John Koontz

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- **MCAA IPM/AIPM Director** – 21 years

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- **Mechanical Industry Consultant** – 25 yrs +

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Goals for This Session

- My focus today will be a brief 60-minute session to help you understand:

  - What's in the manual
  - Why it's in the manual
  - How the manual has changed since the last edition
  - How to use what's in the manual

- To inspire and motivate you to acquire and read the OT-PROD-OT Manual and learn more about how to estimate the impacts of overtime on project labor productivity

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LEGAL DISCLAIMER

► *The information discussed in this webinar is not intended to constitute legal advice. Instead, all information, content, and materials discussed are for general informational purposes only. Please contact your attorney to obtain specific legal advice.*

We are going to be reviewing pages 215 to 231 today

WHAT CHANGED?

2020 Edition vs. 2018 Edition

NEW TABLES AND CURVES

▶ Removal of the U.S. Army Corps of Engineers' (USACE) publication EP 415-1-3 data from the tables and curves contained in the previous edition of the manual

▶ New tables and curves in the manual are now based solely on **three** published studies:

  ▶ Thomas Empirical Study

  ▶ Business Round Table (BRT) Study

  ▶ NECA Study

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Why was it removed?

"In an abundance of caution...."

Recommendation

► Words of advice from the co-authors of the chapter, Dr. Mike Pappas, P.E., and Mr. Paul Stynchcomb, CCM, PSP, CFCC:

► When presenting an overtime loss of productivity claim using the industry studies:

► ACQUIRE, READ, AND UNDERSTAND THE COMPLETE SUPPORTING PUBLICATIONS BY THOMAS, BRT, AND NECA

► PROVIDE THE OTHER PARTY OR THE TRIER WITH THE COMPLETE SUPPORTING PUBLICATIONS BY THOMAS, BRT, AND NECA

DIFFERENT TYPES OF OVERTIME

TYPES OF OVERTIME AND THEIR IMPACT ON LABOR PRODUCTIVITY

▶ There are three types of overtime in the construction industry

1. **Shutdown or Turnaround Projects**
   ▶ Impact costs are in typically in the estimate

2. **Spot Overtime**
   ▶ Impact costs are often negligible

3. **Extended Overtime**
   ▶ Impact costs can be significant

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What are the costs of EXTENDED overtime?

THE REAL COSTS OF EXTENDED OVERTIME

▶ The cost impact (indirect) of unplanned extended overtime work can be significant and can often exceed the additional payroll costs (direct) associated with overtime work

▶ A mechanical contractor confronting significant periods of unplanned extended overtime work must consider and evaluate the impact to labor productivity

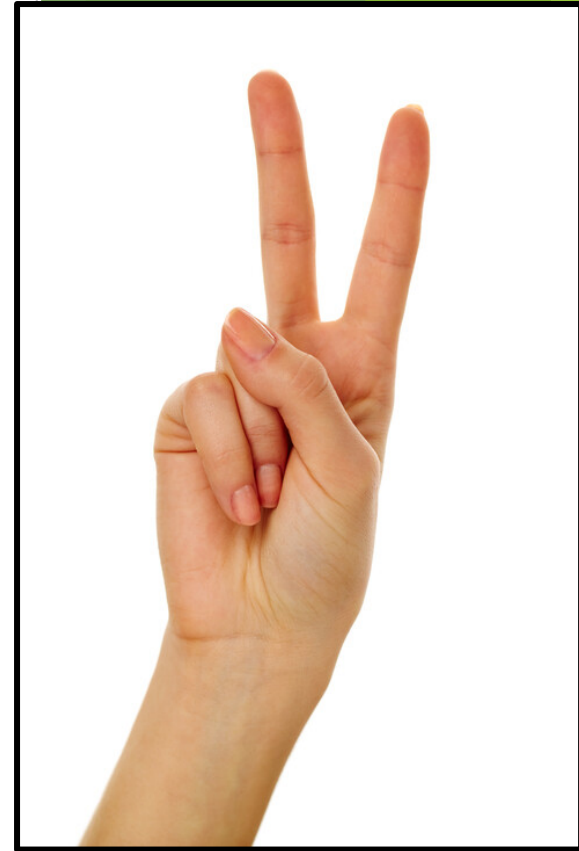# **Overtime Costs – Two types**

▶ **Direct Costs** of Overtime

 ▶ Premium wages, fringes, etc.

 ▶ Relatively easy to compute

▶ **Indirect Costs** of Overtime

 ▶ Impact to productivity/inefficiencies

 ▶ Much more difficult to quantify

THE "CLASSIC" PROJECT MANAGEMENT "ERROR" IN CALCULATING THE COST OF EXTENDED PERIODS OF OVERTIME:

Only requesting reimbursement of the *additional payroll costs (direct costs)* for the overtime hours you've expended….not requesting reimbursement of the impact costs.

Aka: Just asking for the difference between the "premium time" payroll costs and the "straight time" payroll costs not asking for the costs of the additional hours required to do the work

Should we be paid for the indirect cost?

- **Self Inflicted:**
  - *NO*
- **Caused or Directed By Others:**
  - *YES, but……What about entitlement, proper notice, RTFC?*
  - Overtime inefficiency is the most generally accepted category of labor inefficiency in the construction industry
- Even so, the mechanical contractor is regularly denied the indirect costs of overtime – usually by prime contractors, CM's or owners without sound reason and no logical argument

