Vative
truly innovative

CASE STUDY – Abigroup

LEAN CONSTRUCTION BOOSTS EFFICIENCY AT R&D FACILITY

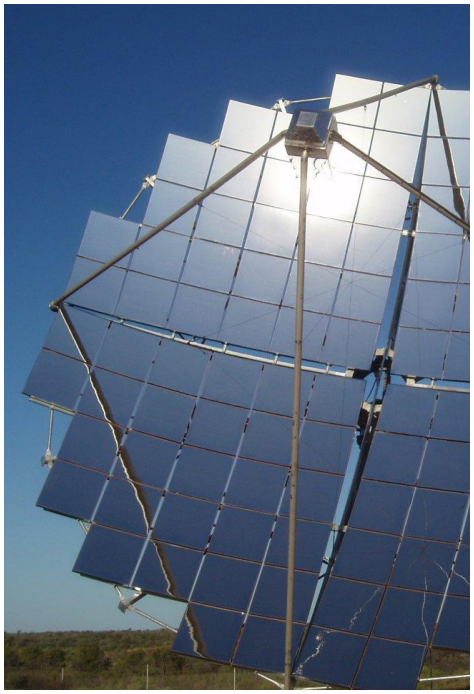
Abigroup
Constructing Australia's Future

36% CUMULATIVE IMPROVEMENT ACHIEVED THROUGH LEAN CONSTRUCTION METHODOLOGY

The Sunraysia Solar Alliance's R&D facility provided an ideal candidate for the application of Lean construction techniques delivered by Vative and the project management team. Over four days, a single dish was assembled and disassembled several times as a time lapse camera recorded the time taken for each construction activity.

Armed with the recorded data, the team was able to analyse Abigroup's current construction methods and benchmark them against accepted Lean techniques. Recommendations were then made to change specific processes to reduce waste in the construction process, including piling, mechanical, electrical and commissioning works.

The 40 dishes were constructed in four 'arrays' of 10 dishes each. With the first array taken as the baseline, significant productivity gains in labour hours were achieved for the following three arrays:



- Array 2: 10% improvement on Array 1
- Array 3: 9% improvement on Array 2
- Array 4: 17% improvement on Array 3

Process improvements included:

- Stacking and staging all material in and around a dedicated assembly/work area.
- Presenting all material/ components on purpose built A-frames in sequence of assembly.
- Barricaded zones for access/ plant equipment, such as cranes and forks.
- Assigning each staff member specific assembly tasks and standardising all assembly

