Advanced Manufacturing Technician

The TOYOTA AMT Career Pathway Program

A Global Technician Development Path
The AMT Career Pathway

Dennis Dio Parker

Assistant Manager
TOYOTA North American Production Support Center

AMT Program Developer
North American Lead for the AMT Program
What Is AMT?

At its core, AMT is a Career Pathway

The TOYOTA Multiskilled Technician Path
TOYOTA Integrated Career Pathways

SKILLED TECHNICIAN

TOYOTA Advanced Manufacturing Career Paths

- Automotive Manufacturing Engineer (M.B.A.)
- Lean Manufacturing Certificate
- Manufacturing Management Program (B.B.A., A.B.)
- Advanced Manufacturing Technician Program (AMT)

TOYOTA Maintenance Career

- Maintenance Internship
- Advanced Program

TOYOTA Seibi Career

- Seibi Career
- Org Mgt. Seibi Mgt. Seibi Tech

Toyota Maintenance Internship

Toyota Advanced Program

* 6 mo. – 2 years
* Full-time floor experience

Robotics
Programmable Controls
Line Controllers
Vision system
Troubleshooting

ENGINERING

TOYOTA Engineering Career

- Engineering Career
- Production Engineer TEMA
- New Engineer Development

TOYOTA Engineering Career

- Engineering Career
- Design Engineer TTC

AME Advanced Manufacturing Engineering Program

NED New Engineer Development

Toyota Maintenance Career MGR AM GL TL TM

Toyota Maintenance MGR AM GL TL TM

Toyota Advanced Program

* K-12

Specialized Toyota Degree Program

100% Toyota Relevant

Project Lead the Way

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And On to Other Companies

TOYOTA Advanced Manufacturing Career Paths

TOYOTA Maintenance Career
- MGR
- AM
- GL
- TL
- TM

TOYOTA Seibi Career
- Org Mgt.
- Seibi Mgt.
- Seibi Tech

Toyota Maintenance Internship

Toyota Advanced Program

Automotive Manufacturing
- M.B.A.

Lean Manufacturing Certificate

Manufacturing Management Program
- B.B.A.
- A.B.

NED New Engineer Development

AME Advanced Manufacturing Engineering Program
- Electrical / Industrial Mechanical
- B.S.

Special Toyota Degree Program

AMT Advanced Manufacturing Technician Program

100% Toyota Relevant

K-12

Project Lead the Way

* 6 mo. – 2 years
* Full-time floor experience

KY FAME
Kentucky Foundation for Advanced Manufacturing Education
Why AMT?

AMT is an effort to secure a reliable and consistent pipeline of *global quality* technical talent to sustain and improve advanced manufacturing operations in the U.S.

AMT is one answer to help the U.S. sustain global leadership in manufacturing, and to protect the contribution of manufacturing to the national quality of life.
What Is AMT?

• It’s an industry-initiated career pathway
  – Toyota visioned the program
  – Toyota & Bluegrass Comm. & Tech. College started it
  – Toyota and 11 additional companies in KY have grown it
  – 4 more Toyota plants, 4 more schools, and 2 more companies (with more coming) have expanded it.

• It is a tightly coordinated, connected pathway

• It is a “Pull System” pathway, and not a “Push.”
AMT Pathway Principles

• Consistently produce technicians that are on par with the best in the world.

• Every step & activity is “best practice.”

• Data-based management.

• Coordinate resources and partnerships.
AMT Pathway Principles

• Coordinated connections:

- TOYOTA PLANT
- High Schools (Selected)
- Middle Schools (Feed the selected high schools)
- Elem. Schools (Feed the selected middle schools)

Those schools with which we cannot establish an in-person connected receive a comprehensive e-mail package.

Package sent to the Superintendent, HS Principals, Counselors
The Pathway Steps: K-5 (5th Grade)

BEST PRACTICE FOR:
1. ENCOURAGING PARTICIPATION IN STEM
2. CREATING A FAVORABLE EXPOSURE TO MANUFACTURING
* MESSAGE: ENROLL IN GATEWAY TO TECHNOLOGY

- Engage 5th students.
- Plant tour & school tour. Tailor to age.
- Involve in fun activities which create interest and excitement around science & math.
The Pathway Steps: Middle School

- Engage Middle School students.
- Plant tour & school tour. Tailor to age.
- Involve in fun activities which promote STEM.
- Introduce Manufacturing as a rewarding career.
- Middle schoolers love robots!