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Can we use the "MCAA Overtime Study" to calculate the impact of extended periods of overtime on project labor productivity?
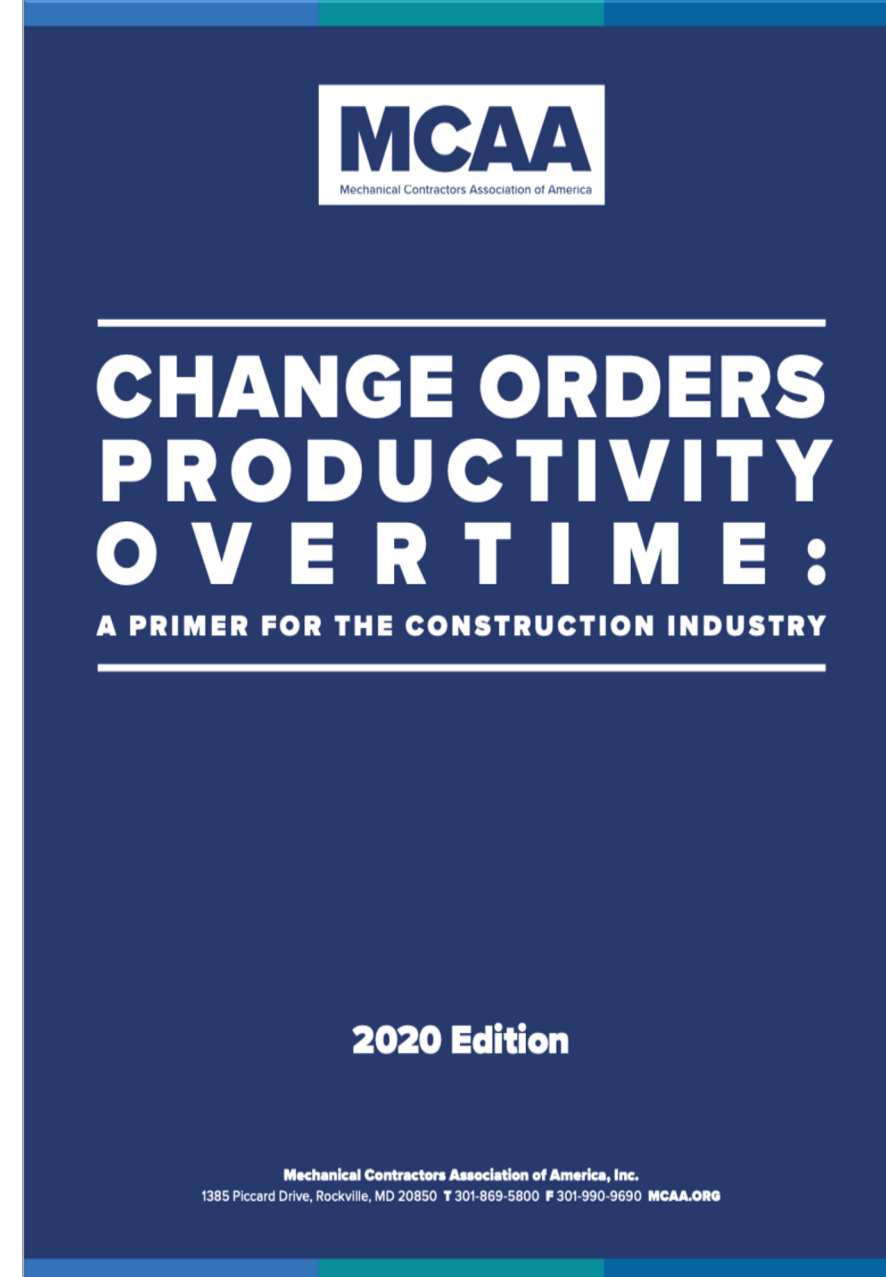
Nope…..Say what?

FACT:
THERE IS NO EMPIRICAL MCAA OVERTIME STUDY

OK…. Then what DO WE USE to calculate the impacts of extended periods of overtime on project labor productivity?

MCAA Management Methods Bulletin OT1-2020 which can found on Pages 217 to 231 of the 2020 Edition of the MCAA's Change Orders-Productivity-Overtime Manual

MCAA
Mechanical Contractors Association of America

CHANGE ORDERS
PRODUCTIVITY
OVERTIME:
A PRIMER FOR THE CONSTRUCTION INDUSTRY

2020 Edition

Mechanical Contractors Association of America, Inc.
1385 Piccard Drive, Rockville, MD 20850 T 301-869-5800 F 301-990-9690 MCAA.ORG

Work Schedule and Reset

▶ When calculating the inefficiencies of overtime it is important to know the work schedule of the crews working overtime

▶ Why?

▶ Crews working overtime progressively lose productivity over time, but when overtime ceases and a regular 40-hour per week work schedule resumes, the crew's efficiency must be RESET before resuming overtime.

Three Existing Studies

▶ As mentioned earlier, this chapter is based upon the 3 most widely recognized and accepted overtime inefficiency studies in the construction industry

1. November 1980 Business Roundtable publication titled *"Scheduled Overtime Effect on Construction Projects"*

2. The 2011 study published by NECA titled *"Impact of Overtime on Electrical labor Productivity: A Measured Mile Approach"*

3. The 1997 peer reviewed empirical data study published by Dr. H. Randolph Thomas titled "Schedule Overtime and Labor Productivity Quantitative Analysis", in the June 1997 *Journal of Engineering and Construction Management*

Three Existing Studies

- The baseline data in these studies has <u>never</u> been proven to be inaccurate

- These studies provide a reliable and accepted source from which to prepare a reasonable estimate of efficiency damages arising from unplanned extended overtime

- They are <u>not</u> precise or exact…..nor do they need to be

- They show striking similarities in their results

FACTS

MEASURED MILE ANALYSIS(MMA) OF LABOR PRODUCTIVITY

► If a measured mile labor productivity study can be performed, and is utilized, there is no need for a separate inefficiency for overtime loss of productivity using these studies

► The *MMA* is the preferred method of impact measurement and analysis because IT USES ACTUAL PROJECT RECORDS to compare impacted against unimpacted jobsite production

Presentation of Data in the Charts and Curves

- The loss of productivity is presented in terms of a Productivity Index or PI

  - PI = $\dfrac{\text{Planned Activity}}{\text{Actual Activity}}$

- The PI for a normal 40-hour week is assumed to be 1.0, meaning actual productivity was equal to planned productivity

