Create a Ruthlessly Efficient Machine Shop
Principles of Lean Manufacturing - Minimize Waste

1. Transportation – Non-valued-added movement of parts, materials, or information.

2. Waiting – When people, parts, or facilities stand idly while they wait for work cycle to be completed.

3. Overproduction – Producing outputs in greater quantities than customer demand.

4. Defects – Producing outputs so flawed that customers would deem them unacceptable.

5. Inventory – Accumulating leftover raw materials, works-in-process, or finished goods.


7. Extra Processing – Performing additional work, even though it is not required to meet the customer’s standards.
Principles of Lean Manufacturing - Minimize Waste

Underutilizing Human Potential – When employees are capable of making greater contributions yet are prevented from doing so because of the other tasks they need to perform.
LEAN CNC PRODUCTION
Easily move raw parts in and out with the supplied carts

INCLUDES DELIVERY, INSTALLATION, AND TRAINING
Everything is included in the price: we will deliver with our truck within 100 miles of Fusion, handle the required installation, and the on-site training

QUICK DELIVERY
Our promise is to personally deliver our standard configurations within 15 business days of order

CUSTOM END-EFFECTORS
Easily swap out gripper fingers and entire end-effectors as your jobs change

REMOTE SUPPORT
After installation Fusion provides 10 hours of remote support

CONTINUOUS OPERATION
Designed for "lights-out" operation
Create a Ruthlessly Efficient Machine Shop: Automation & Technology
WEBINAR BY Misa Ilkhechi
INTRODUCTION

ABOUT THE SPEAKER

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• Business Development Manager
• Email: miil@universal-robots.com
• Cell: +1 (773)-678-0980

INTRODUCTION

WEBINAR OVERVIEW

• What's a Cobot?
• Typical Applications Machine shops
• Benefits of using Cobots in Machine Shops
• Who is Universal Robots?
• Q&A
WHAT IS A COBOT?

PROGRAMMING INTERFACE

- A user friendly and intuitive teach pendant.
- Free-drive, program a cobot by moving the arm with the hand.
- Drag-and-drop functions on a touchscreen tablet.
EASILY DEPLOYABLE

- 110V
- No need to change production layout
- Lightweight
- No Need for special surface on the shop floor
- Flexible mounting angles

SMALL FOOTPRINT

- No Need For Cages
- Fits where the operator is currently standing
- Allows access to your machine when needed
- Could be moved out of the way during setup
**SAFE TO WORK AROUND**

- Built in Safety sensor which stops the robot on light impact (power and speed limiting)
- Safety plane for no operate zones
- Built in safety controller for safety mats and scanners

**FLEXIBLE**

- Move the robot around your shop floor
- Tend Multiple Machines
- Easily change tools
- 24/7 Productivity
What You See Is Just the Tip of the Iceberg

Robot Hardware Cost:

Additional Items:
- End-of-Arm-Tooling
- 3-Phase Power Infrastructure
- Fencing & Guarding
- Light Curtains
- Safety Scanners
- Software License
- Integration/Programming
- Maintenance/Repairs

Avg. Robot Implementation Cost:

Cobot Hardware Cost:
Plugs into a 110 V outlet

Additional Items:
- End-of-Arm-Tooling
- Teaching

Avg. COBOT Implementation Cost:

FASTEST PAYBACK
IN THE INDUSTRY
AVERAGE PAYBACK TIMES

(in months) by application

Assembly
CNC
Gluing, dispensing and welding
Machine tending
Quality inspection
Lab analysis and testing
Polishing
Packaging and palletizing
Pick and place

Reported payback time (in months) for sample cobot deployments across ten applications (internal UR data)

Machine Shop Applications
LATHE TENDING:

MILL TENDING:
POST MACHINING

Part Washing

Deburring, Polishing

INSPECTION:

- Inline inspection
  - Gripper
  - Vision
  - CMM
- Dedicated Inspection Station
- Small Footprint
ABOUT UNIVERSAL ROBOTS