BEST PRACTICE FOR:
1. PROMOTING STEM CAREERS
2. DEVELOPING CRITICAL THINKING
3. DEVELOPING COMMUNICATION SKILLS
4. CREATING A FAVORABLE EXPOSURE TO MANUFACTURING
   * MESSAGE: ENCOURAGE ENROLLMENT IN PROJECT LEAD THE WAY.
The Pathway Steps: High School

- Plant & school tours. Promote manufacturing.
- Accelerate career thinking, maturity growth.
- Underclassmen: build relationships.
- Seniors: recruit to AMT Program.
- Engage students/parents/teachers/counselors/admins.

BEST PRACTICE FOR:
1. PROMOTING STEM CAREERS
2. DEVELOPING CRITICAL THINKING
3. DEVELOPING COMMUNICATION SKILLS
4. CREATING A FAVORABLE EXPOSURE TO TOYOTA/FAME

* MESSAGE: ENCOURAGE APPLICATION FOR THE AMT PROGRAM
Preparing Students For the Global Economy

- World-Class Curriculum
- High-Quality Professional Development
- Engaged Network

- Leadership
- Innovation
- Continuous Improvement
- Accountability
PLTW Curriculum

Elementary School Program

Launching in 2014

Middle School Program

Gateway To Technology

High School Programs

Pathway To Engineering & Biomedical Sciences

COLLEGE, CAREER, & BEYOND

PLTW – Leading provider of STEM education programs

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America’s STEM Solution

- Over 5,200 programs
- More than 4,700 schools
- More than 10,500 teachers trained
- 100s of partners
97% of PLTW seniors intend to pursue a four-year degree or higher. The national average is 67%.
80% of PLTW seniors say they will study STEM in college

The national average is 32%
50 University Affiliates

PLTW – Leading provider of STEM education programs
Going places...together

PROJECT LEAD THE WAY

preparing students for the global economy
The Pathway Steps: High School

• At the Kentucky Program:
  – Visit about 20-25 high schools each year
  – Selected because they host PLTW program
  – Ask to include more:
    • Tech Ed / Vocational Ed
    • Math/Science/Honor organizations
The Pathway Steps: High School

• Recruiting goal: *Reach every graduate in the state.*
  – In-person visits, relationship building, recruiting at schools close enough for travel
  Target: About 25 schools/year.
  – E-mail package to every public school superintendent, high school principal, and counselor
  – E-mail package to every private school principal
  – E-mail package to as many home school activities as practical (states vary greatly in organization)
The Pathway Steps: 2-Year College

The "Hub" program of the pathway.

Degree program re-designed from the ground up.
The Pathway Steps: 2-Year College

• Selective program
• Maximize learning
• Work/study format on a day-to-day basis
• Extensive non-technical student formation
• Set *high* standards for academics and work, and ...
• ...never compromise standards
• Incentivize performance
The Pathway Steps: 2-Year College

NEXT GENERATION Technical Degree

Advanced Manufacturing Technician Program
Associate Degree in Applied Science

<table>
<thead>
<tr>
<th>1\textsuperscript{st} Semester</th>
<th>2\textsuperscript{nd} Semester</th>
<th>3\textsuperscript{rd} Semester</th>
<th>4\textsuperscript{th} Semester</th>
<th>5\textsuperscript{th} Semester</th>
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<td>Technical Core Areas</td>
<td>Manufacturing Floor Experience</td>
<td>Internship</td>
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<td>Math</td>
<td>Intro to Electricity Fluid Power</td>
<td>Production Experience</td>
<td>Maintenance Foundation</td>
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<td>Welding &amp; Machining Drawings</td>
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**Selection Process**

- Target Criteria:
  - High School Graduates
  - 1/3 Math Ranking
  - 1/1 Class Standing
  - PLTW Participant

**Weekly Schedule**

- M T W Th F: WORK
- 8+ Hrs / Day
- 40+ Hrs / Week

5 Straight Semesters

**Characteristics When Hired**

- Communication and critical thinking skills
- Multiskilled Technical Foundation
- Floor experience and hands-on skill
- Good safety practice on hire
- 5S understanding and practice on hire
- Lean mfg thinking and practice on hire
- Problem solving thinking and use on hire
- Understanding of maintenance practice on hire
- Excellent worker behavior on hire

**Manufacturing Core Exercises**

The DNA of Manufacturing

- Continue Practicing Activity
- Continue Practicing Activity
- Continue Practicing Activity
- Continue Practicing Activity
- Continue Practicing Activity

**Personal Behaviors**

- Attendance – Communication – Diligence – Teamwork – Interpersonal Relations

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### The Pathway Steps: 2-Year College

