

PARTNERS IN PROGRESS

ALL IN 2020

SHEET METAL | AIR | RAIL | TRANSPORTATION
SMART





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**OPPORTUNITIES TO
EXPAND MARKETS
WITH TECHNOLOGY**



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TECHNOLOGY



**“I SKATE TO WHERE THE PUCK
IS GOING TO BE,
NOT TO WHERE IT HAS BEEN”**

- WAYNE GRETZKY

ROBOTIC WELDING

ADVANTAGES OF ROBOTIC WELDING



2 Bay Robotic Welding Cell

- Speed
- Accuracy
- Consistency
- Quality
- Operator Safety
- Overall Cost Reduction

ROBOTIC WELDING

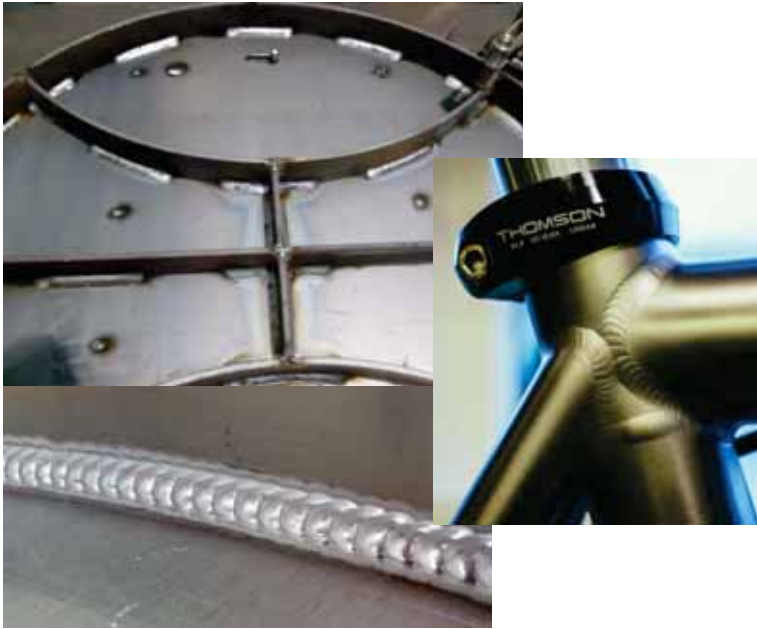
SPEED



- Human Welders – Typically less than 50% arc-on time
- Robotic Welders – Typically average 75%-80% arc-on time
 - Arc-on time can be increased to as much as 95% for parts with longer seams
- Robotic Welders can weld with faster travel speeds (which can also reduce warpage)

ROBOTIC WELDING

ACCURACY AND CONSISTENCY



- Automated system creates consistent weldments with a high level of accuracy
- Same weld, Same place, Every time
- This does not completely eliminate mistakes and defects
 - Malfunctioning or damaged equipment, incorrect programming or misaligned materials can still result in product defects

ROBOTIC WELDING

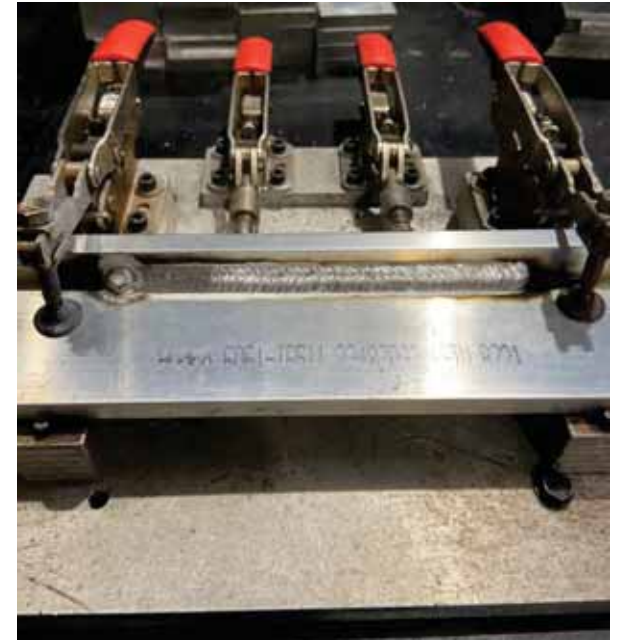
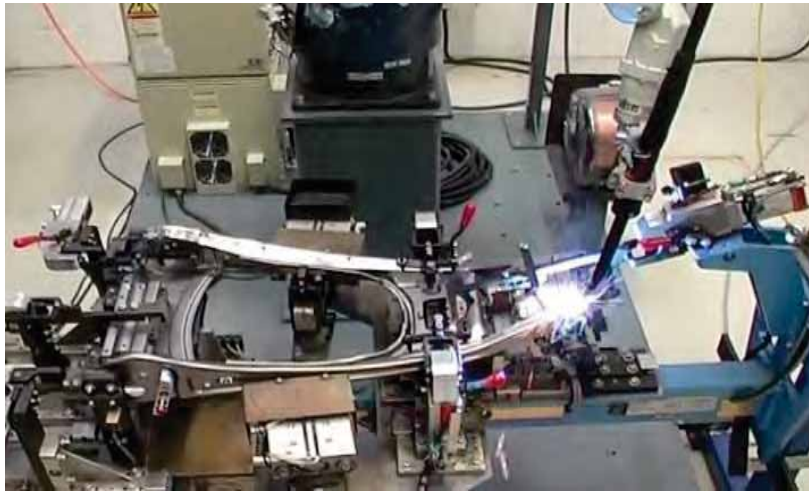
QUALITY



