What to know about loss of labor productivity

Felipe Gutierrez – June 09, 2022

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Abstract

- **Loss of labor productivity is one of the common** negative impacts a contractor may experience in a construction project, no matter how complex or large the project is.

- However, it is frequently observed that contractors, of different sizes and experience, **struggle in quantifying** these losses and proving that these damages should be compensated by the owner.

- In this webinar we will explain the **different mechanisms** available for that purpose, as well as explain in more detail the most commonly accepted method, the "measured mile".

- We will provide **examples of real-life mistakes** that contractors incur in quantifying those losses, which must be avoided, to increase the chances of success in claiming compensation for such losses.

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General Introduction and Definitions

- **Productivity** is a measurement of rate of output per unit of time or effort usually measured in labor hours. E.g., cubic meters of concrete placed, linear meters of conduit installed, etc. per crew hour or other time measure.

- **Productivity loss** is experienced when a contractor is not accomplishing its anticipated achievable or planned rate of production (contractor produces less than planned output per work hour of input). The result is a loss of money for a contractor.

- A **challenging** aspect of construction **cost control is measuring and tracking work hours and production in sufficient detail** to allow analysis of the data in order to determine the root cause(s) of poor labor productivity.

Common causes of lost labor productivity

AACE International Recommended Practice No. 25R-03

ESTIMATING LOST LABOR PRODUCTIVITY IN CONSTRUCTION CLAIMS

TCM Framework: 6.4 – Forensic Performance Assessment

- Absenteeism and the missing man syndrome
- Acceleration (directed or constructive)
- Adverse or unusually severe weather
- Availability of skilled labor
- Changes, ripple impact, cumulative impact of multiple changes and rework
- Competition for Craft Labor
- Craft turnover
- Crowding of labor or stacking of trades
- Defective engineering, engineering recycle and/or rework
- Dilution of supervision
- Excessive overtime
- Failure to coordinate trade contractors, subcontractors and/or vendors
- Fatigue
- Labor relations and labor management factors
- Learning Curve
- Material, tools and equipment shortages
- Overmanning
- Poor morale of craft labor
- Project management factors
- Out of sequence work
- Rework and errors
- Schedule Compression Impacts on Productivity
- Site or work area access restrictions
- Site conditions
- Untimely approvals or responses

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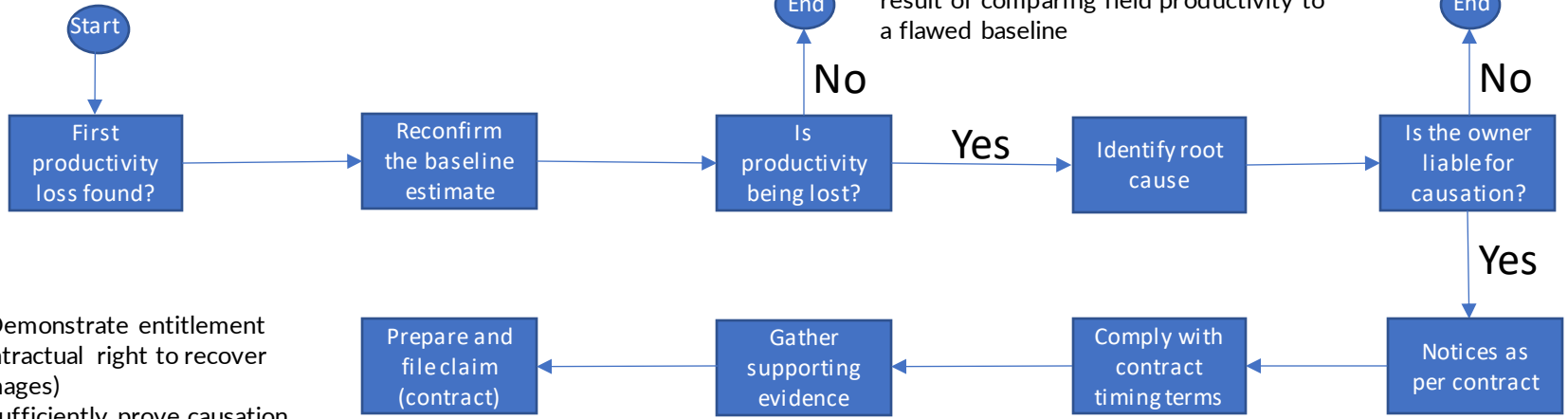
Recommended Step by Step



Productivity loss detected is simply the result of comparing field productivity to a flawed baseline

1) Demonstrate entitlement (contractual right to recover damages)
2) Sufficiently prove causation (nexus between entitlement and damages)
3) The resulting damages (cost) are an outgrowth of the change in Output/Input.