- Above 1.0 is better productivity than planned

- Below 1.0 is worse productivity than planned

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Reviewing the Data and the Graphs
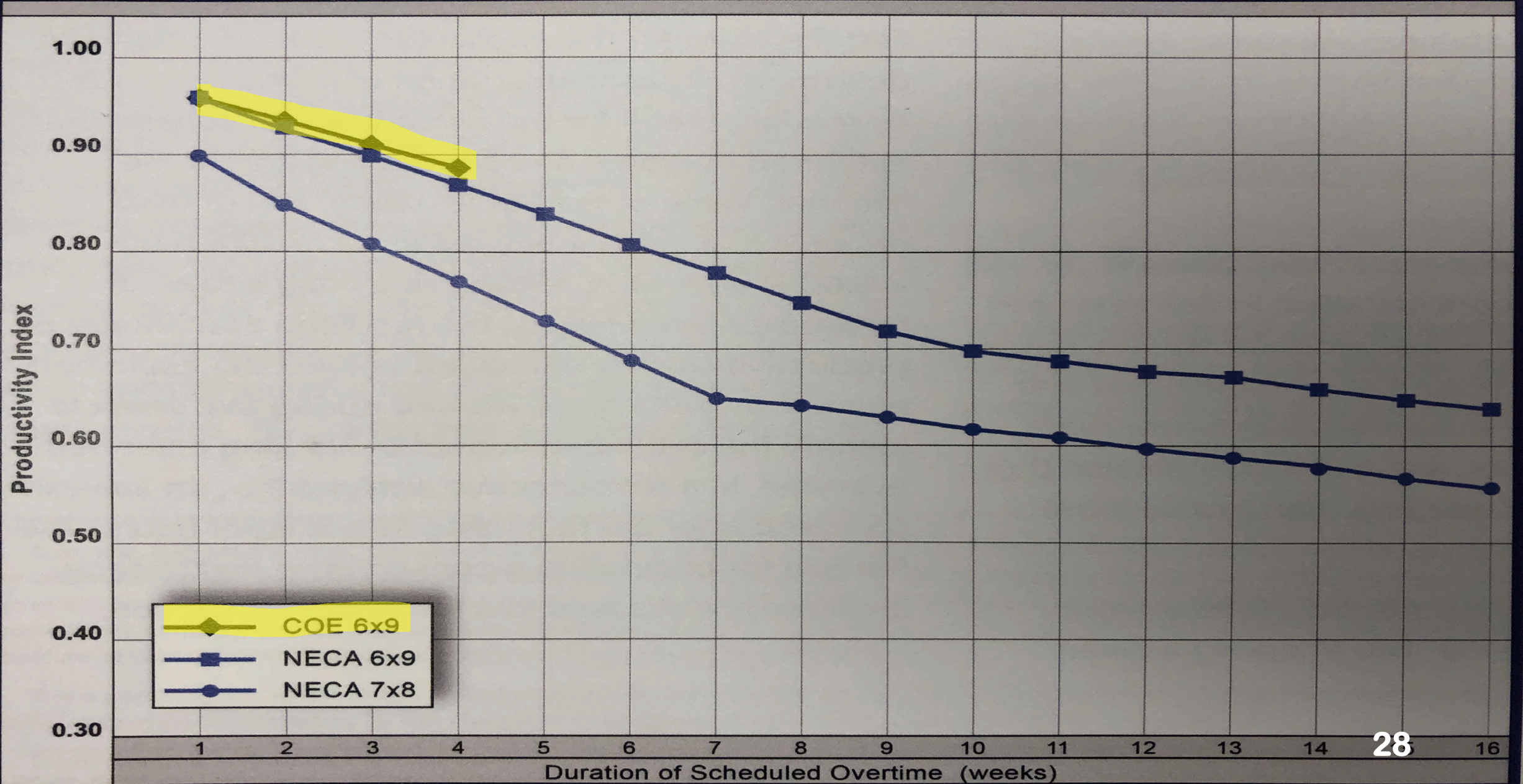
▶ The data points from each study for each work schedule has been interpolated as applicable and then overlaid on common graphs

