improvement in productivity, especially when your labour costs are so high. As lean construction comes from the manufacturing industry, people are going to be sceptical about whether it can be used in ours, but look at the improvements we made. Just give it a go.

‘You cannot ignore a 13.8% improvement in productivity, especially when you employ so much labour.’

Terry Bilsbrough of NG Bailey & Co

LEARNING POINTS

- All the improvements made during the pilot project will be carried on through a further masterclass.
- The aim is to re-engineer our processes and to develop the NG Bailey common approach to projects.
- I ensured I picked people who would buy into the pilot project and do it justice.
- We studied the details of the project, and decided what information we would want to pass onto future projects.
- As lean construction comes from the manufacturing industry, people are going to be sceptical about whether it can be used in ours, but look at the improvements we made.
- We used team brainstorming sessions to identify, and then countermeasure the 'root cause' of the problems.
- The team has identified the 'best' method for each sequence of work, which has minimised waste and allowed effective working. We have now produced a number of method statements, which explain the best way to do a particular job.
- We let the site supervisors and workforce run the CLIP project. They are the ones who are best placed to understand how our processes can be changed to improve our productivity.

A building contractor used CLIP to help improve their framework for partnering and reduce their pre-construction lead times



“We quickly recognised the possible advantages of looking at a project, pulling it apart and then reassembling it. We wanted to produce a clear vision of our future partnering strategy.”

Neil Quaife of Denne Construction

THE PROJECT

Unicorn Primary School – Bromley

CLIENT:
London Borough of Bromley

CONTRACTOR:
Denne Construction

Neil Quaife of Denne Construction tells how CLIP helped the company to reduce waste and improve their framework for partnering with the supply chain.

BACKGROUND TO THE PROJECT

Denne Construction is the construction division of Denne Group Ltd. We undertake general contracting covering residential, care and commercial works in both the public and private sectors. Denne is a regional contractor operating in London and the South East.

The company has a strong emphasis on partnering with 80% of our work being repeat business.

What attracted us to CLIP

We heard about CLIP through one of our managers. We knew that other contractors were using it successfully. We also noticed someone with process management experience from outside the industry was involved. We asked Martin Watson of Construction Best Practice to come and meet our Managing Director Graham Brown.

They discussed the process, and looked at the areas where it could bring the greatest improvements. We quickly recognised the possible advantages of looking at a project, pulling it apart and then reassembling it.

What our aims and expectations were

We do a lot of work for local authorities, and we thought this would be a good opportunity to use CLIP in a partnering context. The Unicorn Primary School at Langley Court in Bromley, is a traditional low-rise construction. It is a brick and block structure with a trussed roof and block work finish. The project cost is £2.5 million.

We decided to focus on the pre-construction phase and look at the areas where we had the best chance of making improvements. We wanted to compare our current practices against new possibilities.

Our main objective in joining the CLIP project was to improve on the relationships with the client, suppliers and subcontractors. We wanted to understand what 'partnering really meant' and to identify issues that could be barriers to making it work. We wanted to produce a clear vision of our future partnering strategy.

From partnering using CLIP, we expected to be able to:

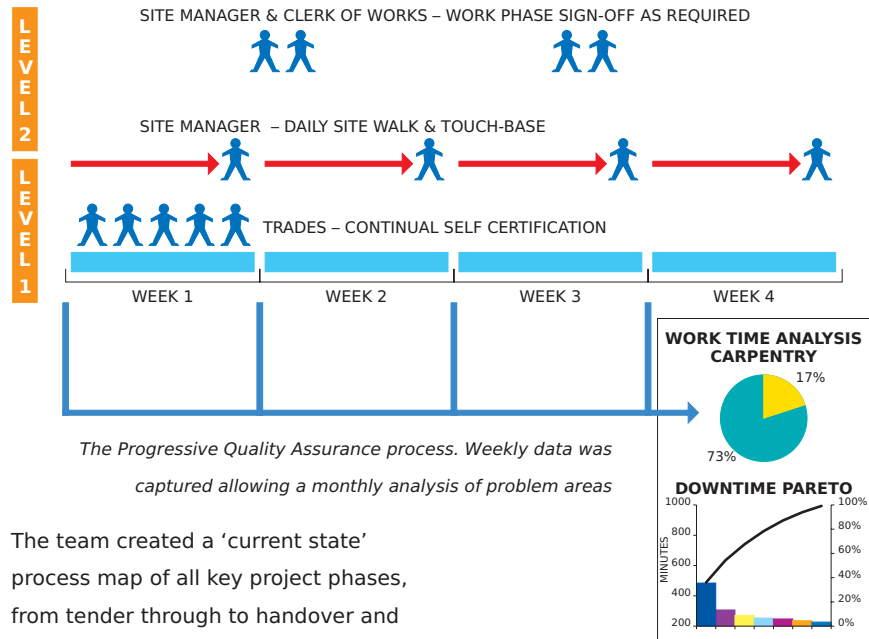
- Increase profits
- Reduce build times
- Reduce waste and defects
- Partner more effectively
- Meet our clients' needs better.

How the CLIP process worked for us

Once we had chosen Langley Court as the pilot project, we informed the project team. We invited the client and their representatives to a meeting, where a CLIP engineer gave us a taster of the process. Everyone turned up not knowing what to expect. But things got more exciting as we looked at how we could analyse our processes.

We looked at the tools available for breaking down activities and looking for waste. Then we applied these tools to each process to see what was necessary to reduce the amount of waste. We discussed various ways of improving them, and the team agreed three areas to focus on:

- Improving relationships and collaboration by focusing on pre-construction activities
- Handover and maintenance
- Improving materials planning, procurement and control.



The team created a 'current state' process map of all key project phases, from tender through to handover and maintenance. We plotted the key phases of actual times and planned times to give the total project lead time. The team chose to focus future improvements on the pre-construction phase.

CLIP put us into a new arena of looking for new ways of doing things. We identified changes we could make from our current practices, by applying the principles of lean construction and partnership collaboration. Looking at the changes led the team to a new 'blue-print' for pre-construction activities.

We produced visual charts to plan future activities, to help the partnering process. We set targets, and identified the critical areas to focus on by breaking down the project into manageable phases. The visual charts allowed free thought and brainstorming.

This process turned up many improvement opportunities from the tendering and selection process, to the final handover and payment phase. We decided to focus improvement on the handover and maintenance phase of construction. We then used 'future state' mapping to define the improved processes for handover & maintenance.

The site foreman logged information on delays and disruptions to the work. We

found that 31% of the time lost was caused by the late supply of door thresholds.

The client identified snags as the reason why many of their previous projects had been delayed at handover. Client satisfaction on the project was poor, and there was additional time and cost in rectifying the snags.

We made two improvements to help eliminate snags at handover. We set up a site-based quality control scheme. So, when a subcontractor has completed a section of work, we check it carefully looking for unnecessary waste. We can then discuss this with them and look for ways to improve.