- Better control of welding variables produces higher quality welds
 - Modes of transfer
 - Weld hotter and faster
 - Use of larger diameter wires (less expensive)

ROBOTIC WELDING

FIXTURING



ROBOTIC WELDING



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ROBOTIC WELDING

PROGRAMMING



- Can be programmed at the machine or from an office computer
 - Easily done at the machine
- Programmer must understand the science of welding
- SMART members are best positioned to program and operate Robotic Welders

ROBOTIC WELD CLEANING



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ROBOTIC TOTAL STATIONS



- Why use a Robotic Total Station?
 - Speed
 - Accuracy
 - Productivity
 - Inaccessibility
 - Value/ROI

AUTODESK SOFTWARE



- Autodesk Software Applications
 - AutoCAD
 - Revit
 - Navisworks
 - Fabrication CADmep
 - Fabrication CAMduct
 - And more

ADDITIONAL SOFTWARE



eVolveMEP

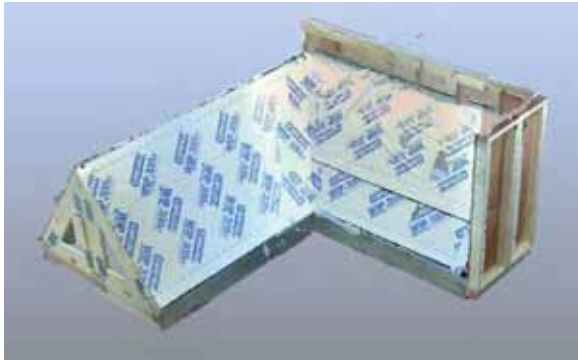


PROCORE

- Software Applications
 - Bluebeam
 - PlanGrid
 - Stratus
 - eVolveMEP
 - DADO
 - Procore
 - Many others

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3D LASER SCANNERS



- Why use a 3D Laser Scanner?
 - Speed
 - Accuracy
 - Schedule
 - Verification
 - Value/ROI

FUTURE OF 3D LASER SCANNERS



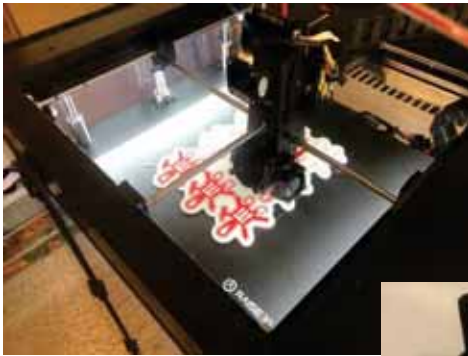
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MOBILE DEVICES