▶ Upon review of the curves for all 3 studies, you will find that they generally show the same order of magnitude
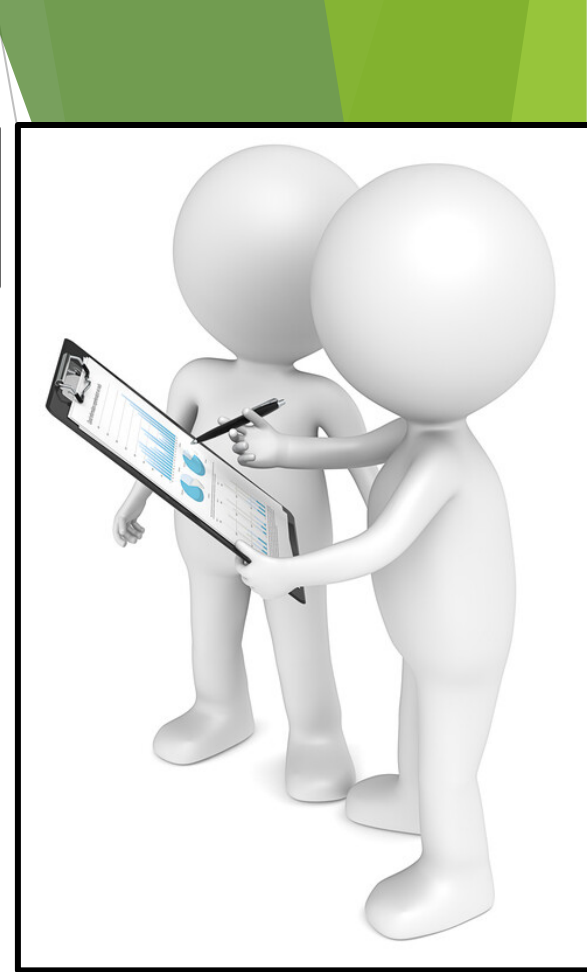
Overtime Productivity Loss - 50 hours/week