We want to get all our subcontractors to self-certify their work on site. The quality system meant we could measure the number of times defects occurred, and then diagnose the problem. We looked at how we could change the way we worked to remove the fault.

Secondly, we analysed the snag data from site. We found problems with the current set-up and operation of procurement. We identified the reasons for the snags, and put in place effective measures to eliminate them.

Be prepared for the CLIP process to get in the way of your normal day job. It takes time out of your day to work with the CLIP engineer to develop your own skills set, so you will need to put in the extra time and effort. Go into the process with an open mind, the guys on site certainly did.

How we benefited from this initiative

The main benefit is that the team now fully understands our process improvement systems, and this has helped transfer vital knowledge between projects. We used CLIP to create a mindset of looking at every process for unwanted waste. The results are startling.

By taking the learning points from the process and putting them into our Business Management System, the whole company can benefit from the developments. We now have what we call our 'blue-print' for pre-construction activities.

We also have improved our framework for collaboration between client, main contractor, subcontractors and suppliers. The visual framework for the project has improved team and partnership relationships.

The whole team is delighted with the initiative and the amount of waste we have removed through our newly developed processes. We now run a workshop to ensure the actions from the pilot project are accessible to everyone. We are also using CLIP thinking on repetitive house building projects and in our joinery division.

CLIP has helped us to produce an action plan that will develop our processes further, and the changes have reduced the amount of waste in our processes. The next step is to apply and trial the 'blue-print' to new construction projects.

How we plan to use the skills and lessons learned

You will get the most out of CLIP if it fits with your company's long-term strategy, and if you prepare the team properly at the start of the process. My advice would be to run a session that clearly explains the principals of lean construction and process management. It has been hard work and the process does require top management support to succeed.

The great thing about the process is that it got the whole project team in a room thinking strategically. Suddenly, everyone was discussing how to work more effectively in a pre-construction environment.

I would say that it is vital to develop trust and to understand each other's business processes. We went through the tendering process with the client, and they were amazed by the amount of duplication and wasted effort involved. We also reviewed the actual lead-time from feasibility to start on site, and came up with a proposal that could reduce it by 48%. The client is now considering using different procurement routes, and is talking to other local authorities about using CLIP.



“The great thing about CLIP is that it got the whole project team in a room thinking strategically.”

Neil Quaife of Denne Construction

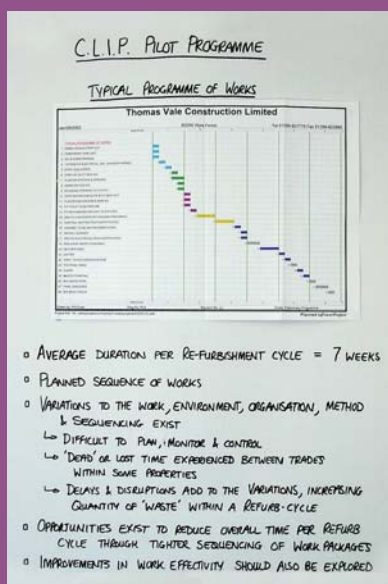
LEARNING POINTS

- It has been hard work and the process does require top management support to succeed.
- We used CLIP to create a mindset of looking at every process for unwanted waste.
- We have taken the learning points from the CLIP process and put them into our Business Management System. The whole company can now benefit from the developments. The result is a 'Blue-Print' for pre-construction activities.
- I would say that it is vital to develop trust and understand each other's business processes.
- People turned up not knowing what to expect from the idea. However, the whole thing got more exciting as we looked at how we could analyse processes.
- We quickly recognised the possible advantages of looking at a project, pulling it apart and then reassembling it. We wanted to produce a clear vision of our future partnering strategy.
- You will get the most out of CLIP if it fits with your company's long-term strategy, and if you prepare the team properly at the start of the process.
- We produced visual charts to plan future activities, to help the partnering process. We set targets, and identified the critical areas to focus on by breaking down the project into manageable phases. The visual charts allowed free thought and brainstorming.

A general contractor used CLIP to reduce property refurbishment times and improve their partnering relationships



The foremen working together as a team, developed an improved programme that resulted in a revised target time of 24 days (originally 30 days)



A programme of works for the CLIP project was displayed

What attracted us to CLIP

Our Managing Director Tony Hyde is very active in the industry and is always looking for new ideas. He heard about CLIP and got into discussions with CBP about being involved with the pilot scheme. He heard how other industries had benefited from using lean working methods, so the company decided to give it a go.

At the time Thomas Vale Construction was partnering with Wyre Forest Community Housing, to modernise a significant number of social housing units. We invited Wyre Forest's Chief Executive, Ray Brookes, to the CLIP pilot launch presentation. He could also see the potential benefits of applying CLIP to the programme, and agreed to take part.

What our aims and expectations were

As we were partnering closely with Wyre Forest on a community housing project, we decided to use CLIP as a way of improving the refurbishment programme. Assuming that good results were achieved, there would be an opportunity for transferring the lessons we learned from this project to similar ones in the future.

At the time of the CLIP pilot, the modernisation programme had already been running for one and half years. The five year programme will involve the modernisation of over 3,000 occupied properties, involving flats and houses. The renovation activities included new kitchens and bathrooms, central heating and decoration.

We wanted to become more efficient as we went through the project by building on existing ideas.

THE PROJECT

Modernisation of community housing, The Wyre Forest District

CLIENT:

Wyre Forest Community Housing

CONTRACTOR:

Thomas Vale Construction plc

Bill Munn of Thomas Vale tells how CLIP helped the whole project team to increase client satisfaction, by reducing property refurbishment times and the number of defects.

BACKGROUND TO THE PROJECT

Thomas Vale is a general contractor operating in the Midlands. We provide a comprehensive construction service, and use a number of modern construction techniques, such as design and build and partnering arrangements.

We are a forward-looking company, with a strong commitment to best practice, lean construction and continuous improvement.



The before situation of the stores layout



The team carried out a 5C activity, completing the first 3 Cs (clear out, configure and clean & check) to create an improved stores layout

By using CLIP the company expected to:

- Identify and reduce wasteful activities
- Learn more about lean production
- Create ownership of improvement among the project team
- Improve client and tenant satisfaction.

The project team also set themselves a number of goals to reach, by the end of the project. Our main one was to ensure the 'involvement of all'. This way, any improvements could be maximised and 'owned' by the team. This would provide a good basis for continuous process improvement.

How the CLIP process worked for us

We followed the CLIP 'standard structured approach', which is made up of four main stages; pre-diagnostic, diagnostic, improvement activity and follow up. Then we selected the CLIP team, which was made up of representatives from all the partnering organisations.