#### Weekly Schedule

<table>
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<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
<th>FRIDAY</th>
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<td>WORK</td>
<td>SCHOOL</td>
<td>WORK</td>
<td>SCHOOL</td>
<td>WORK</td>
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<tr>
<td>8 Contact Hours (9+ total)</td>
<td>1-2 Hrs</td>
<td>COMPLETE MANUFACTURING CORE EXERCISES</td>
<td>HOMEWORK</td>
<td></td>
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The Pathway Steps: 2-Year College

The New Model School
For Manufacturing

- MORE REALISTIC
  Looks Like a Factory
  Feels Like a Factory

- MANUFACTURING SIMULATOR
  Central Focus
  Reason for Learning
  Toyota Troubleshooting

- TOYOTA LEARNING
  Safety, TPS, 5S
  Learning Lab

- ORGANIZED BY
  FUNDAMENTAL SKILL
  Electricity / Fluid Power
  Mechanics & Fabrication

- PROCESS LEARNING
  Students learn in a
  structure sequence

- Students Learn
  the Right Way
  the First Time
The AMT Program in Action

COMMUNICATION DEVELOPMENT

AMTs receive accelerated and intensive training in both verbal and written communication. Note in this photo:

• Group presentation

• Attendees standing, not sitting in desk

• Looks and feels like a manufacturing site – not like a school. (No classrooms!)

They are assessed on their communication performance by their peers.
The AMT Program in Action

Toyota 5S Training

Traditional students never get this type of training. Companies will pay top $$$ for this training for their employees.

It is estimated that AMTs receive $10,000 worth of free training and education beyond their academic curriculum.
The AMT Program in Action

ADVANCED WORK EXPERIENCE

AMTs work in the real world at the same time that they are learning. 3 days of the week are spent in a manufacturing plant working with mentors and trainers.

Their experiences and training in the program are linked to their learning in school on the other two days of the week.
The AMT Program in Action

PROBLEM SOLVING

AMTs learn an unprecedented level of problem solving and critical thinking. Before graduating from the college program they will have deeply absorbed the Toyota 8-Step problem solving process and its principles, will have solved a real problem on the school floor and a real problem on the manufacturing floor. And they’re still 1-2 years away from potentially being hired.

This level of problem solving and critical thinking analysis is rarely seen at the university level.

Here an AMT student presents her school based problem to a group of visiting legislators and state-level college system administrators.
Progressive Reward

Powerful Message:
Work Hard
Do Well
Get Along
Keep Learning
Get Rewarded!

In the College phase raises are earned by a combination of Grades + Floor Evaluations

Message
How much do you want to study?
How Involved do you want to get?
Program Results

Measured Results

• **100%** pass rate on Toyota’s tough multidisciplinary technical knowledge test
  
  *Pass rate of experienced technicians: < 50%*

• > **95%** pass rate on all 4 major areas of the Toyota test
  Of external (experienced) applicants who pass, < 50% pass more than one area.

• **100%** pass rate on 3 of the major areas
  *Includes the toughest area, Electricity and Control*

• **87%** of 2013 graduates were “Honor Graduates.” Rate for the same program at the other six campuses < 30%.
Program Results

Program Retention

SUCCESS 95%

70%

5%

30%

DROP
Program Results

Observational Results

• Bluegrass Community & Technical College Public Speaking Instructor: “AMT students are coming into my class with better public speaking and verbal communication skills than my usual students at the end of class.”

• David Cox, General Manager of the Power Train Plant: “My Group Leaders now “fight” to get AMT interns for their groups.”

• John Dotson, Manager of TMMK Assembly Maintenance: “I have to run my AMT student out for lunch and she’s already completed a full (Problem Solving) activity that most of my team members have never done.”

• Karen Price, President of the West Virginia Manufacturers Association: “The most amazing aspect is their communication skill!”

• Several managers at the annual Toyota North American Maintenance Management meeting: AMTs are the best new-to-field talent ever experienced.
Program Results

Observational Results

Vince Bertram, President of Project Lead the Way, a national engineering development program for K-12 education:

“This model has become a national source of discussion.”

“The Project Lead The Way team, consisting of our internal members and a strong national network of university affiliates, state leaders, and corporate partners, tells me there is no stronger program in the United States than Toyota’s model for training its future workforce.”
What Does This Mean for the College?