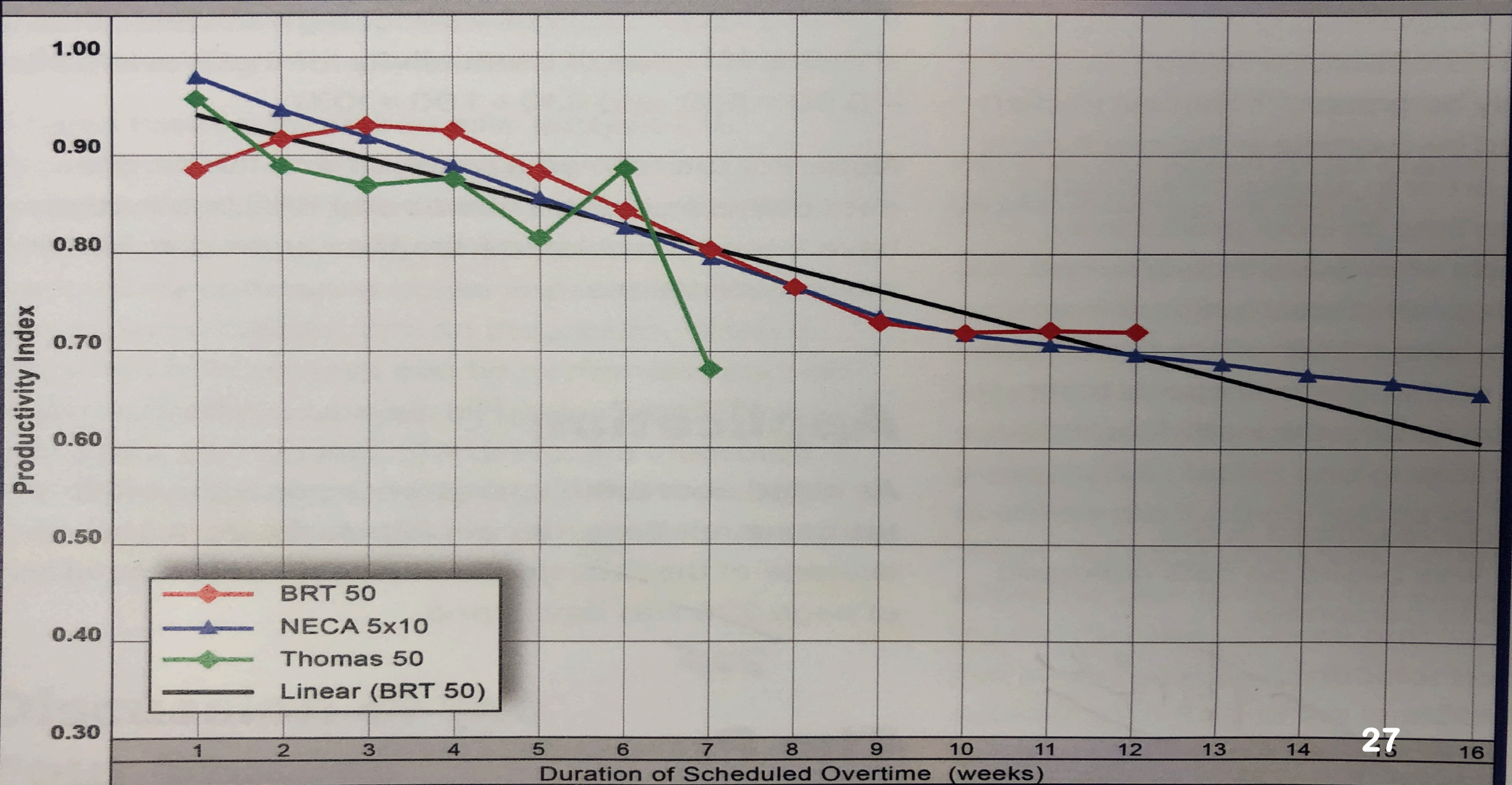
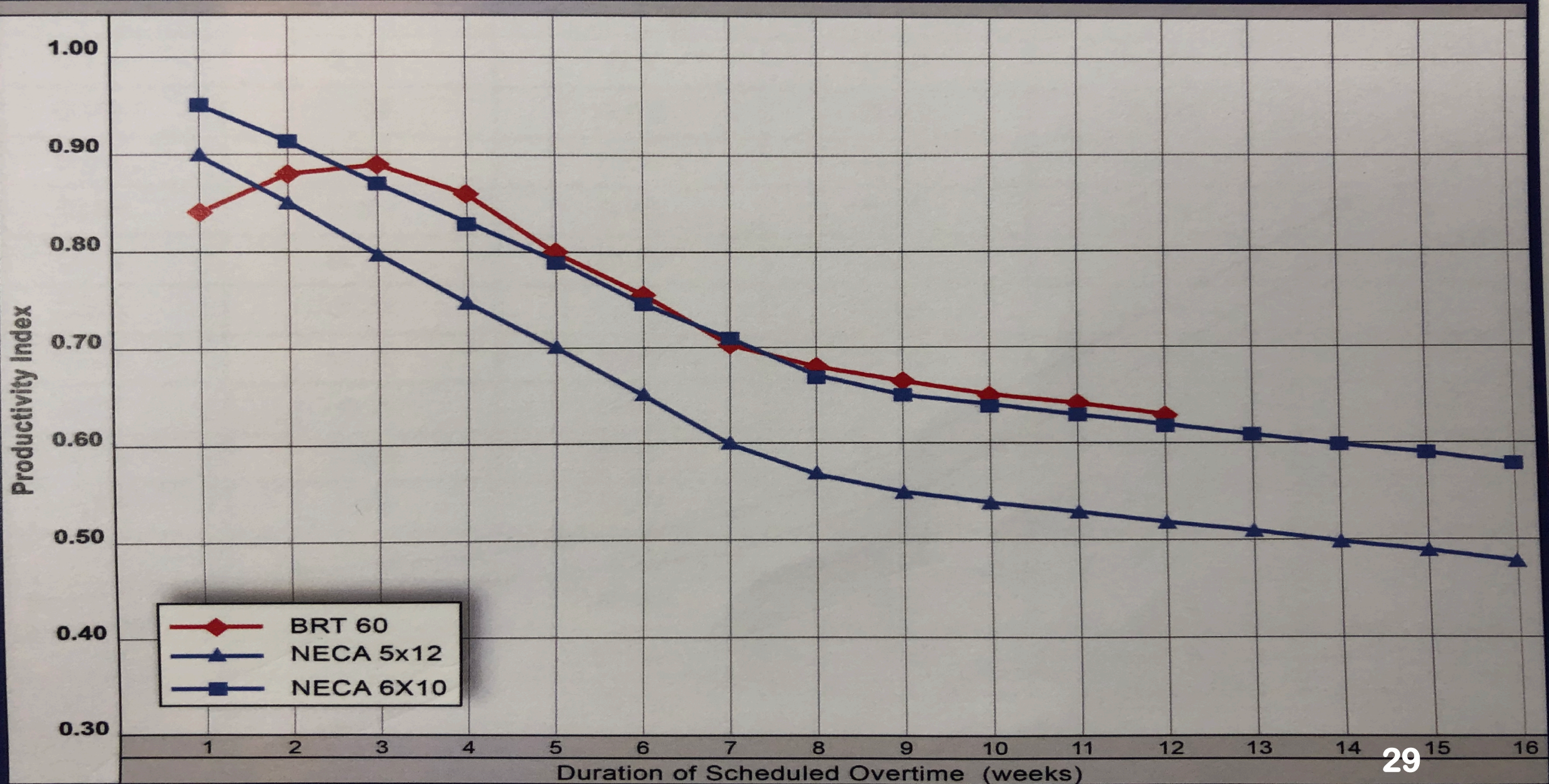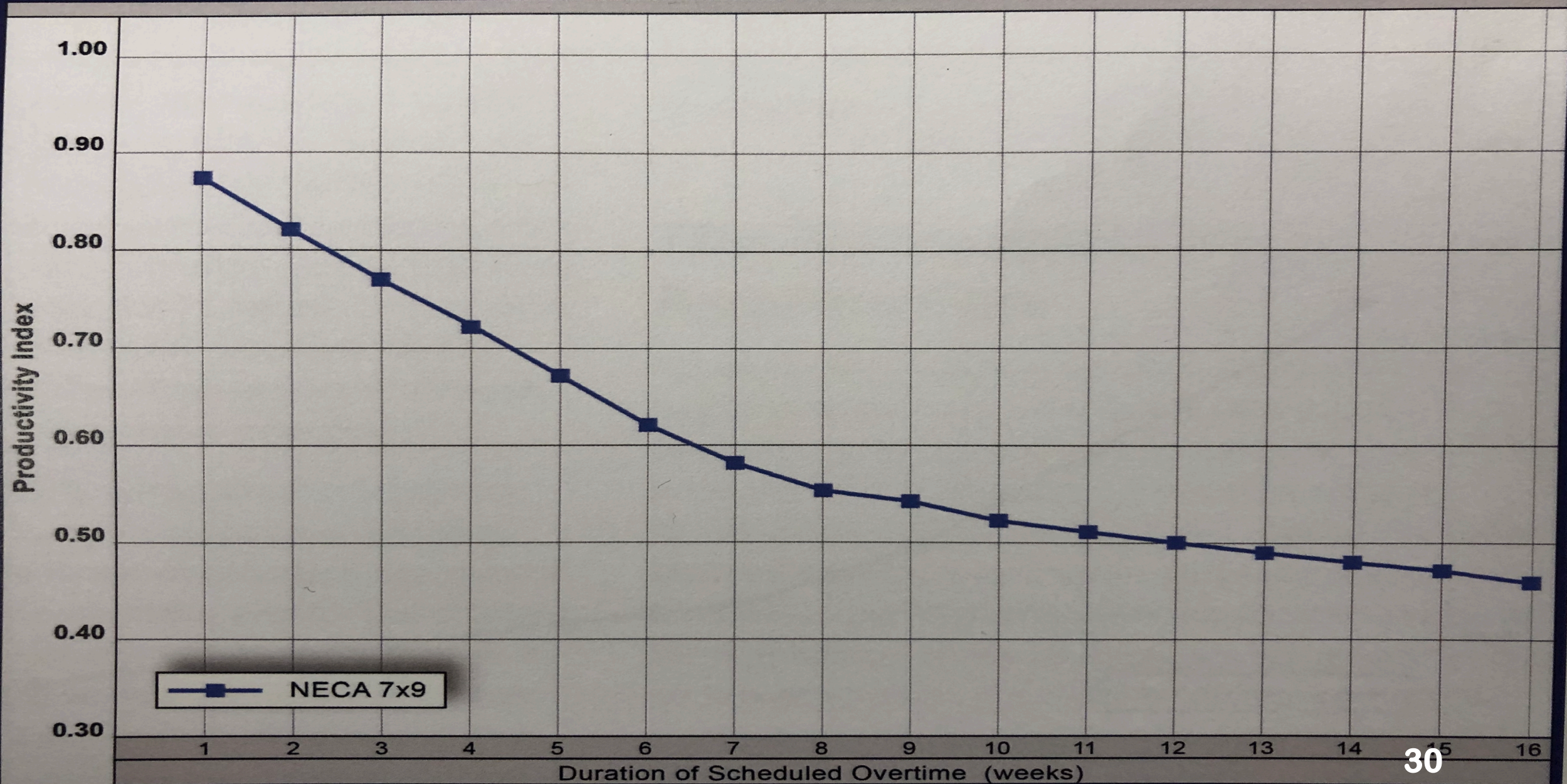Overtime Productivity Loss - ~55 hours/week

