Improving Construction Productivity: Time & Motion

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Introduction

• It is said that oil sands projects are not executed that efficiently:

“…the performance and improvement in construction productivity has been declining over the past 20 years\(^1\). The decline in Alberta is consistent with the decline of productivity in North America over the past three decades\(^2,3\).”

3.- Jergeas, G & Alberta Economic Development (2009).” Improving Construction Productivity on Alberta Oil & Gas Projects
Introduction

• Effective work time, or ‘Tool-time’ is lower than that of commercial construction projects:

![Pie chart of working/tool time](image1)

![Pie chart of oil sands](image2)

• Random improvements based on experience are not enough...

1.- University of Calgary(2008)
2.- Construction Owners Association of Alberta (COAA) – Source unknown
Improve productivity, an industry challenge

Laricina is advancing *innovation project execution* strategies

- Labour is a key component
- Any efficiency obtained means significant cost savings
- Estimates up to 9% reduction in TIC/CAPEX\(^1\)

*Images from Laricina Energy Ltd website, [www.laricinaenergy.com](http://www.laricinaenergy.com)*

Improve productivity, an industry challenge

- Objectives:
  - Measure and verify current productivity
  - Improve productivity levels
Improve productivity, an industry challenge

• Challenges remain in identifying specific issues affecting productivity at all levels

Technical Management Human/Labour

External factors Market Conditions
How can we improve productivity?

**Time & Motion:**

A Time & Motion (T&M) study is a business efficiency technique that observes the time and methods (motions) to perform any type of work\(^1\).

**STEP 1:** Monitor construction activities and site operations

**STEP 2:** Identify inefficiencies and opportunities

**STEP 3:** Implement changes

**STEP 4:** Quantify the impact

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1.- Archives from Frederick W. Taylor and Frank and Lilian Gilbreth.
Time & Motion study

- Modern model for T&M: Remotely controlled video cameras, accessed exclusively by third party researcher

- Privacy protection is a must

- Laricina has partnered with the University of Calgary’s Centre for Project Management Excellence:
  - Canada Research Chair Dr. Janaka Ruwanpura and researchers (Chandana Siriwardana)
  - Construction Visualization and Monitoring Centre (CMVC)
What is Tool Time?
- The amount of time that workers spend in producing tangible outputs

Non-Tool Time
- Supporting Time: discussions, toolbox meetings, safety etc.
- Ineffective Time: idle time, extra-socializing, searching for tools and materials
Opportunities (something big)

• Example 1: Applying just one process change…

Productivity Increase of 17% means significant savings

* University of Calgary (2004-2008). Results observed in Commercial construction Projects
Opportunities (something big)

• Example 2: Applying a set of new processes

Productivity Increase of 20% means even greater potential savings

* University of Calgary (2004-2008). Results observed in Commercial construction Projects
Sneak Peek: Actual Data Analysis
Data and analysis (different days)

Observations

- High idling time
- Socializing and walking times are comparatively similar
- Average tool time of the 3rd day morning session and 4th day afternoon session taken for the calculation
Data and analysis (during the day)

* Session are different times during the day
Tool time variation (during the day)
Benefits

• **Learning and Teamwork:** Participants (Laricina, contractors and workers) can learn more about the project execution and how they function as a team.

• **Real-time improvements:** Tool for site management to improve in real-time and capture lessons learned.

• Contractors improve and are recognized for achievements (and become industry leaders).

• **Cost-Schedule-Quality:** T&M partners realize immediate improvements.
Next Steps

• **Laricina continues to pioneer with UofC:**
  – Early stage; collecting and validating the data. This is the first time using this model in the industry
  – This innovation is setting a precedent for industry Tool time,
  – Ability to implement change is the next challenge.

• **Change practices in field:**
  – We are going to improve our practices, continue to observe and quantify these gains.
Questions?