At the pre-diagnostic meeting, we agreed the aims and time scale of the project. We decided how to organise ourselves, plan the activities, and what information we needed to collect to fulfil our aims. There was an initial resistance to change. Some of the workforce were suspicious of this type of initiative. They felt it would not bring any benefits to the project, because

they were already doing a good job. It took a bit of time to talk them round, a key part of which is showing people that you are there to help them be more effective.

During the diagnostic stage, a CLIP engineer trained the team to do work observation exercises, such as activity sampling. By observing the different trades carry out their work tasks, the team captured data on work methods, times, effectiveness and waste. When we analysed the data, it showed the team that people approached the jobs in different ways, and some were more effective than others. Areas of waste were also identified.

Additionally, the team analysed the data recorded for us by the site personnel on 'delays & disruptions' and 'defects & snags'. The two areas experiencing the most delays and disruptions were carpentry and plastering. The carpenters were often standing idle because kitchen units were either not delivered or some were damaged.

Through looking at our process we identified a significant number of opportunities for improvement. We used a 'Priority Matrix' to help define which ones would yield the greatest benefits, when looking back at the aims of the project. The CLIP engineer helped us to look at specific improvement areas. Then they had to produce an action plan as part of our Plan-Do-Check-Act (PDCA) process.

Our main focus for improvement was to reduce the amount of time it took to refurbish a property. The CLIP team worked with the site foremen to eliminate waste and transfer the value-adding work, both within and between properties. We found ways to improve how tradespeople worked and interacted on site, and this significantly reduced the time it took to refurbish a property.

Part of the drive to eliminate process waste was discovering the 'root cause' of the key delay and disruption issues. This took us back to the main central site stores. We decided that the layout, configuration and operation of the stores needed to be improved. Lean tools such as 5Cs, 7Ws and visual management were applied. We established an improved system for inventory control and distribution.

To support the CLIP process we looked at the flow of management information. This was important as it was affecting the planning, operation and control of the work. This led to delays that left the tenants feeling dissatisfied. We talked to the site foremen about any changes they would like, and quickly altered the project drawings to accommodate them.

The team introduced visual charts to improve the way we managed the refurbishment process. The charts allowed us to plan, manage and control the refurbishment programme. The charts also linked the flow of informa-

tion between the site and the central stores, improving our inventory and stock systems.

We used a number of company and project Key Performance Indicators, and displayed them on our central visual planning board, where we could all see them. We reviewed the results regularly, prompting the team to focus on making improvements.

How we benefited from this initiative

We found that before the CLIP project, the actual time taken to refurbish a house was between 35 – 45 days. The original target set in the partnership was 30 days. Now we have completed the CLIP project, we can do the same refurbishment in 20 – 23 days. This improved output is being achieved whilst working on twice the number of properties at any one time, with the same level of resource.

Tenant satisfaction is now 93%, having risen from 87% last year. 66% of tenants said they are very pleased with the project.

76% of properties now have less than five snags, compared to 61% in the previous year, and this has produced a big benefit in terms of cost and time savings.

Overall, we have reduced the refurbishment cycle time by 33% for houses, and by 50% for flats. We have also

identified reductions in work package time of between one to eight hours, and once the improvements are implemented, refurbishment times will be reduced further.

Using CLIP has helped us to improve the way we manage our tools, so we lose less time on-site. We now manage and measure the flow of materials, which has improved inventory and stock turnover. We measure KPIs and this is critical for driving improvements in the future.

How we plan to use the skills and lessons learned

CLIP is a journey, starting with looking at your internal processes, and developing a company culture for continuous improvement. As part of this, we have just started to establish a process to 'grow' a framework of internal 'agents for change'.

We want to develop a team-based 'common approach' to making improvements. Lean and continuous process improvement is about getting people to challenge their own processes. It's a way of life.

By driving this change, we can create processes that will enable us to partner more effectively with the rest of the supply chain. We can use CLIP methods to see how well our suppliers are performing on projects, and how together we can reduce waste. We have made big improvements, but there is so much more to go at. This culture of continuous improvement will help us to grow a lean supply chain, achieving 'best value using best practice'.

The project was very successful and has certainly drawn the CLIP team and the partnership closer together. The CLIP project team has now formed their own 'innovation group' to improve other aspects of the modernisation programme and also their own business.

“Lean and continuous process improvement is about getting people to challenge their own processes. It's a way of life.”

Bill Munn of Thomas Vale Construction plc

LEARNING POINTS

- CLIP is a journey, starting with looking at your internal processes, and developing a company culture for continuous improvement. As part of this, we have just started to establish a process to 'grow' a framework of internal 'agents for change'.
- The CLIP project team has now formed its own 'innovation group' to improve other aspects of the modernisation programme and also their own business.
- We can use CLIP methods to see how well our suppliers are performing on projects, and how together we can reduce waste.
- The team introduced visual charts to improve the way we managed the refurbishment process. The charts allowed us to plan, manage and control the refurbishment programme.
- Some of the workforce were suspicious of this type of initiative. They felt it would not bring any benefits to the project, because they were already doing a good job. You have to show people that you are there to help them be more effective.
- At the start up meeting, we agreed the aims and time scale of the project. We decided how to organise ourselves, plan the activities, and what information we needed to collect to fulfil our aims.
- We want to develop a team-based 'common approach' to making improvements.

“CLIP unifies all of the project team, and is a great benefit to both the project overall and the client. I honestly believe CLIP to be the way forward for all construction projects.”

Bill Munn of Thomas Vale Construction plc

A shop-fitting contractor used CLIP to improve their productivity and product offering to clients, making them more competitive in the market



What attracted us to CLIP

We heard about CLIP through the National Federation of Builders. The enthusiasm and clear thinking of the CLIP engineers at the original presentation attracted us to it. We had to give a presentation in order to be chosen, but we saw it as an opportunity to 'step outside the box', and gain improvements for a priority-customer relationship.

What our aims and expectations were

For this CLIP project, we decided to focus on an area that we considered we currently did well, and to try to improve it further. This was the manufacture and installation of shop counters. We work for Argos and we will fit-out around 20 stores this year. There can be 10-15 counters in each shop, so we decided to focus on that. In a rolling contract partnership, like that with Argos, the client expects improvements and added-value.

Initially we wanted to improve on what we thought was already a good process. I thought that it would help reduce our costs and add value. This is important with the high level of repeat business that we get from clients like Argos and Debenhams. But, to do this, we felt that we needed to step back and re-focus.

We were looking for manufacturing savings in the region of 5-10% although we actually achieved considerably more than that.