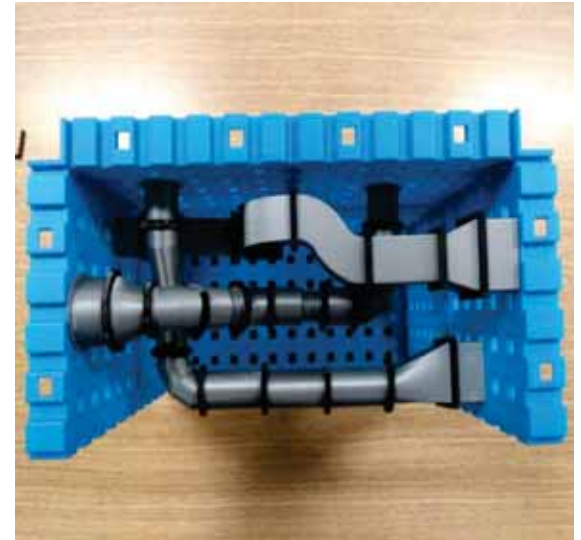
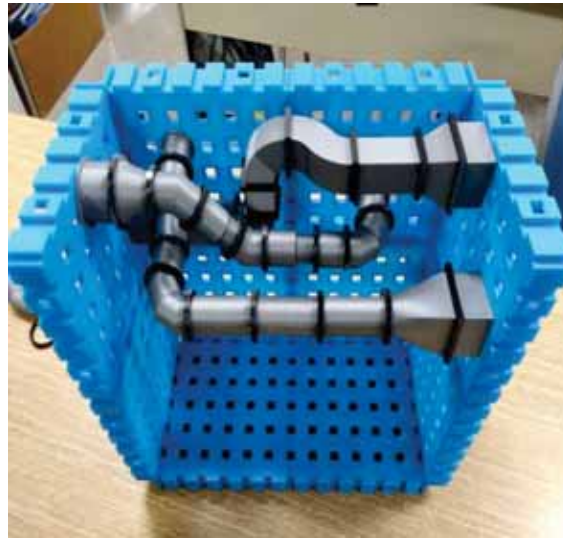
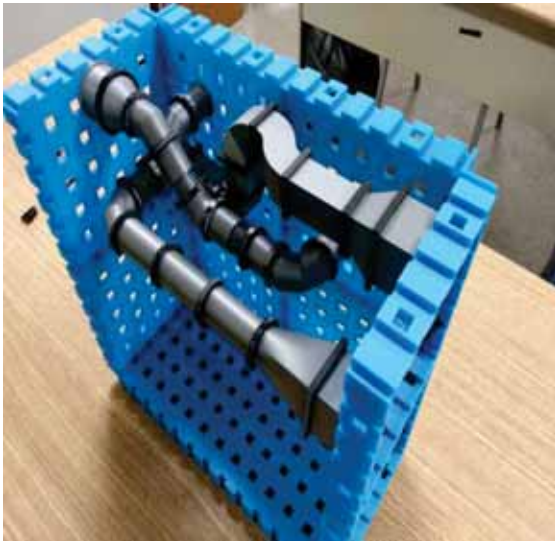
- Why use mobile devices?
 - Accessibility
 - Speed
 - Real-time Collaboration
 - Cost
 - Efficiency

3D PRINTERS



- Ability to print smaller scale parts
 - Examples:
 - Nuts, bolts and washers
 - Ductmate Corners
 - TDC Clips
 - Prototypes
 - Etc.

3D PRINTERS



AUTOMATED SHOP EQUIPMENT



- TigerStop
 - Automates processes
 - Fast and accurate cutting
 - Reduces waste
 - Improves productivity
 - Attaches to existing equipment

VIRTUAL REALITY LIFT



serious:labs®

- VR Mobile Elevated Work Platform (MEWP)
 - Safe Operation
 - Efficient Operation
 - Proficient Operation
 - Train new operators
 - Assess operators
 - Remediate experienced operators
 - International Powered Access Federation (IPAF) approved use for recertification

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VIRTUAL REALITY WELDER



- Speeds up learning process
- Pre-training assessment
- Remediation
- Reinforces welding principles
- Real time analytics (not subjective)
- Reduces cost for training
- Teaches use of WPS

HOLOLENS



- Trimble XR10 with HoloLens 2
 - Field of View
 - Communication
 - Wearability
 - Easy to Use

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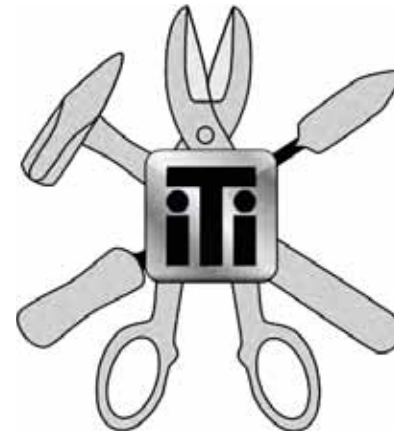
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