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Attention Points!

- Optimal productivity is rarely if ever at the maximum production rate.
- Lost productivity claims must compare planned and documented productivity rates with actual productivity rates.
- Non-optimal productivity is inefficient and costly **but** if driven by factors known at bidding does not give rise to compensation.

Sufficiently Demonstrate

- Compliance with the notice requirements (contract).
- Events occurred during the performance of the work (unforeseeable at time and not under an approved CO).
- Events beyond the control of the contractor.
- Events caused by the owner or risk owned by the owner.
- Recoverability for the damages is not contractually barred.
- Events caused a change in the performance of the work and increased costs and/or time required to perform the work.

AACE International Recommended Practice No. 25R-03

ESTIMATING LOST LABOR PRODUCTIVITY IN CONSTRUCTION CLAIMS

TCM Framework: 6.4 – Forensic Performance Assessment

Methods of Estimating Lost Productivity

Project Specific Studies
- Measured Mile Study
- Earned Value Analysis
- Work Sampling Method
- Craftsmen Questionnaire Sampling Method

Project Comparison Studies
- Comparable Work Study
- Comparable Project Study

Specialty Industry Studies
- Acceleration
- Changes, Cumulative Impact and Rework
- Learning Curve
- Overtime and Shift Work
- Project Characteristics
- Project Management
- Weather

General Industry Studies
- U.S. Army Corps of Engineers Modification Impact Evaluation Guide
- Mechanical Contractor's Association of America
- National Electrical Contractor's Association
- Estimating Guides

Cost Basis
- Total Unit Cost Method
- Modified Total Labor Cost Method
- Total Labor Cost Method

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Productivity Impact on Schedule
- Schedule Impact Analysis

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Note of caution:

- In most cases the loss of productivity is due to multiple causes.
- The root cause of the lost productivity must be determined from project records and/or project personnel **before** estimating the impact.

- Multiple causes may require the claim preparer to perform multiple estimating analyses and then rationalize the results.

Common Mistakes

- Calculating the % change on a cost rather than a labor hour basis;
- Applying calculated lost productivity factors to as-bid labor hours rather than actual labor hours;
- Applying calculated factors to all hours on the project rather than the hours during a certain impacted period;
- Failing to account for typical learning curve productivity factors;
- Failing to deduct the additional labor hours already paid for in change orders, before applying the productivity loss factor(s) estimated;
- Failing to deducting other factors, which impacted productivity, but which are not recoverable under the terms of the contract.

Measured Mile Definition

AACE International Recommended Practice No. 25R-03

ESTIMATING LOST LABOR PRODUCTIVITY IN CONSTRUCTION CLAIMS

TCM Framework: 6.4 – Forensic Performance Assessment

"The most widely accepted method of calculating lost labor productivity is known throughout the industry as the "Measured Mile" calculation. This calculation compares identical activities in impacted and non-impacted sections of the project in order to ascertain the loss of productivity resulting from the impact of a known set of events. The Measured Mile calculation is favored because it considers only the actual effect of the alleged impact and thereby eliminates disputes over the validity of cost estimates, or factors that may have impacted productivity due to no fault of the owner."

Schwartzkopf, Calculating Lost Labor Productivity in Construction, ibid, §2.09[A] and §10.4.

Measured Mile (cont.)

Requirements

- Non-impacted (or least impacted) period with measured performance exclusively resulting from the contractor's work (baseline level of productivity);
- MM must be significant (ref impacted and total). "*It would not be reasonable to extrapolate 2% of progress to 80% of the cost*"[1];
- Contemporaneous information is assumed to be correct.

[1] Zink, D. A. (1986). "The measured mile: Proving construction inefficiency costs." Cost Eng., 28(4), 19-21