ROLL OUT PLAN				
NO	ACTION	WHO	WHEN	STATUS
1	INTRODUCE CHECK LISTS ON RACK SAW AND PRESS (AND MAINTAIN)	ANDY/ADN	15 TH JULY	⊕
2	INTRODUCE CHECK LISTS TO BENCHES	MARK/ADN	15 TH JULY	⊕
3	RACK FOR INTUMESCENT STRIP AND COVERGLASS	MARK	7 TH JULY	⊕
4	CONFIGURE AREA FOR SIG STORAGE	ANDY	15 TH JULY 2012	⊕
5	CREATE GOODS OUT AREA	ADN	15 TH JULY 2012	⊕
6	DROP DOWN POWER POINTS TO CUTTING OUT AREA	MARK	24 TH JULY	⊕
7	COMPILE SC IN PRESS AREA: - STORAGE FOR ROLLER - CLEAN FLOOR - TAKE OUT PACKAGES ON FLOOR	DAVE/ANDY	15 TH JULY	⊕
8	TEAM MEETINGS			⊕
9	CHART TIME PER COUNTER / MONITOR	ADN/ANDY	EVERY 15 TH JULY	⊕

An action plan enabled workshops to be rolled out over the following months

THE PROJECT

Interior Shop Fitting

CLIENT:

Argos

CONTRACTOR:

Simpson (York) Ltd

Ron Gatenby of Simpson (York) tells how the company used CLIP to review the productivity of their manufacturing and on-site process, and how it has brought cost savings and improved their product offering.

BACKGROUND TO THE PROJECT

Simpson (York) carries out a large amount of shop fitting work for established retail customers, mostly on a repeat basis. We have our own joinery shop and teams of installers.

The company evolved from a management buy-out about nine years ago, and our teams have a very positive attitude towards business improvement.

■ **The main aim of the CLIP activity was to improve the productivity for the standard counter units, through:**

- Reducing the time for assembling the Argos counter
- Creating a better, safer working environment
- Getting a fresh view of the best way to do things
- Demonstrating improvements to our customers and the team
- Understanding the potential gains of using CLIP.

■ **Our main concerns with the Argos counters were that:**

- Detailed drawings and information are not always available on time
- We can't always get the right materials and equipment for a job, within the required time scale
- Our knowledge of the process would make it difficult to challenge fixed ideas.

Identifying just these main concerns on the project allowed us to work on the most important areas.

How the CLIP process worked for us

It was important that everyone got involved so that they were contributing. It needed someone to be 'The Champion' to steer the process through and someone to manage it on a day-to-day basis. We involved eight people in the project and initially I acted as champion. The Assistant Manager in the joiners shop led it on a day-to-day basis, involving the bench-hands and machinists. The team had a broad spread of age and experience and interacted well together.

Involving the team in this way allowed them to become comfortable with this new process. This enabled them to review & analyse our working methods and contribute ideas, whilst gaining in confidence. This allowed a



change of attitude and approach to a familiar process.

Working with the CLIP engineer, we decided that the first step was to discover exactly what was the current situation. We chose seven measures to look at, although not all were relevant to the joinery shop. Then we could use this to plan the improvement workshops and we could then compare them before and after the improvements.

The team visually mapped out the process flow for the Argos counters and noted any concerns. They also did the same for the flow of materials through the joinery shop.

Our CLIP engineer suggested that we video each step of the process. It was somewhat unnerving to watch at times. The team noted the most wasteful areas, so that we could tackle these during the workshop activities. Then we developed an action plan.

We used the improvement workshops to focus on the 5Cs, and to identify wasteful activities and eliminate them. We found the area around the rack was a problem, so the team carried out an initial check on it. They also found a number of machine faults, such as damaged extraction hoses.

They drew up diagrams showing the best cutting patterns and created a new cutting schedule. This enabled the joiners to spend more time cutting, and less time working out the best use of materials.

When looking at our manufacturing activities for signs of the 7Ws, we found that the process for cutting counter tops was particularly wasteful. We used to clamp a template to the work piece, before it was routed. But then the clamps had to be removed and re-clamped, so that the cutting could be finished. We ended up developing a new workstation, which incorporated vacuum clamps, so that we could cut the templates in one go. This saved a lot of time and effort.

We also created clear areas in front of the timber store. This reduced the amount of time we spent reorganising the timber. Gangways were clearly marked on the floor to designate clear areas, to make it easier to transport timber and veneer. Further checks on the press led us to allocate a clearly marked home for all of the materials required for them.

We gave a checklist to each employee working in a selected area, so that the team could maintain the factory conditions that they had achieved during the workshop.

“This was not an initiative just for the suits, but an opportunity for the workforce to contribute.”

Ron Gatenby of Simpson (York) Ltd



above: before – an initial 5c activity (configure) was carried out around the rack saw area & below: after



After we had improved in the joinery shop, we followed the counters to site to get the installers' views. Here we found that the counter top length can creep, causing a misalignment of joints. The drawings needed better co-ordination and there was often a risk of damage to the counter fronts, after they had been fitted. We also developed a spacer block system to make levelling the units quicker and easier.

The team produced so many action points that the workshops ran over a number of months. This was not just an initiative for the 'suits', but an opportunity for the workforce to contribute.

How we benefited from this initiative

None of this was rocket science, but the CLIP programme created an environment to stop, analyse and release creative thinking.

We have now made several improvements to the way we work. We are better organised, and through this have a safer working environment in the joinery shop. We have saved time managing the process by improving the cutting lists, cutting methods and assembly processes. This has allowed better efficiency. We have also improved the fitting problems we had on site, and the quality of the work has improved.

We have managed to reduce the number of man-hours per counter by 1.5, which is a 17% improvement in productivity. This was especially good remembering that our target was 5-10%.

By focusing on the 5Cs, we laid a foundation for continuous improvement. We used the activity to spot any abnormal conditions and control them. Our employees now have ownership of their own work area, which has improved teamwork and training.

The main benefit is that we can now give our clients a better product and when we had to re-tender our Argos contract, we were able to be more competitive.

How we plan to use the skills and lessons learned

The main benefit for us was the opportunity to focus on the manufacturing process, which can then be readily extended to other product lines.

For future CLIP projects more record data needs to be available at the start, to allow the project team to carry out their preliminary review.

Our experience is that success depends on getting people to their comfort level, where they can contribute positively. The team leader and champion roles are very important to this process.

‘None of this was rocket science, but the CLIP programme created an environment to stop, analyse and release creative thinking.’

Ron Gatenby of Simpson (York) Ltd

LEARNING POINTS

- For us, it was an opportunity to 'step outside the box'.
- The idea of videoing each step of the process came from our CLIP engineer. It was somewhat unnerving to watch at times.
- None of this was rocket science, but the CLIP programme created an environment to stop, analyse and release creative thinking.
- Success depends on getting people to their comfort level where they then can contribute. Having a champion and team participation is very important to create this.
- Identifying the main concerns on the project allowed us to work on the most important areas.
- The team had a broad spread of age and experience, which encouraged interaction, with a balance of enthusiasm and experience.
- Our employees now have ownership of their own work area, which has improved teamwork and given them the confidence to challenge fixed ideas, which in turn is allowing continuous improvement.
- Specifically, we learnt that we need to have more record data available to work with at the start.