Overtime Productivity Loss - 60 hours/week

Overtime Productivity Loss - 63 hours/week

Overtime Productivity Loss - ~70 hours/week

Productivity Index vs. Duration of Scheduled Overtime (weeks)

Legend:
- NECA 7x10
- NECA 6x12
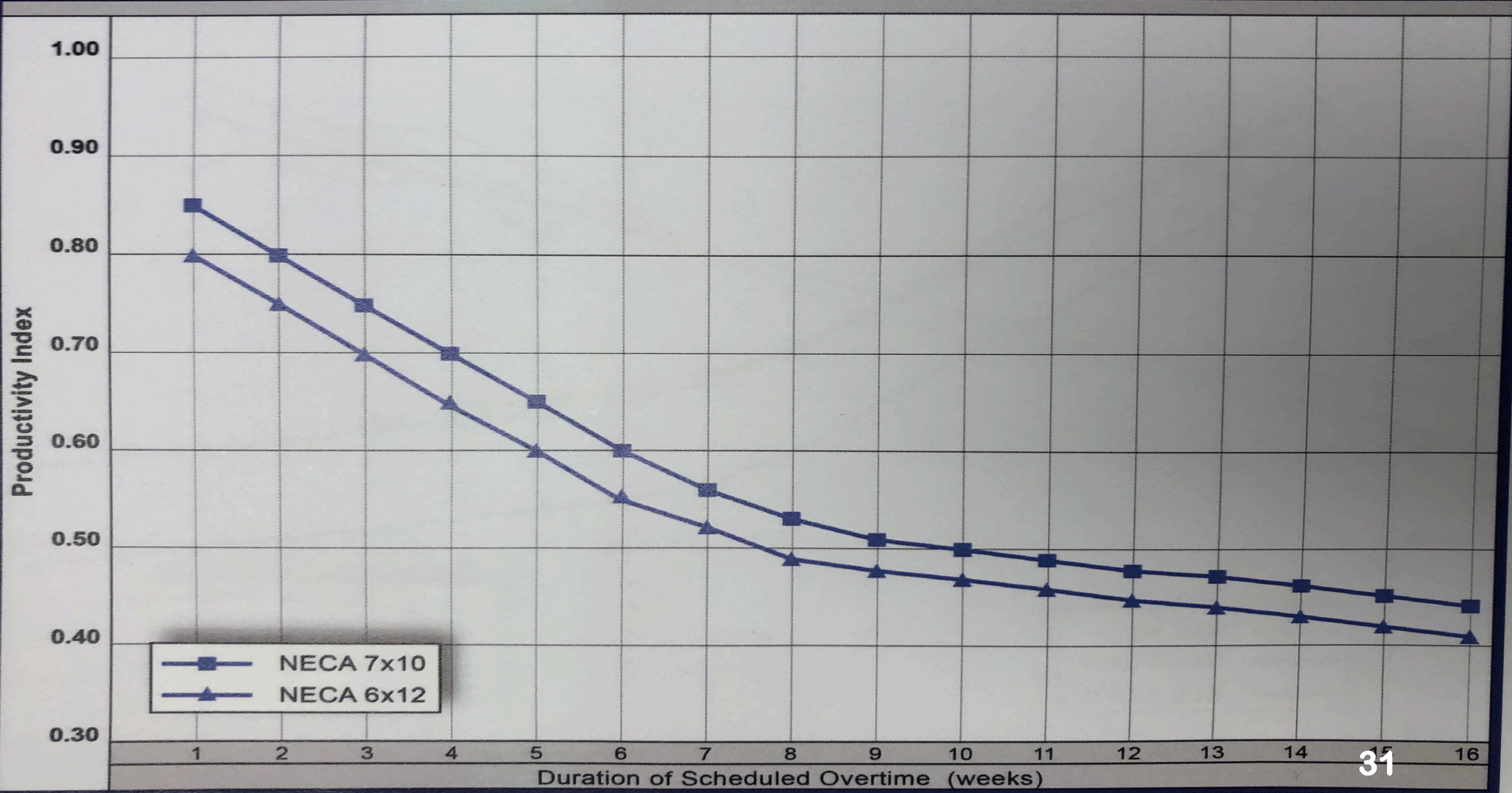
Overtime Productivity Loss - 84 hours/week

Productivity Index vs. Duration of Scheduled Overtime (weeks)

Legend: NECA 7x12
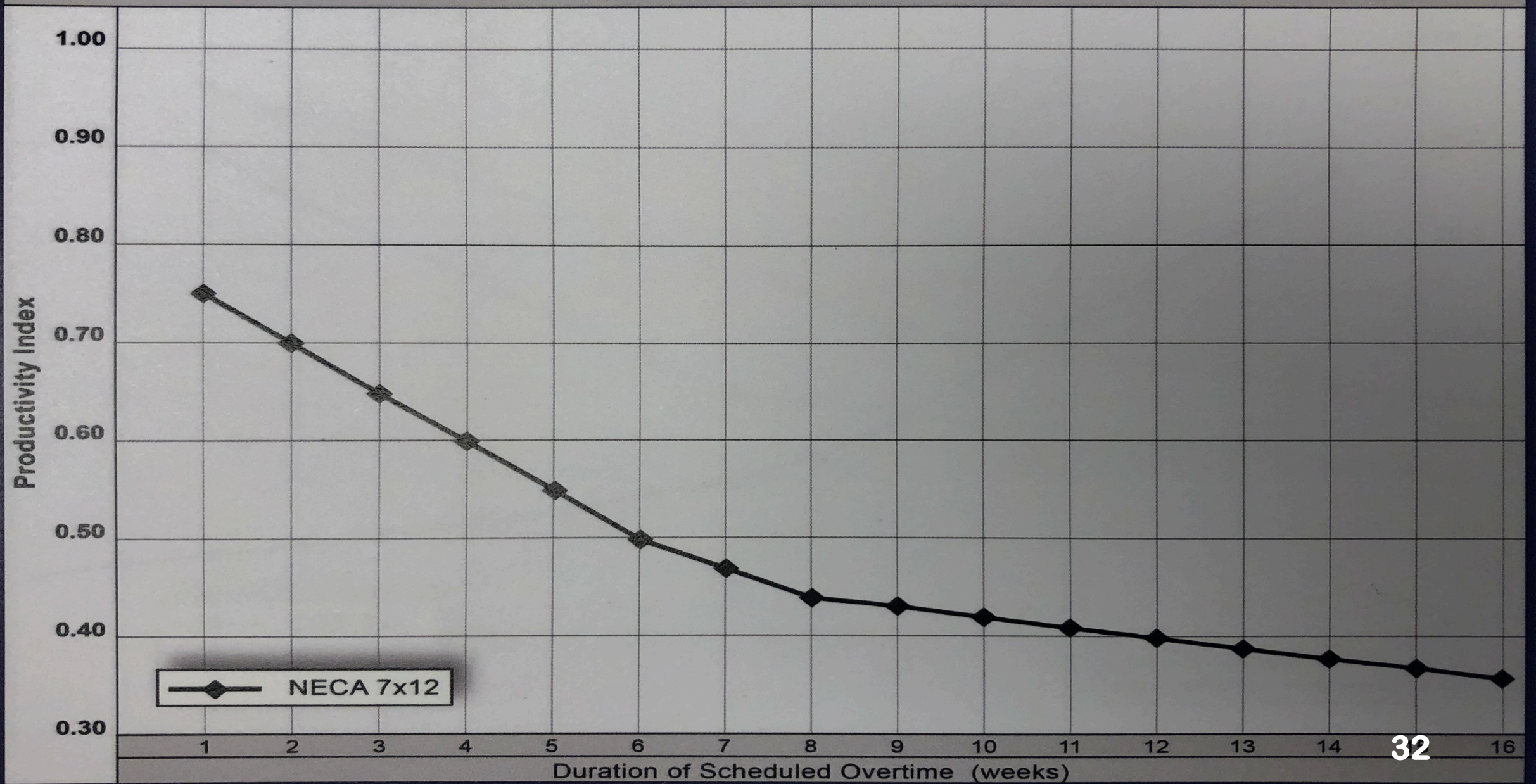
The Following Table of PI was Developed Using Data From All Three Studies