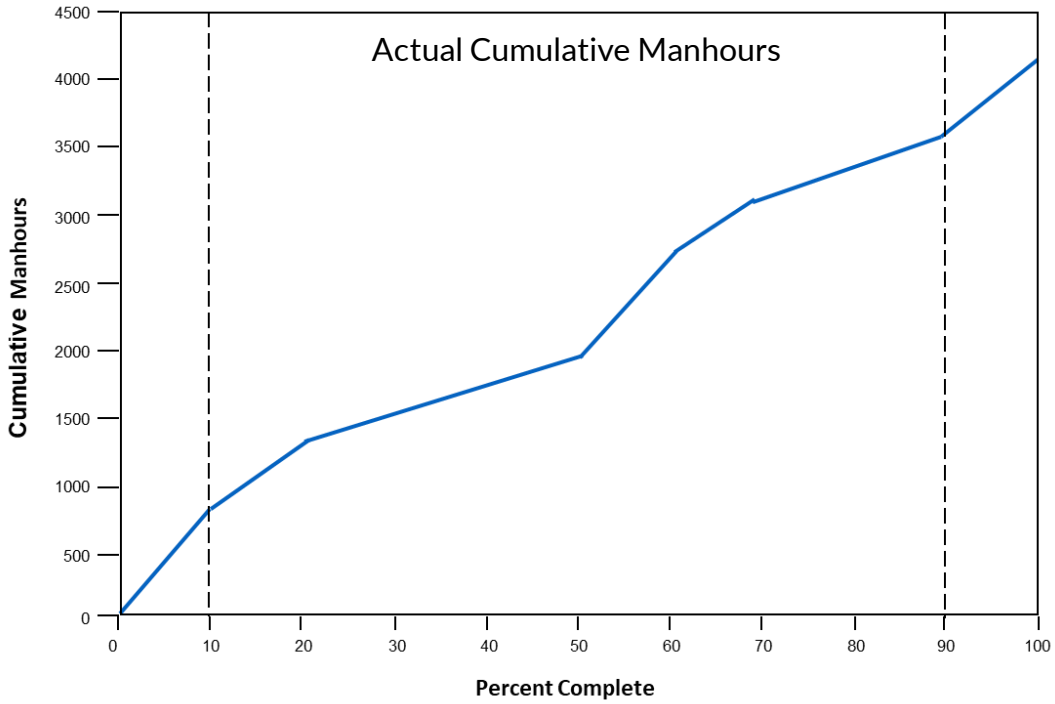
Measured Mile (cont.)

Requirements (cont.)

- Sufficient contemporaneous information (periodic reports of physical units executed, e.g. cumulative progress of HH).
- Identified impacts must be from a single party.
- Variables affecting productivity but unrelated to the claimed impacts, must be removed from the impacted period calculation (if occurred during the least or unimpacted period). E.g. weather, mismanagement, subcontractor issues, voluntary acceleration.

Measured Mile: Graphical representation

Example



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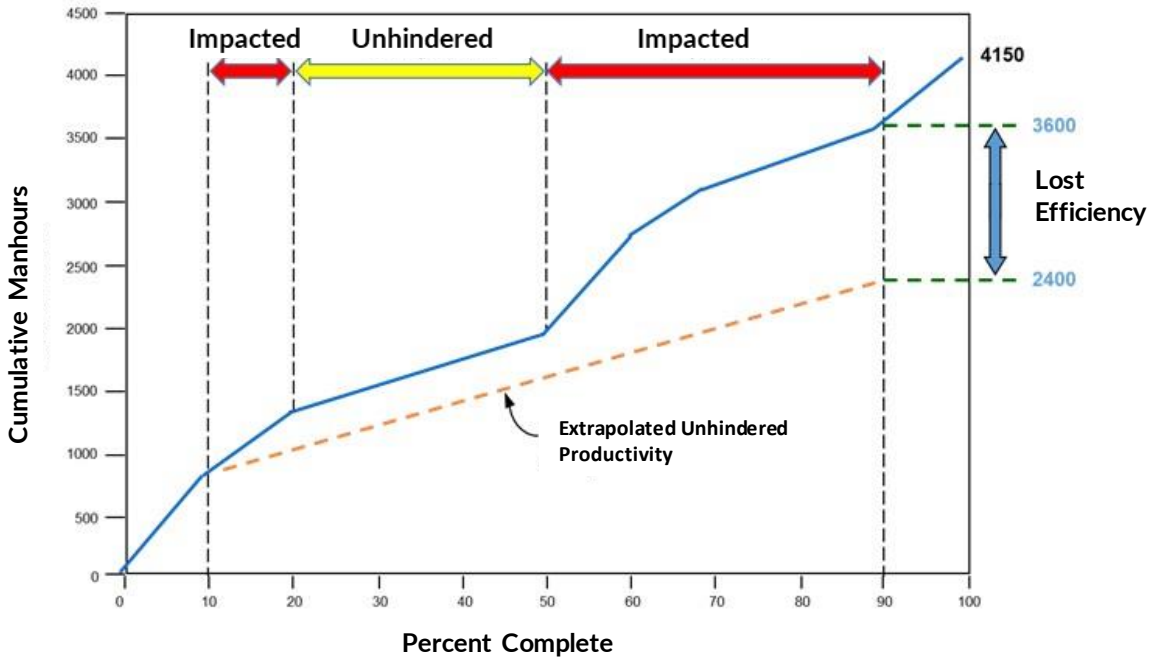
Measured Mile: Graphical representation



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Measured Mile (cont.)