A specialist contractor used CLIP to reduce defects in newly refurbished local authority housing properties and to improve customer service levels



THE PROJECT

Local authority housing refurbishment – Preston Road, Hull

CLIENT:

Hull City Council

CONTRACTOR:

Keepmoat plc

Nathan Brough of Keepmoat tells how the company used CLIP to improve client satisfaction, and develop a best practice procedure to drive future improvements.

BACKGROUND TO THE PROJECT

We specialise in the construction and refurbishment of social housing through our operating companies, Frank Haslam Milan and Bramall Construction. Our main goal is to assist in providing 'community regeneration', through our expertise in delivering quality new and refurbished housing.

We were one of the first companies to encourage a partnership approach, and have developed a number of long term relationships, particularly with local authorities and housing associations.

What attracted us to CLIP

As a company, we use best practice as a way of giving our clients value for money. Our group Chief Executive became a champion for lean construction and CLIP after meeting Martin Watson of Construction Best Practice.

We realised that we could use the principals of CLIP to reduce waste and improve our processes.

What our aims and expectations were

The main aim was to look at areas of our business where we were always having problems. We wanted to analyse our processes and find a way of dealing with them. We felt we could get the most out of CLIP on the Preston Road contract. It involved the complete refurbishment of local authority houses and we would be able to look at every aspect of our work.

The project was a relatively new scheme in partnership with Hull City Council. It involved gutting most of the



existing houses leaving only the shell, and then refurbishing them. We did the majority of the work ourselves, but sub-contracted out the roofing, plastering and M&E works.

■ **We wanted to work on the following areas during the CLIP project:**

- Rethinking the way we do things
- Improving team working between partners and clarify roles and responsibilities
- Improving the supply chain
- Improving quality and reducing defects
- Identifying opportunities for cost reductions
- Identifying opportunities and spreading improvements onto other projects.

How the CLIP process worked for us

I was the champion for the pilot project. I began by assembling the project team, which included the client, architect, project manager, site manager and quantity surveyor. There was little resistance to the idea, as we already had a good working relationship – having partnered before on previous jobs.

We held an introductory meeting where we decided to use key performance indicators (KPIs) to analyse our current situation. The site team understood what we were trying to achieve so I had no problems in motivating them to use CLIP. The team was already using 'snagging sheets', to record the defects before handover, and these provided an indicator of the quality of the work on site. We then found where the main quality issues lay on the project, by using a Pareto chart. This is a simple bar chart where you can record the number of defects in each area of work, and plot the cumulative total on the same page.

The charts showed that the existing joinery, windows and internal doors were causing a number of snags. There were also problems at handover with the electrics, plumbing & heating and joinery work. However, we decided that they could not resolve the problems without collecting more detailed data. We modified the form to collect data on the amount of delays caused by each trade.

We reviewed the additional information on post-handover defects and found that the method for fitting doors was

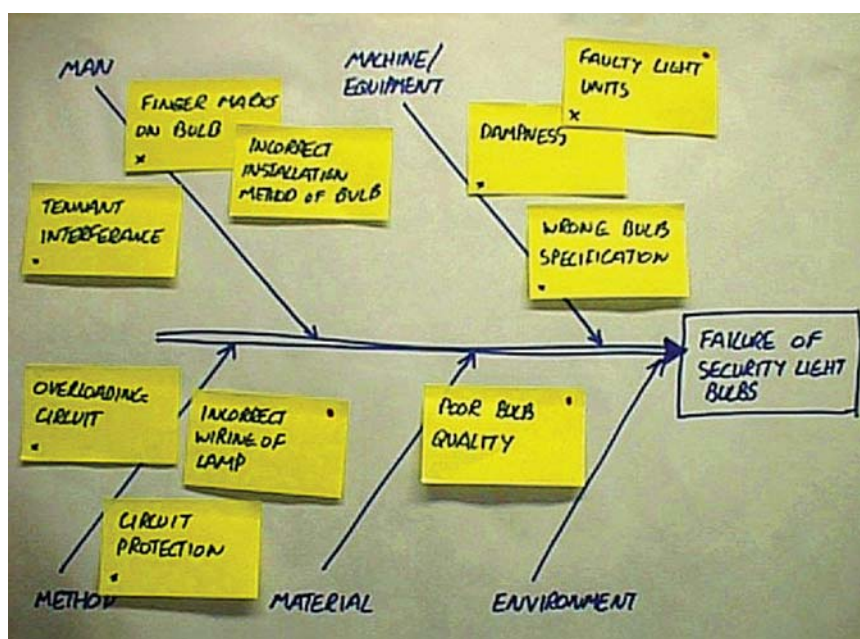
‘It is important that we do not forget the lessons we have learned from this project, particularly as we are expanding the business.’

Nathan Brough of Keepmoat plc

not at fault. However, the delivery of doors and windows caused delays and snagging defects, which was preventing early hand over. The team then collected more data on the plumbing and heating, and identified two main problem areas. Debris in the pipes was causing taps to fail and a number of supplied parts failed (mostly valves).

We found an average of 32 minor defects per property. Although we rectified almost all of these before handover, they were adding to the cost of the project. Tenants were also reporting minor snags and defects in a large proportion of the properties after handover. We decided to focus on reducing the total number of snags or defects, because of the cost and disruption caused by returning to the properties to remedy faults.

A number of security light bulbs were failing after handover. The team brainstormed the reasons for the failures and drew a fishbone diagram to map their ideas. The team thought that the most likely cause for failure was poor bulb quality. After contacting the supplier, we made little progress so we decided to buy in new bulbs before fitting any more security lights. We found that this cost less than being called out to fix every bulb failure.



The team brainstormed reasons for the failure of security light bulbs and created a fishbone diagram

The team found that some of the reported defects did not exist, and were caused by tenants misunderstanding how the installations within the properties work. We now give the tenants a more detailed set of 'user documents' that explain and give advice on this.

The team also drafted a flow chart for different parts of the building, such as fire alarms and plug sockets. The charts outlined how each component could go wrong and what was the best way to fix the problem. We produced a corrective action report to record all the reported defects.

Now the customer service team uses the flowcharts when taking calls from tenants, which means they are in a better position to handle complaints and give advice to tenants. By giving the staff extra information about the properties, we have reduced the number of abortive calls and improved our customer service levels.

How we benefited from this initiative

We thought we were running a tight ship, but the CLIP project did highlight areas where we could make improvements. The number of defects per property dropped and we reduced the amount of post-handover maintenance. The number of call-outs has also dropped, which saves money and frees up resources.

We are also developing our internal non-conformance system. We are using our 'corrective action reports' to ask the client what they, or our team, did to rectify a problem. By getting to the route of the problem, we can identify the best way to deal with it. We can now ensure that our customer services team is fully aware of any problems, so that they can sort out any complaints effectively. It is about making sure you ask the right questions.