A Paradigm Shift
Opportunities for the College

• Enhanced relationship with industry
• Create career pathways for students in manufacturing
• Contribute to the local community
• Instrumental in creating a future workforce that is globally competitive
Opportunities for the Students

• Classroom concepts applied at work immediately
• Work concepts applied in class workplace organization, safety, culture/attendance/teamwork
• Presentation and communication skills integrated into program
• Income (hourly wage, bonuses, raises)
• Future employment and increased opportunities
First Class of AMTs

Fall 2010
Challenges for the College

- Class schedules
- Faculty and staff
- Recruitment minorities/women
- Implementation of activities into curriculum
- Work vs. school
- Outside activities
- Resources
Challenges for Students

• Being professional
• Being on time for class
• Turning homework in on time
• Time management
• Staying focused
• Controlling the texting
Recommendations

• Buy-in from all parties from the beginning
• Plan and standardize schedules in advance
• Set expectations with students and faculty
• Do consistent interval student performance checks
• College and company communicate regularly
• Engage managers in activities where possible
The Pathway Steps: Internship

BEST PRACTICE FOR:
1. First Day work readiness
   *Runs the floor on a daily basis.*
2. First Day work behaviors
   *Demonstrated attendance, teamwork, initiative, and diligence capabilities*
3. First Day Lean Manufacturing readiness
   *Knows/practices 5S ... TPS ... Problem Solving*

• Well paid, full-time ($38,000 - $50,000 annualized)
• Invaluable experience, deepens skill.
• Student demonstrates comprehensive capability.
• Target: Master tasks to keep shop running daily.
• Flexible length allows to align to job opening.
The Pathway Steps: Internship

- At the Kentucky Program
  - Internship is 1-2 years.
  - Interns are eligible for medical and vacation benefits.
  - Pay is progressive based on performance.
  - Basic structure is:
    - 1\textsuperscript{st} year: Master the Daily tasks to run the floor.
    - 2\textsuperscript{nd} year: Align to a job opening.
    - Actual time can vary.
The Pathway Steps: Employment

Hired if: a) Successful internship, b) job opening.
About 95% of interns are being successful.
Annual starting pay in the $60k range.
Typical is $70k - $100k with premiums and overtime.

MEASURABLY CONTRIBUTES TO INDUSTRY BEST PRACTICE FOR:
1. Safety Improves company safety condition and goals
2. Quality Right work the first time, every time
3. Productivity Continually improves work lead time
4. Cost Lowers company cost
5. Fastest Learners for Performance Shortest learning time
The AMT Program: **FAME**

- Toyota reaches out to other manufacturing and invites them to join the AMT program.

- The manufacturing collaborative group supporting the AMT Program is known as the **Federation for Advanced Manufacturing Education → FAME!**

- Active groups: **WV FAME, KY FAME**

- Tennessee, Alabama, & Indiana groups starting
THE AMT Program: KY FAME

• 13 companies: 10 sponsoring AMTs, 3 waiting for new AMTs.
• About 50% of AMTs are now non-Toyota.
• Work collaboratively to support the program
• Are a “living advisory committee.”
AMT Program: More

• Professional Development
  – Faculty training for new programs
  – Training in all Manufacturing Core Exercises
    Safety Culture, Workplace Organization, Lean Manufacturing, Problem Solving, Machine Care
  – Can teach the Core Exercises to non-AMT customers
  – Continuing experiences in the Mfg. workplace
  – Part of national communication network
AMT Program: More

• Fact-based Decision Making
  *An aspect of Toyota management practice!*
  
  – Comprehensive data-base in active development
  
  – Types of data: Academic (grades, etc.), work-task completions, attendance, drop reasons, work evaluations, demographics, source schools, assessment results (including ACT, SAT, other tests), special programs in all phases (e.g. PLTW), class standing, and more.
AMT Program: More

• Fact-based Decision Making Example:

What we already know about PLTW/non-PLTW students coming into the program:

  *For completers, PLTW has higher GPAs*
  *For drops, non-PLTW rate is 300% higher than PLTW*

• Current conclusion: Strategy to focus on PLTW schools appears to be correct and productive
AMT Program: Future

- Integration of the AMTEC online curriculum as a regionally common core
- Annual conference including companies, schools, faculty, and students (starts 2014)
- Nationally networked program management and data management
- National website, promotion, recognition, etc.
- Engagement of external researchers for mutual benefit (meaningful research for them, actionable results for us)
- System to assess U.S. performance vs. global performance (skilled/technical education and work).
The AMT Program: Snapshot Today

• Six AMT programs in place
  – Kentucky (4th year): Bluegrass CTC
  – West Virginia (2nd year): Bridgemont CTC
  – Indiana (1st Year): Vincennes Univeristy
  – Mississippi (1st Year): Itawamba Community College
  – Texas (1st year): Alamo Colleges
  – Tennessee (Starting): Jackson State Community College

• One programs starting implementation (Aug., 2014)
  – Alabama: Calhoun Community College