HISTORY

2005
Universal Robots founded by 3 members in Denmark

2008
URS, the world’s first cobot

2012
Launch of UR10 – longer reach and greater payload

2014
TUV Nord, certifies the safety systems of UR robots

2015
Universal Robots was acquired by Teradyne for $285M

2016

2017
Launch of Universal Robots Academy

2019
Launch of UR16e - Heavy-Duty Payload Cobot
20 Countries
29 Offices
680+ Employees

40+ Nationalities
50% Market share
65 Patents

Source: Bi Research Analysis, Global Collaborative Industrial Robot Market, 2018-2023; Interact Analysis, The Collaborative Robot Market - 2018

43,000+ COBOTS SOLD WORLDWIDE
The Product

**PRODUCT**

**UR3e**
Automate tasks up to: 6 lb.
Working radius: 19 in
(Best deployed in tight spaces or on table tops)

**UR5e**
Automate tasks up to: 11 lb.
Working radius: 33 in

**UR16e**
Automate tasks up to: 35 lb.
Working radius: 33 in
(Designed for heavy-duty applications)

**UR10e**
Automate tasks up to: 22 lb.
Working radius: 51.2 in
(For tasks across large areas)
APPLICATIONS

Packaging and Palletising
Gluing, Dispensing and Welding
Injection Moulding
Screw Driving
Lab Analysis
Machine Tending
Assembly
Pick and Place
Quality Inspection

Benefit Of Using Cobots
BUSINESS BENEFITS

- Increased Capacity
- Increased quality, minimized waste
- Constant throughput
- 24/7 operation, increased uptime
- Less than 1 year payback time
- Modular and fenceless, easy to move and reallocate ideal for high mix/low volume production
- Ergonomic solution, decrease workers injuries and increase productivity
- Free up operators from repetitive to do more value add tasks

TECHNICAL SPECIFICATIONS

- Payloads up to 35lb. (including tool and products)
- Repeatability +/- .002 in at maximum speed and payload
- Built in Force/Torque(F/T) sensor on the wrist to search, contact, align and index the workpiece
- Designed to work alongside personnel
- Ability to tend multiple machines with Maximum Radial Reach of 51 Inches
- Up to 6-10 cycles per minute for Tending
- Load and unload at the same time with Dual Grippers
- Floor, wall, ceiling and any other mounting angle
Sample ROI

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## Lean Robotics

### Baselines
- Employees on a Shift (Unit): 1
- Hours per Shift (Unit): 8
- Shifts per day (Unit): 2
- Employee hourly salary and Benefits: 50,000 $
- Downtime cost: 5,000 $
- Scrap Part Cost: 5,000 $
- Tool and Process Enhancement Cost: 0 $
- Total Cost: 110,000 $

### Investment

<table>
<thead>
<tr>
<th>Year</th>
<th>Robot System Cost</th>
<th>Yearly Savings</th>
<th>Yearly Cash Flow</th>
<th>Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(75,000) $</td>
<td>99,000 $</td>
<td>24,000 $</td>
<td>24,000 $</td>
</tr>
<tr>
<td>5</td>
<td>(5,000) $</td>
<td>100,980 $</td>
<td>95,980 $</td>
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<tr>
<td>1</td>
<td>(5,000) $</td>
<td>103,000 $</td>
<td>98,000 $</td>
<td>217,980 $</td>
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<tr>
<td>4</td>
<td>(5,000) $</td>
<td>105,080 $</td>
<td>100,080 $</td>
<td>318,060 $</td>
</tr>
<tr>
<td>6</td>
<td>(5,000) $</td>
<td>107,161 $</td>
<td>102,161 $</td>
<td>420,221 $</td>
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</table>

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**LEASING OR RENTAL**

UNIVERSAL ROBOTS
ROBOT LEASING:

- **NO CapX**
- **Get the equipment you need to grow**
- **Stay tech agile**
- **Low rates**
- **Flexible end-of-contract options**
- **Maximize tax advantages**

Ready to Automate?
INTRODUCTION
WEBINAR OVERVIEW

1. Email us your machine's make and model
2. Shoot us a few pictures or videos of your parts and operation
3. We'll prepare you proposal!
4. Delivery within weeks

THANK YOU

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UR ONLINE RESOURCES

https://www.universal-robots.com/ - UR Website


UR Robots in Production & Testimonials.