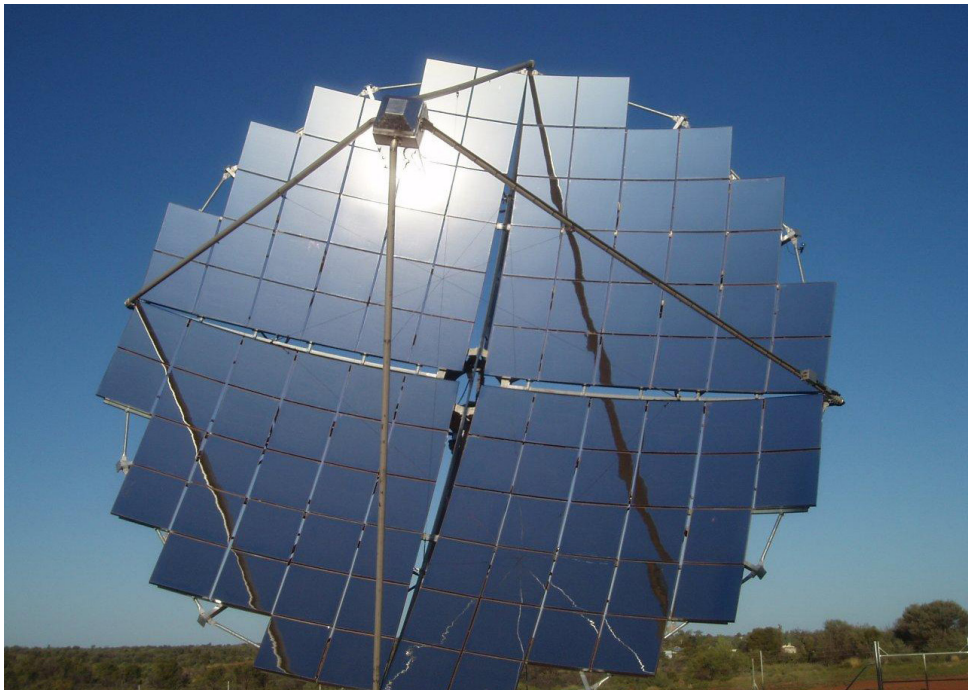
OVERVIEW

INDUSTRY
Construction

CLIENT PROFILE
The Sunraysia Solar Alliance is a partnership between Melbourne company Solar Systems (later bought out by Silex Systems) and tier 1 engineering and construction company Abigroup. A member of the Lend Lease group, Abigroup provided more venues for the 2000 Sydney Olympics than any other contractor. In 2003, in a joint venture, the company was awarded the then-largest single infrastructure contract in Australian history: the $1.5 billion Western Sydney Orbital (now the Westlink M7 Motorway).

BUSINESS SITUATION
The alliance was responsible for the design, construction and commissioning of a 2MW solar plant in Mildura, Victoria. Comprising a 40 dish-system that used concentrating photovoltaic (CPV) technology, it was the largest of its kind in Australia. The project management team knew that only genuine innovation could deliver such a complex, multidiscipline project and contracted Vative to provide Lean construction advice and technical support.

SOLUTION
Because the project involved 40 mirror-covered dishes, the assembly process was highly repetitive. So the team explored ways to reduce waste both in time and in resource utilisation, particularly by zeroing in on anticipated productivity and efficiency gains. Current construction practices at the client's R&D facility were observed and filmed over a 4-day period, during which time a single dish was assembled and disassembled several times. Recommendations were then made to change specific processes to reduce waste in the construction process.



activities.
- Reducing time spent moving between tasks and increasing repeatability.
- Improving quality and accelerated learning.
- Identifying processes that could be run in parallel instead of sequentially, drastically reducing construction time.

As the project progressed, further opportunities for improvement were identified.

"While standardisation was introduced into the materials handling process, further gains could be made by appointing a dedicated material coordinator with targets for cost, quality and delivery," says George Dimitropoulos of Vative.

"Issues were also identified around the dish building foundation and manual tilting of the dish. We recommended introducing a re-usable and portable quick set-up foundation on which to build the dish, and a hydraulic ram to tilt the dish with minimal manual intervention. The hydraulic lifter was positioned so that the dish tilted towards the material store location to reduce motion waste."

Time lapse video shot on site revealed that product packs were delivered with masts underneath trusses, even though the masts were the first items to be removed. Double handling and storage difficulties could be overcome through separating the supply of masts and trusses.

When QA and time study data was examined, a number of issues emerged regarding the thousands of mirrors which covered the solar dishes. A failure rate of nearly 7 per cent was identified, with quality issues including cracking, impact damage and rivets. Mirrors were also over supplied, prompting changes to delivery schedules to match the build process with a manageable buffer quantity.

Mirror alignment time could also be reduced through a second mirror alignment unit to manage capacity and provide backup, while a redesign of the mirror fixing with a snap-on configuration could reduce assembly time in fixing the mirror to the dish frame.

New materials for the dish frame with reduced mass (from 4T to 2.5T) were introduced for Arrays 3 and 4. This reduced fatigue on members and also cut the number of members required to lift frames.
As the 2MW stage 1 was intended to be the catalyst for a massive 100MW stage 2 plant, Vative recommended a process to capture and implement process improvements into site standards, manuals and instructions. However in August 2014, Silex Systems announced it was suspending stage 2 due to factors including low wholesale electricity prices and uncertainty surrounding Renewable Energy Targets.

VATIVE

Vative achieves significant business improvement for clients through solutions which are simple, realistic and highly effective. Providing consultancy and training services, Vative's 45-strong team includes Lean and Six Sigma excellence coaches with extensive business management, academic, engineering and trade backgrounds.

Mark Bartoli
Alliance Manager
Abigroup Contractors

"The project was able to achieve an increased labour utilisation from 50% to around 80%, giving the double benefit of lower costs and a faster program that resulted in significant gainshare for the alliance. Put simply, Vative was able to provide the necessary tools and innovation that enabled greater efficiency and perhaps more importantly, superior quality and safety outcomes for all project stakeholders."

Vative is a **ShareTree** company.
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