- Please read the manual carefully to better understand what data was used and how the data was used from each of the three studies to create the following table of PI values
  - Averaging, interpolation, and a decision of "average" intensity level are among the reasons and methods for data selection and usage

Week of Extended OT	50 hrs/wk	54-56 hrs/wk	60 hrs/wk	63 hrs/wk	70-72 hrs/wk	84 hrs/wk
1	0.94	0.93	0.9	0.87	0.83	0.75
2	0.92	0.89	0.88	0.82	0.78	0.7
3	0.91	0.86	0.85	0.77	0.73	0.65
4	0.89	0.82	0.81	0.72	0.68	0.6
5	0.85	0.79	0.76	0.67	0.63	0.55
6	0.86	0.75	0.72	0.62	0.58	0.5
7	0.76	0.72	0.67	0.58	0.54	0.47
8	0.77	0.7	0.64	0.55	0.51	0.44
9	0.74	0.68	0.62	0.54	0.5	0.43
10	0.72	0.66	0.61	0.52	0.49	0.42
11	0.72	0.65	0.6	0.51	0.48	0.41
12	0.71	0.64	0.59	0.5	0.47	0.4
13	0.69	0.63	0.56	0.49	0.46	0.39
14	0.68	0.62	0.55	0.48	0.45	0.38
15	0.67	0.61	0.54	0.47	0.44	0.37
16	0.66	0.6	0.53	0.46	0.43	0.36

How to Use the PI Table
Forward Pricing/Prospective Analysis

▶ Example: 15 workers are expected to work 60 hours per week for 3 weeks:

   ▶ Week #1 – 15 X 60 = 900 hrs, 1 – 0.90 = 0.10, 0.10 x 900 = 90 inefficient hrs

   ▶ Week #2 – 15 x 60 = 900 hrs, 1 - 0.88 = 0.12, 0.12 x 900 = 108 inefficient hrs

   ▶ Week #3 - 15 X 60 = 900 hrs, 1 – 0.85 = 0.15, 0.15 x 900 = 135 inefficient hrs

   ▶ **Total Inefficient Hours = 90 + 108 + 135 = 333 hours**

   ▶ **Compensation for 333 hours of lost productivity would be requested**

▶ See the next slide for the source of inefficiency factors

Week of Extended OT	50 hrs/wk	54-56 hrs/wk	60 hrs/wk	63 hrs/wk	70-72 hrs/wk	84 hrs/wk
1	0.94	0.93	0.9	0.87	0.83	0.75
2	0.92	0.89	0.88	0.82	0.78	0.7
3	0.91	0.86	0.85	0.77	0.73	0.65
4	0.89	0.82	0.81	0.72	0.68	0.6
5	0.85	0.79	0.76	0.67	0.63	0.55
6	0.86	0.75	0.72	0.62	0.58	0.5
7	0.76	0.72	0.67	0.58	0.54	0.47
8	0.77	0.7	0.64	0.55	0.51	0.44
9	0.74	0.68	0.62	0.54	0.5	0.43
10	0.72	0.66	0.61	0.52	0.49	0.42
11	0.72	0.65	0.6	0.51	0.48	0.41
12	0.71	0.64	0.59	0.5	0.47	0.4
13	0.69	0.63	0.56	0.49	0.46	0.39
14	0.68	0.62	0.55	0.48	0.45	0.38
15	0.67	0.61	0.54	0.47	0.44	0.37
16	0.66	0.6	0.53	0.46	0.43	0.36

Total Hours (Forward Price Estimated) to Do the Work

- Original Plan:
  - 900 hrs using a 40-hour week
- Forwarded Priced Estimate:
  - 900 hrs + 333 hrs = 1,233 hrs total using a 60-hour week for 3 weeks

How to Use the PI Table
Retrospective Analysis

▶ **Example:**

> ▶ A 40-hour week was originally planned but the mechanical contractor was directed by the general contractor to work 15 workers, 60-hours per week, for three weeks

> ▶ 2,700 actual hours were expended to complete the work on OT

How to Use the PI Table
Retrospective Analysis

► The math is <u>not</u> the same as the forward pricing method

 ► Why?

  ► You will overstate the inefficient hours because the table factors are only to be applied to PLANNED HOURS to estimate the additional inefficient hours required to complete the work on overtime

 ► Huh?