We are now in the process of developing a 'best practice procedure' framework. Future project teams can use this framework to pre-empt potential issues and eliminate snags. It is important that we learn from this project and adapt best practice throughout our growing business.

Although the Preston Road contract was curtailed early in 2003, the CLIP project was a success and we have moved on to a new site.

How we plan to use the skills and lessons learned

The company has an informal approach to business improvement, and each site is currently using different best practice ideas and tools. We are now trying to streamline our new projects, so that they all focus on the same key areas. This will take time and require a culture change throughout the company. Our new 'best practice framework' will drive improvements in the future projects.

We will continue to use the pareto charts as they are a good visual aid for highlighting problems. We are also rolling out a series of workshops in the next few months to discuss the findings from the first CLIP project.

If I could start again, I would use CLIP from the start of the project. We could have picked up the main snagging areas before they led to defects and delays, by collecting more data from the start. We also spent too much time looking at our processes and not enough time trying to improve them.

Remember to have a clear goal for your CLIP project, and map out what you want to analyse before you start. You will need to be committed to make it work. Don't ignore the trivial things as they are still worth looking at and improving. All the small cost savings we made during the project do add up.

"We thought we were running a tight ship, but the CLIP project did highlight areas where we could make improvements."

Nathan Brough of Keepmoat plc

LEARNING POINTS

- The site team understood what we were trying to achieve so I had no problems in motivating them to use CLIP.
- Remember to have a clear goal for your CLIP project, and map out what you want to analyse before you start. You will need to be committed to make it work.
- By looking at the data from our 'snagging sheets', we have developed a 'best practice manual'. This will drive improvements in future projects.
- I was the champion for the pilot project. There was little resistance to the idea, as we already had a good working relationship – having partnered before on previous jobs.
- We wanted to analyse our processes and find a way of dealing with them. We felt we could get the most out of CLIP on the Preston Road contract.
- If I could start again, I would use CLIP from the start of the project.
- Don't ignore the trivial things as they are still worth looking at and improving. All the small cost savings we made during the project do add up.

A regional contractor used CLIP to improve the productivity of their bricklaying team



PROJECT

St Duke's Terrace – Liverpool

CLIENT:

Maritime Housing Association –
Liverpool

CONTRACTOR:

Cruden Construction Ltd

Stephen Morris of Cruden Construction tells how the company used CLIP to improve the management and productivity of their bricklaying team.

BACKGROUND TO THE PROJECT

Cruden Construction is a regional contractor specialising in new social housing and refurbishment. We also work in the private sector building industrial, retail and commercial facilities for clients in the Northwest.

We have a strong focus on best practice and are following many of the recommendations from the Egan Report 'Rethinking Construction'.

What attracted us to CLIP

We heard about CLIP at one of our local National Federation of Builders (NFB) meetings. We were putting an improvement programme together at Cruden, and it sounded as though CLIP could help us to achieve this.

We approached the NFB for more details, and he put us in contact with CBP. After some initial discussions, we launched the first CLIP pilot project in the UK.

What our aims and expectations were

We wanted to use CLIP on a project where it could help improve our own partnering arrangements. The £3.8m project at St Duke's Terrace, central Liverpool was the second of a strategic partnership programme taking place on a major construction site. It seemed ideal.

This project involved the demolition of the existing structures, followed by the

construction of four new buildings. The site is located in a conservation area. We decided to start using CLIP to improve the productivity of our brick laying processes, by harnessing the best ideas from the team.

■ We wanted to:

- Identify key issues and inefficiencies relating to the brickwork activity and the associated site services
- Improve the management of brickwork and the workforce
- Improve methods, practices and cost predictability
- Improve the management of our own bricklaying force
- Maximise the benefits across the entire construction project. We wanted to use any improvements made throughout all our projects, to optimise the productivity of our own precious bricklaying resources.

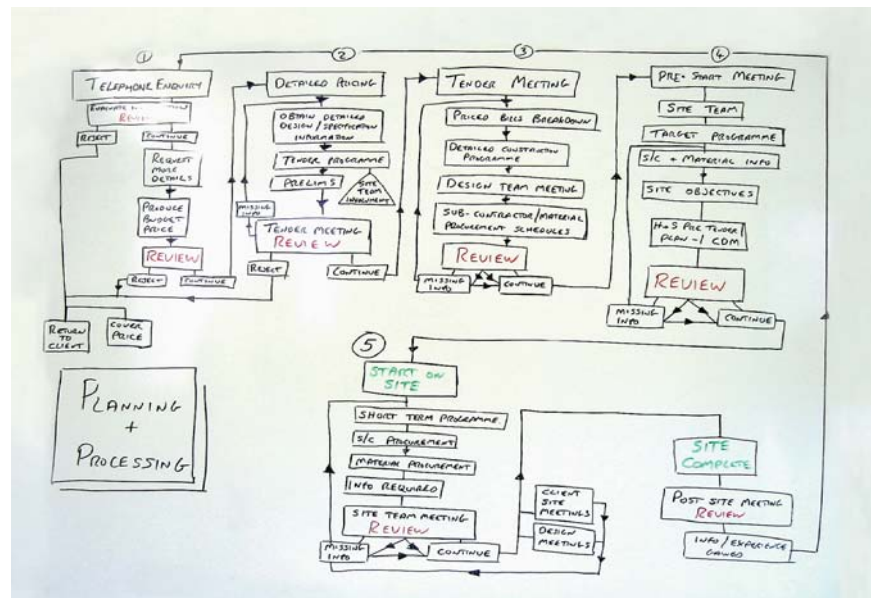
We also tasked the team to learn from the CLIP project, and to develop a team-based 'common approach' to process improvement. This could then be used throughout Cruden Construction.

How the CLIP process worked for us

We already had a good relationship with the client as we had worked together before. Their Chief Executive was also keen to improve the building process, and she was happy to be involved in the process.

I felt that the whole company needed to be involved with the project for it to be a success. I set up the first meeting with our contracts manager, senior buyer, site brickwork supervisor, estimator, project manager, contract surveyor and chief bonus surveyor. Our CLIP engineer then briefed the team.

The CLIP engineer introduced Key Performance Indicator analysis and the



By challenging the Current State the team created and mapped out an improved Future State

need to measure change. We then discussed and agreed the areas to be measured. We put them on a board so that everyone had access to them.

Everyone decided to review the performance of the project on a regular basis, as a way of prompting improvements. At this point, we agreed that we should just let the team get on with it.

They analysed the way our work force laid brickwork, and in particular the re-laying of reclaimed facing bricks. They also looked at issues such as access, tools, work patterns and the movement of materials around the site.