Challenges

- The analysis is somewhat subjective/ visual;
- Ignores natural variations in productivity across jobs;
- Ignores effects of better efficiency per experience;
- Ignore lost productivity over time; and
- It is difficult to clearly prove the relationship between cause and effect.

Measured Mile: Case Study

Contractor filed claims for additional costs (direct and indirect) resulting from interference by the owner. It became a dispute resolved in arbitration.

Measured Mile: Case Study (cont.)

- Claim included the request for the reimbursement of:
  - ✓ Indirect costs for prolongation/EOT caused by the owner; and
  - ✓ **Lost labor productivity** due to increased use of labor to recover time (without acceleration).

- The main method utilized by the contractor to “justify” direct cost losses was the “Measured Mile”.

Measured Mile: Case Study (cont.)

	Unhindered Period		
	Period Start	Period End	Full Period
	12/05/12	30/08/12	111 d
Progress %	20,27%	32,36%	12,09%
Manhours ($)	394.903,79	829.203,39	434.299,60

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It concluded that for progressing 85.61% (progress status at contract termination) of the project, had it not been impacted, would have spent $ 3,075,968.

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Measured Mile: Case Study (cont.)

- Compared the “should have spent” with what the contractor’s accounting system => $4,204,757

Manhours ($) As per ERP
4.204.757,00

- Started claiming the difference: $ 1,128,788

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Measured Mile: Case Study (cont.)

Our Analysis

- Using information and results from the contractor and its own Experts, we recalculated their study considering:

  - ✓ Poor management of the work, lack of supplies, rework, voluntary acceleration, disagreements, etc.
  - ✓ Real manpower spent after work site abandonment;
  - ✓ Factors for which the owner was not liable under the contract terms: rain, strike, overtime and others.

Measured Mile: Case Study (cont.)

Our Analysis (cont.)

- Using information from the contractor's Expert report:

Category	mar/14
Manhours Month Total	203.429,23
Direct	147.385,13
Indirect	51.225,88
Equipment	4.818,22
Manhours Total	5.754.624,04
Direct	4.127.968,01
Indirect	1.420.179,18
Equipment	206.476,85

(-) →

Manhours ($) As per ERP
4.204.757,00

=> Difference #1
$ 76,789

Recorte do "2.a - Histograma de MO resumo.pdf"

- The contractor's Expert considered the hours worked until the termination of the contract as unproductive hours;
- The starting point was, then, $4,127,968 (and not $4.204.757).

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Measured Mile: Case Study (cont.)

Our Analysis (cont.)

- $ 76,976: Manhours quantified based on recorded absences and delays (as per contractor's job site reports and ERP)

- $ 462,547: Incurred manhours that had to be discounted since the owner had agreed to them, approved corresponding COs, and paid for them;

Measured Mile: Case Study (cont.)

Manhours ($) from COs extracted from calculation			
Change Order	Manhours (A)	Progress % (A)	Manhours Earned (AxB)
CO 3	14.565,00	100,00%	14.565,00
CO 4	31.415,02	98,34	30.893,53
CO 6	105.840,00	100,00%	105.840,00
CO 7	13.372	100,00%	13.372,00
CO 10	161.225,92	93,93%	151.439,51
CO 11	169.680,69	84,91%	144.075,87
CO 12	2.461,30	95,95%	2.361,62
Total	**498.559,68**		**462.547,53**

Measured Mile: Case Study (cont.)

Our Analysis (cont.)

- Other manhours' discounts had to be factored in since contractor was contractually liable for:
    - $ 202,000 (rework)
    - $ 145,000 (stoppages due to rain)
    - $ 226,000 (strikes)

      $ 573,000

Measured Mile: Case Study (cont.)

Results

- The adjusted incurred manhours resulted in $ 3,015,842, while its initial calculation was of $ 3,075,968.
- We concluded that, if there were interferences from the owner, these resulted in an improvement in productivity.

Manhours ($)	Incurred	Adjusted
HH incurred	4.127.968,01	
Absences and delays	-76.976,00	
HH COs	-462.547,53	
Other factors	-572.602,58	
Total	**3.015.841,90**	

Versus

Manhours for 85.61% progress if unhindered
3.075.968,24

Contractor

Quantification

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THANK YOU

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