  ► The inefficient hours are imbedded in the actual hours

How to Use the PI Table: Retrospective Analysis

▶ **Example:** 60-hour weeks, for 3 weeks, 15 workers

> ▶ **Week #1** – 15 X 60 = 900 actual hrs, 1 - 0.90 = 0.10, 1 + 0.10 = 1.10,
> > ▶ 900 hrs/1.10 = 818 efficient hrs, 900hrs - 818 hrs = <mark>82 ineff. hrs</mark>

> ▶ **Week #2** – 15 x 60 = 900 actual hrs, 1 - 0.88 = 0.12, 1 + 0.12 = 1.12,
> > ▶ 900 hrs/1.12 = 804 efficient hrs, 900 hrs– 804 hrs = <mark>96 ineff. hrs</mark>

> ▶ **Week #3** - 15 X 60 = 900 actual hrs, 1 – 0.85 = 0.15, 1 + 0.15 = 1.15.
> > ▶ 900 hrs/1.15 = 783 efficient hrs, 900 hrs – 783 hrs = <mark>117 ineff. hrs</mark>

Week of Extended OT	50 hrs/wk	54-56 hrs/wk	60 hrs/wk	63 hrs/wk	70-72 hrs/wk	84 hrs/wk
1	0.94	0.93	0.9	0.87	0.83	0.75
2	0.92	0.89	0.88	0.82	0.78	0.7
3	0.91	0.86	0.85	0.77	0.73	0.65
4	0.89	0.82	0.81	0.72	0.68	0.6
5	0.85	0.79	0.76	0.67	0.63	0.55
6	0.86	0.75	0.72	0.62	0.58	0.5
7	0.76	0.72	0.67	0.58	0.54	0.47
8	0.77	0.7	0.64	0.55	0.51	0.44
9	0.74	0.68	0.62	0.54	0.5	0.43
10	0.72	0.66	0.61	0.52	0.49	0.42
11	0.72	0.65	0.6	0.51	0.48	0.41
12	0.71	0.64	0.59	0.5	0.47	0.4
13	0.69	0.63	0.56	0.49	0.46	0.39
14	0.68	0.62	0.55	0.48	0.45	0.38
15	0.67	0.61	0.54	0.47	0.44	0.37
16	0.66	0.6	0.53	0.46	0.43	0.36

How to Use the PI Table: **Retrospective Analysis**

- ▶ **Total Inefficient Hours**
  - ▶ = 82 + 96 + 117 = **295 hours**
- ▶ **Compensation for 295 hours of lost productivity would be requested**

Does that make your brain hurt just a little bit?

Mechanical Contracting Reality

- It's common for an owner, cm, or gc to request that the mechanical contractor provide a prospective cost proposal to accelerate a construction project

- These requests or "offers" are often limited to added payroll costs only (premium time vs. straight time)

- YOU MUST ADD ESTIMATED LABOR INEFFICIENCIES TO YOUR COST PROPOSAL

**REALITY CHECK**

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Mechanical Contracting Reality

▶ If the extent of the OT is unknown, you must at a minimum, include an express reservations clause in the change order proposal (see manual page 228)

▶ What does your contract or change order form say relative to "full accord and satisfaction" clauses?

▶ Getting paid for the inefficiencies caused unplanned extended OT is often a "messy" business

Webinar # 4 in my 4-part "Change Order" series:

Tuesday, July 7, 2020 - 1-2pm

"The Importance of Obtaining the Prime Contractor's Native CPM Scheduling Files - Presented By John Koontz & Paul Stynchcomb"

Acquiring the Manual – MCAA.org
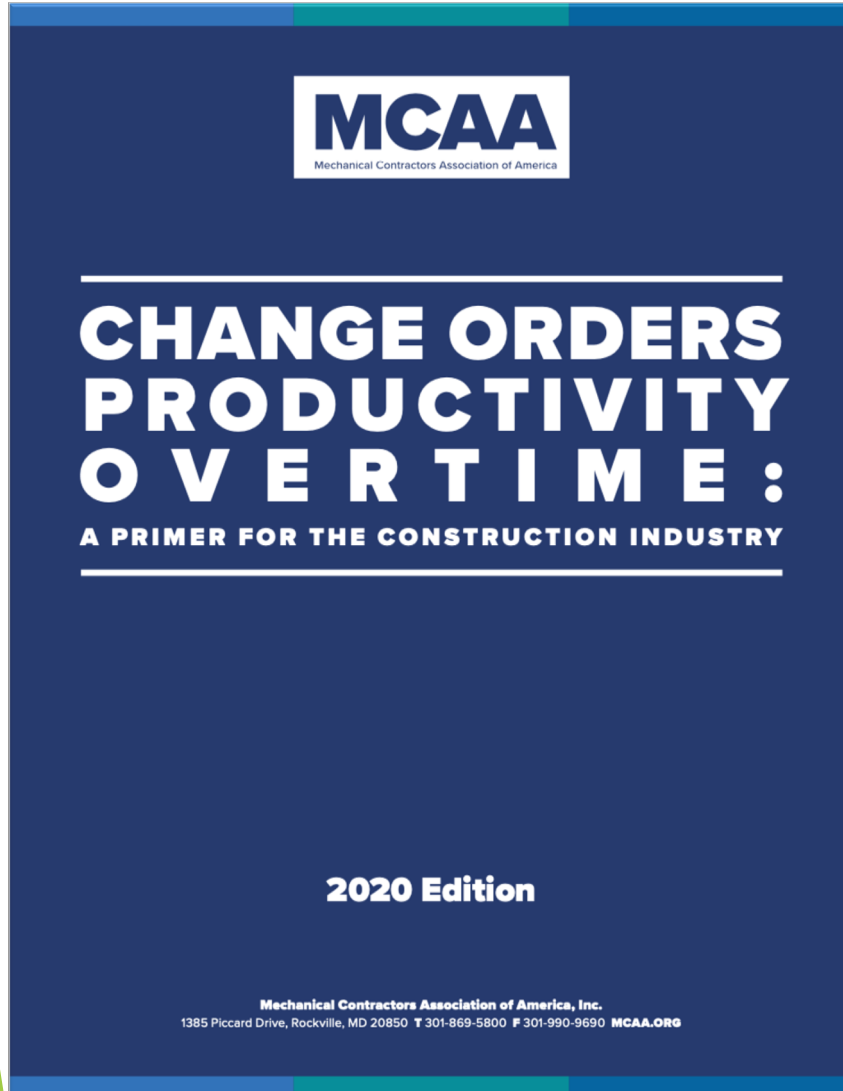
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