The brickwork foreman used a log sheet to collect data on work activities, which were affecting the effectiveness of the bricklaying process. It revealed that 45% of the bricklayers' working time was being wasted. We identified two main areas that were impacting heavily on the productivity of our bricklayers.

Even a small problem or delay to the scaffolding and excavation works was causing us problems. The team mapped out each stage of the bricklaying process, and looked at how the rest of the site activities affected it. We then looked at each stage of the works and asked ourselves, why are we doing

this? We wanted to see what was going wrong, and if there was a better way of doing things.

We looked at different ways of maximising the productivity of the bricklayers. The team brainstormed the issues most likely to impact on the effective construction of brickwork, from the ground works to wall plates. They started by improving the interaction between the different trades on site. For instance, you can't lay bricks when there is scaffolding in the way because you are running a service pipe through to another part of the building. We defined pro-active countermeasures based on how important they were, and wrote down the crucial action points on improvement activity sheets.

“This has created a loop for knowledge transfer across the company, turning us into a learning organisation.”

Stephen Morris of Cruden Construction

Visual planning was used to show the order and timing of the work, and the interaction of the trades. We found that, in certain situations, the skill and competence of the material handler affected the speed and success of the work.

We have now defined the 'best' method for the set-up, operation and control of the brickwork. By challenging how we do things, the team has created improvements that have reduced waste

How we benefited from this initiative

CLIP has made us analyse what we do, before we do it. This means we will think ahead about using construction methods that will remove the maximum amount of waste from the project. It has also made our internal departments work closer together during a project. This has created a loop for knowledge transfer across the company, turning us into a learning organisation.

We also benefited by getting the whole team together to discuss any key issues, allowing us to develop a common understanding. Now we can create a company wide framework that will improve our operations and project management.

“By challenging how we do things, the team has created improvements that have reduced waste.”

Stephen Morris of Cruden Construction

We are currently implementing an on-site process for recording and analysing why delays and disruptions are occurring. We can then get to the root of any problems, and identify the best way to solve them. By using a 'plan-to-protect' methodology we can prioritise ideas, based on how much they impact on the successful delivery of the project. This should improve the productivity of the work.

We have developed a 'best set-up' method for our brick and block work, and identified the best way of getting the best mortar supply possible. We now need to implement this, but it should help us to reduce site lead times. Overall, we have improved the productivity of the brick laying process by 7%.

How we plan to use the skills and lessons learned

The CLIP project made us review our tendering and estimating processes. We can now predict the cost of a project more quickly and accurately, which means we can manage our resources more easily. By setting up a system for transferring information around the company, we can ensure that all departments receive timely, value-adding information.

We are also going to change the way we manage and plan our labour resources. We will analyse how productive they are each week, and what encourages the best people to stay on with us. 83% of the workforce said that knowing they could go straight onto the next job was most important to them.

We are still monitoring the feedback from this project. We are going to transfer the processes where we have made the biggest improvements into future contracts. I have asked the team to create a 'Roll-Out Plan' and to start a review and management process for future CLIP projects.

Starting again, I would have spent less time analysing the problems we had on site, and more time coming up with practical solutions on how to solve them. My advice is not to use CLIP as a way of solving all your problems at once. It is at its most powerful when you focus on one element of the construction process.

LEARNING POINTS

- The main aim was to improve the productivity of our brick laying processes, by harnessing the best ideas from the team.
- We also benefited by getting the whole team together to discuss any key issues, allowing us to develop a common understanding. Now we can create a company wide framework that will improve our operations and project management.
- We are still monitoring the feedback from this project. We are going to transfer the processes where we have made the biggest improvements into future contracts.
- My advice is not to use CLIP as a way of solving all your problems at once. It is at its most powerful when you focus on one element of the construction process.
- We have now defined the 'best' method for the set-up, operation and control of the brickwork. By challenging how we do things, the team has created improvements that have reduced waste.

A civil engineering and building contractor used CLIP to improve their knowledge base and internal processes, to add value and bring cost savings to their client's buildings



What attracted us CLIP

We heard about CLIP through one of our directors, Mark Wakeford. He had attended a course on supply chain management, run by the National Federation of Builders. After some discussions, we were invited to join the programme. The company has been involved with partnering activities before, so we recognised that CLIP could be of real benefit.

What our aims and expectations were

As many of our projects are similar, we recognised that CLIP could bring benefits to the way we partner. It would also help us to streamline our construction processes. We expect to be able to use the lessons learned from the CLIP process in future projects.

We had a contract to design and build a new childcare facility in Milton Keynes. As the start had been delayed, we decided to use CLIP on another contract in Swindon as a benchmark to try to improve our processes. We have designed and built several childcare facilities in the past, and had opted for timber frame structures, as these could be completed within 21 weeks.

THE PROJECT

New Childcare Facilities at Swindon and Milton Keynes

CLIENT:

NHS Trust and Tender Loving Childcare Ltd

CONTRACTOR:

Stepnell Ltd

Jim Smith of Stepnell tells how the company used CLIP to develop their internal processes and to produce a best practice document, which they now use to add more value to their clients' buildings.

BACKGROUND TO THE PROJECT

Stepnell is a regional civil engineering and building contractor, delivering buildings for a range of clients. We operate in a number of specialist markets, which are generally design and build schemes.

We are a family owned business, so we can be flexible and change our processes more easily.

■ We set ourselves a broad range of aims to achieve, which included:

- Finding out if our partnerships with subcontractors are economic
- Gaining a better understanding of how efficiently we build
- Improving our understanding of subcontractors' costs
- Making the project run more smoothly, with better co-ordination with and between subcontractors
- Improving health and safety standards

NON-CONFORMANCE REPORT		STEPNELL LTD	
Contract Name:	M.K. CRECHE	Contract No:	21246
Date of non-conformance:	22.8.02	Site Manager:	WT/1
Ref:	NCR/		
Area of Work:			
Details of the non-conformance: NO SETTING OUT DETAILS RECEIVED WITH DRAWING ISSUE. A SPECIAL COPY OF DRAWING NO 114-402-04 HAS BEEN ISSUED WITH MARKED ON DIMENSIONS.			
ACTION TAKEN TO PREVENT RECURRENCE		Signed (Site Manager):	
Action Taken: Issue drawing as Standard Issue.		Date:	

A non-conformance report was used to capture any problems which occurred on site

“Don't be afraid to look outside the industry for answers, but recognise that ideas must meet the needs of the construction industry.”

Jim Smith of Stepnell Ltd



- Developing a simple system of work on future projects
- Working together for mutual financial benefit
- Reducing build times and guaranteeing the quality of work.

How the CLIP process worked for us

Mark started by discussing the best route for the CLIP project to follow. We chose the childcare facilities as we carry out repeat work and it would be easy to measure improvements.

The CLIP team visited the Swindon facility to identify the key issues to concentrate on during the project. With help from two CLIP engineers, we identified a number of areas that had contributed towards the successful management of the Swindon project.