UR Certified End Effectors, Accessories & Software.

https://www.universal-robots.com/academy/ - UR Academy Training

Free Online Robot Programming.


Free Technical Documents, Files & Offline Simulator.

https://www.universal-robots.com/builder/ - UR Application Builder

Evaluating OEE & Productivity

April 24, 2020
Akshat Thirani
CEO & Co-Founder

Born & raised in the world of manufacturing
Today’s Challenges

Cost Reduction For Cash Flow
Worker Safety & Business Continuity
Readiness to Ramp

Embrace reality and deal with it.

- Ray Dalio
Why OEE?

- Overall equipment effectiveness (OEE) is a **reality check** of how well your factory operation is performing compared to its full potential.

- OEE can be used as a **framework** for how you structure and focus your limited resources.

<table>
<thead>
<tr>
<th>Utilization</th>
<th>Cycle-Time</th>
<th>Quality</th>
</tr>
</thead>
</table>

What’s holding you back?

- Little to no IT resources
- Machine Integration - Average age in 20 yrs
- Data - but what do I do with it?
- Change & culture
Track True Utilization

“If you are not making chips, you are not making money.”

- MakingChips

On average, manually tracked machine utilization is reported 25% higher than reality.
How to get started: Leverage an easy to deploy solution

- Self-install clip on sensors
- Work with any type of machine
- Use data to track downtime and OEE
- No IT resources needed

Deployed in Minutes

1. **Install non-invasive sensor**
   Connect any kind of machine with sensor

2. **Connect gateway**
   Wi-fi or cellular connection avoids the hassle of complex IT integration

3. **Access analytics**
   Real-time operational data with an intuitive interface for practical use
**Identify:** Which machines aren’t utilized

<table>
<thead>
<tr>
<th>Machine</th>
<th>Util%</th>
</tr>
</thead>
<tbody>
<tr>
<td>#01 VF2SS</td>
<td>51.13%</td>
</tr>
<tr>
<td>#02 VF2SS</td>
<td>16.31%</td>
</tr>
<tr>
<td>#03 VF1</td>
<td>1.72%</td>
</tr>
<tr>
<td>#04 VF2SS</td>
<td>22.59%</td>
</tr>
<tr>
<td>#05 SL20</td>
<td>22.05%</td>
</tr>
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</table>

**Use data to make decisions**

- **Equipment**
- **Automation**
- **Staffing**
Reduce setup & changeover

Empower Operators
Find out the “Why?”

<table>
<thead>
<tr>
<th>Step</th>
<th>Time</th>
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</thead>
<tbody>
<tr>
<td>Locate Tooling</td>
<td>18 min</td>
</tr>
<tr>
<td>Teardown Toolin</td>
<td>5 min</td>
</tr>
<tr>
<td>Stage Material</td>
<td>3 min</td>
</tr>
<tr>
<td>Clean Up</td>
<td>3 min</td>
</tr>
<tr>
<td>Get Prints</td>
<td>2 min</td>
</tr>
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</table>
30% of time spent collecting & processing data.


Embrace reality.
Invest in your operations, tools & your people.
Get started: Risk-Free

hello@amper.xyz
www.amper.xyz
Upcoming Webinars

<table>
<thead>
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<th>Date</th>
<th>Webinar Session</th>
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<tr>
<td>April 28</td>
<td>Getting Back to the New Normal</td>
</tr>
<tr>
<td>April 30</td>
<td>Create a Secure Remote Work Environment</td>
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Visit [www.IMEC.org/Events](http://www.IMEC.org/Events) to register

Rebounding & Reopening Webinars – coming soon!

Topics include:

- Sales
- Culture & Employee Engagement
- Safety
- Supply Chain
- Risk Planning