• Preparing/Studying Implementation
  – Missouri: 2 plants, school to be determined (Preparing)
  – Mexico: Universidad de Tijuana (Studying)
Newest Program: TMMTX

TOYOTA & Alamo Colleges
Advanced Manufacturing Technician Program

TMMTX
AMT Students and Toyota AMT Leaders
July 10, 2013
The First Class
TMMI: 1st Class

TOYOTA & Vincennes University
Advanced Manufacturing Technician Program

TMMI
AMT Students and Toyota AMT Leaders
ORIENTATION DAY
June 17, 2013
The First Class
TMMWV 2nd Class

TOYOTA / Bridgmont Community & Technical College
ADVANCED MANUFACTURING TECHNICIAN PROGRAM

Class 2013
Orientation Day
June 24, 2013
Kentucky 4th Class

KY FAME / Bluegrass Community & Technical College

ADVANCED MANUFACTURING TECHNICIAN PROGRAM

AMT Students 2013 Class

KY FAME
Kentucky Federation for Advanced Manufacturing Education

TOYOTA
3M
Central Motor Wheel
G. R. Spring
Topy

Link-Belt
Sealing Life
Bullard
Florida Tile
Webasto
I. B. Moore
The AMT Program: Snapshot Today

To date there have been over 700 visitors to the AMT Program in the past 2½ years.

- 6 Nations
  - United Kingdom, Germany, Brazil, Japan, Canada, Mexico

- Many companies, including from other states (incl. GE, John Deere, Fed Ex, Ford, GM)

- School districts from Texas and Mississippi

- Many colleges and universities

- CTE and government researchers and research organizations
The AMT Program: **Snapshot Today**

Jennifer McNelly, President of the Manufacturing Institute, part of the National Association of Manufacturers, visits to recognize the AMT Program as a national best practice.
The AMT Pathway to Employment

Megan Gant’s Pathway to Employment

College A.S.

Special Toyota Degree Program

1-2 Yrs

100% Toyota Relevant

$ $ $ $ 

Internship

Team Member

$ $ $ $ $ $ 

Career

$ $ $ $ $ $ 

1-2 Yrs

Megan as a new AMT Student

Megan as mid-term AMT Student

Megan as senior AMT Student

HIRED: August 26, 2013!

Megan as an AMT Intern

Assigned to Assembly with Mgr. John Dotson

Megan as an AMT Intern

Working on the Manufacturing Simulator

Megan as a new AMT Student

Megan as senior AMT Student

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THANK YOU!!

Questions
&
Answers
Global Quality
Technicians Making the U.S.
First in Global Manufacturing

- An Education/Industry Partnership – a “co-owner” program.

- Re-defines the Customer Relationship of education:
  Old Model: The Student is the No. 1 Customer
  New Model: The Student and Industry are Co-No. 1 Customers
  Practical Effect: Results in a better program and an almost 1-to-1 employment ratio.

- Not a “technical college” - a “Manufacturing Magnet” college with the goal of preparing globally competitive technicians that will support the success of U.S. manufacturing against our strongest international competitors.

- Re-designs the learning environment. Transforms the place of learning to look/feel/function like the place of work (Classrooms are unrealistic).

- Emphasis is on the “Technician” (the person) and not the “Technology.”
  But there’s still more technology in this program than in traditional programs.

- Work/Study scholarship program, with close coordination of all activities. Pay for work will covers education expenses.

- Re-designs the curricular program:
  Selective program, targeting best talent from the K-12 system.
  100% use of every learning minute (8 hrs/day, 5 days/week, 5 straight semesters).
  Every course pre-selected for maximum preparation for advanced manufacturing.
  Adds 5 extra-curricular semester-long modules to teach the DNA of manufacturing.
  Emphasizes verbal and written communication skills and key work behaviors.

- Industry-led coalition pulls in additional employers to sponsor students.

- Part of a larger career pathway program leading to additional education.
TOYOTA Education Career Path Model for North American Plants

Kentucky Plant Fall-2010
West Virginia Plant Fall-2012
Mississippi Plant Fall-2013
Texas Plant 2013

Initial Implementation Model

External Hires (already skilled)

Fundamental Skills Assessment

TOUR 1/Yr

Engage These Demographics

Dream It! Do It!

Dream It! Do It!

Career Pathways Partnership

2013 Excellence Award winner!
National 1st place
Toyota AMT Program (NAPSC)

Best Education Career Pathway in the U.S.

Dream It! Do It!

Career Pathways Partnership

1-2 Yr GTT

ACADEMIC LEARNING

TOYOTA

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