We looked at how well the site was organised in general. We looked more closely at issues like the way the timber frame was erected. Our site inspection revealed that the site was run efficiently, with no real sign of the seven types of waste. The documentation for the project was also good, but we decided to be very critical of ourselves to drive us forward. We quickly realised that to identify the areas that produced the most waste, we needed to look at the whole programme as well as individual activities.

When we began work at Milton Keynes, we decided to measure performance in the three key areas: quality, cost and delivery. We felt that these indicators would best measure the success of the project. We used the Plan-Do-Check-Act (PDCA) cycle to encourage continuous improvement. This involves encouraging staff and subcontractors to challenge fixed ideas, be pro-active and constantly seek to improve.

We have developed relationships with subcontractors who we have used before. Unfortunately, not all subcontractors used on the Swindon project were available. The project used a JCT 98 design and build contract, but this did not limit the CLIP process. We have a partnering arrangement with our clients that focuses on allowing us to continually improve our service.

We decided to monitor the project's process with non-conformance reports, to capture data on any problems that occurred on site. Everyone was involved and was honest about the problems on site.

During the Milton Keynes project we identified 149 non-conformances, and we are changing the way we work to address them. Many were linked to the way that information is transferred around the project. We now understand how vital it is to produce information early on in a project and to ensure that the rest of the team know what their roles are.

We recognise that we produce bespoke facilities to meet our customers' needs. In this case it was Ofsted. These include fixing signs at a lower level and using lower case lettering so the children can read them. We also colour code door handles to point out to the children which doors they can use on their own. We keep this information in-house and it is available to each new project team. This means that we do not have to keep re-inventing the wheel.

How we benefited from this initiative

When we first started designing and constructing childcare facilities, we had a lot to learn about the specific needs of our customers and end users. Through CLIP we have developed this information into semi-standard documentation that is cross-referenced. We are standardising all of our drawings, but they remain job specific.

We now understand how to make the building work better which gives the client better value. By re-visiting other facilities and partnering with the client early on, we have become even more cost-effective in the market place.

When we see prospective clients, our extra expertise allows us to negotiate the work better. We can help the whole team focus on the long-term use of the building, rather than just the initial contract. For example, we can advise clients within five minutes, the minimum size the childcare facility needs to be for the number of children and their age ranges. To be able to quote an accurate figure to within 2%, shows them we know how to design and build their building.

This filters down through the whole supply chain. On the latest project in Portsmouth, our mechanical subcontractor found that the flow rate from the plant room was unnecessarily high. The improved design saved us money.

The repeat business means we can keep improving because each time we learn more about this type of building and its use.

How we plan to use the skills and lessons learned

We are developing the lessons learned, adding them to our new best practice document. This will contain single specification sheets on recommended suppliers, previous quotations and design details. The document is made up from individual sheets. Information can be added one piece at a time and it can be plugged into other areas of our business. We are also introducing non-conformance reporting into other repeat building programmes.

Our view is that when faced with a problem, ask 'why' five times to find the cause. Don't be afraid to look outside the industry for answers, and make sure that the rest of the supply chain knows there is a benefit to using CLIP. If you can show early on that your actions are making improvements, then people will take notice and contribute to the process.

It is often easy to resolve problems. The trick is to close the loop so that it does not happen again. If we started again, we would give the non-conformance reporting more attention, because these highlighted problems are often overcome on site but never recorded.

We will continue to review the best practice document and refine it so that it includes the best information available. This way we can continue to improve on the way we partner with our subcontractors. When we started, we felt that our service was good and extended beyond just the building contract. The CLIP process has helped us find ways of improving our construction process so that we can give an even better service.

‘Make sure that you let the rest of the supply chain know that there is a benefit to using CLIP.’

Jim Smith of Stepnell Ltd

LEARNING POINTS

- We decided to monitor the project's process with non-conformance reports, to capture data on any problems that occurred on site. Everyone was involved and was honest about the problems on site.
- As many of our projects are similar, we recognised that CLIP could bring benefits to the way we partner. It would also help us to streamline our construction processes.
- It is often easy to resolve the problem, but the trick is to close the loop and make sure it does not happen again.
- We are developing the lessons learned, adding them to our new best practice document.
- The CLIP process has helped us find ways of improving our construction process so that we can give an even better service.
- If you can demonstrate early on, that your actions will result in improvements, then people will take notice and contribute to the process.
- We used the Plan-Do-Check-Act (PDCA) cycle to encourage continuous improvement. This involves encouraging staff to challenge fixed ideas, be pro-active and constantly seek to improve the process.

JARGON BUSTING BOX

7Ws – LOOK FOR SEVEN WASTES THAT CAN NEVER BE ADDED VALUE:

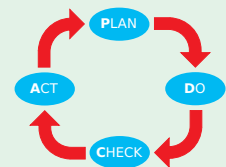
- Motion
- Transport
- Waiting
- Overproduction
- Defects
- Unnecessary inventory
- Inappropriate work or processing.

5Cs – CHECK THESE TO LAY THE FOUNDATIONS FOR CONTINUOUS IMPROVEMENT:

- **Clear out** – separate the essential from the non-essential
- **Configure** – a place for everything, and everything in its place
- **Clean & check** – assess the current condition of the environment
- **Conformity** – ensure standard easily maintained
- **Custom & Practice** – ensure everyone follows the rules.

THE PLAN-DO-CHECK-ACT

(PDCA) CYCLE – a way of thinking which encourages continuous improvement



THE CLIP

'STANDARD STRUCTURED APPROACH' – which is made up of four main stages:

- **Pre-diagnostic** – setting the aims and training the team in lean tools & techniques
- **Diagnostic** – practically applying the tools to analyse the situation
- **Improvement activity** – looking at the data for opportunities to improve processes
- **Follow up** – identify barriers to success and set improvement actions in place.

VISUAL CONTROL –

a major part of the CLIP process is to use visual tools to display data, highlight improvements and record ideas. These include:

- **Key Performance Indicators** – are the measure of performance of activities that are critical to the success of an organisation
- **Pareto Chart** – a comparative bar chart that shows the number of defects for each chosen area of work, and the cumulative total of defects over the whole project
- **Fishbone Diagrams** – are used to identify the possible causes of problems. Start by defining the problem to be investigated and right it down. Then draw lines (bones) to represent each cause that runs into it. Finally you can brainstorm what is actually the cause of the problem
- **Priority Matrix** – a quadrant chart used to prioritise which improvement areas to focus on first. For example, you can place activities that will have a high impact at a low cost in that quadrant and focus on these first.



SEVEN CASE STUDIES

Profit from process improvement



Construction Lean Improvement Programme

P O Box 147 • Bucknalls Lane • Garston • Watford • WD25 9UZ
01923 664638

www.constructingexcellence.org.uk/service/clip



RRP £10

