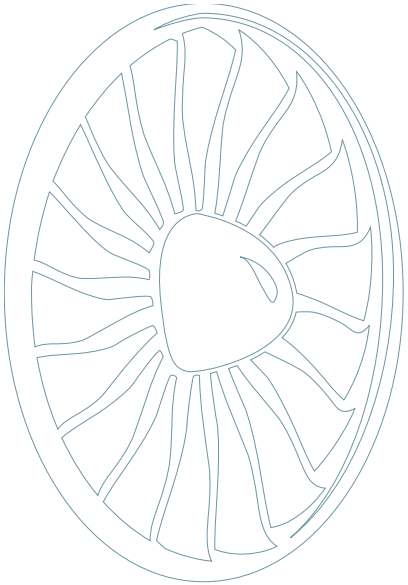
MTU Maintenance Canada
An MTU Aero Engines Company

Innovation and Growth through Human Capital

2nd National Labour Market Strategy - November 2017

MTU Aero Engines at a glance



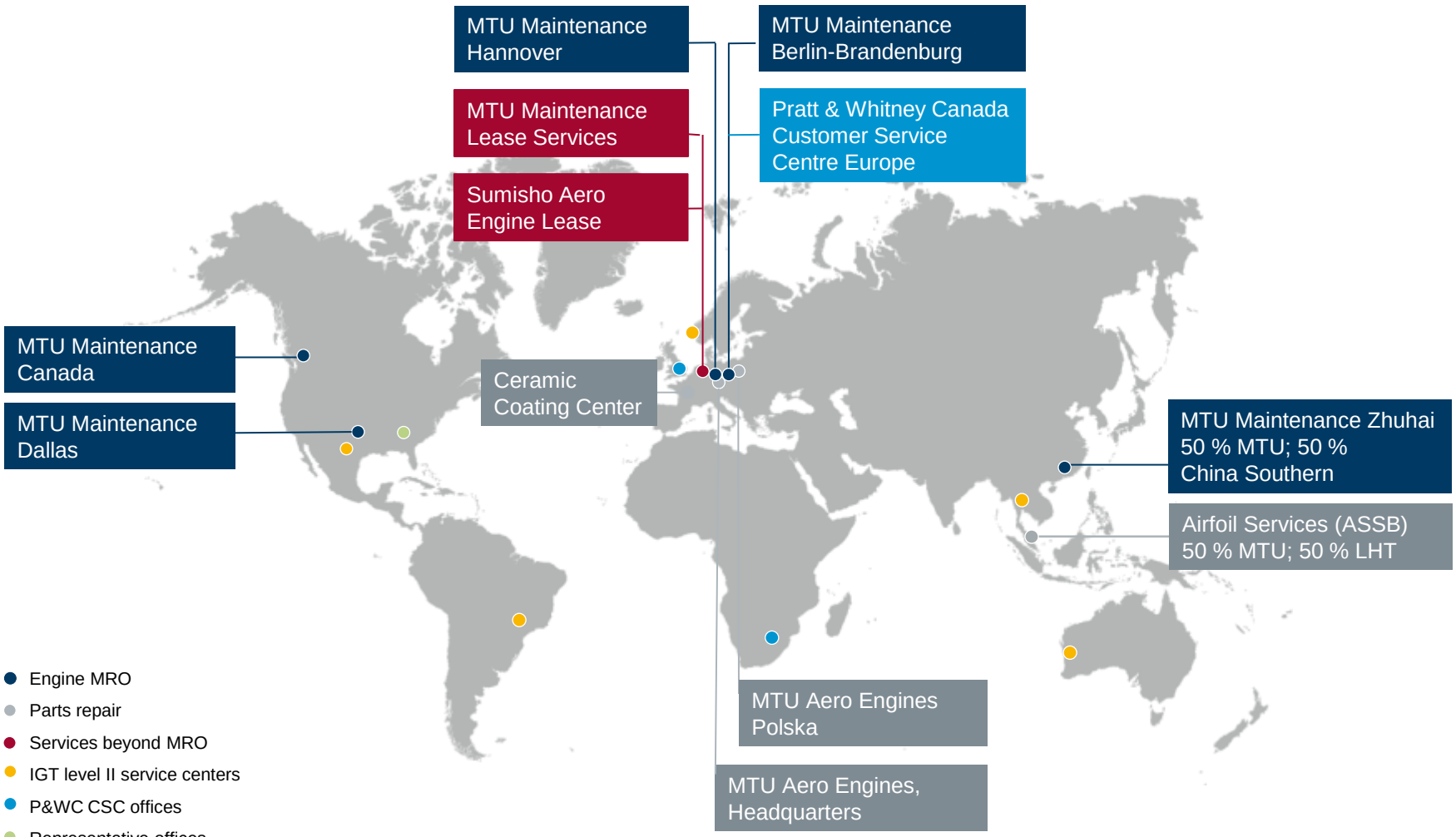
Leading German engine manufacturer
and key partner to OEMs for military and commercial engines

A leading provider of engine services

€4.7 billion revenue with **~9,000 employees**

Worldwide network of facilities and representative offices

Worldwide MRO network



Worldwide MRO network

MTU Maintenance Canada Ltd.

Shareholder	100% affiliate of MTU Aero Engines
Founded	1998
Compe-tencies	Engine and accessory MRO LRU (line replaceable unit) management

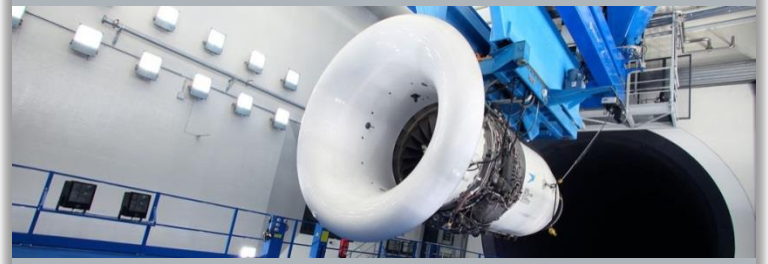
Engine MRO portfolio	Overhaul: CF6-50, CFM56-3, V2500 Minor workscopes: CFM56-2/-7
Production area	Engine shop: ~8,500 sqm Accessory shop: ~3,350 sqm
2016 facts	99 events[1]; 79 shop visits[1/2]; 389 employees[3]

[1] deliveries [2] according to OEM definition [3] total staff capacity per year end

MTU's long-term commitment to its Canadian facility: V2500 capability introduction

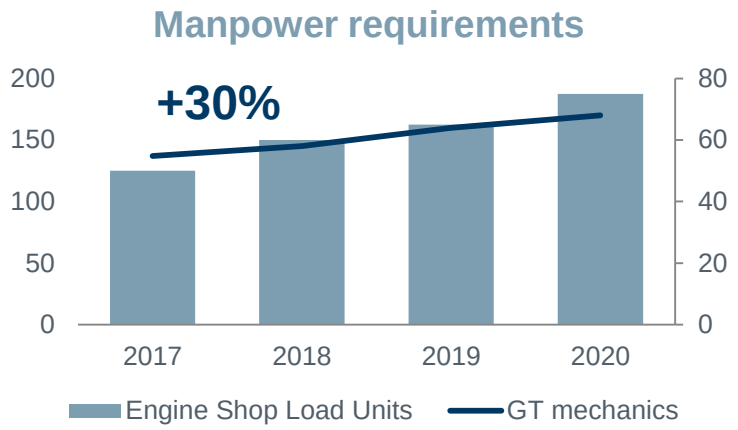
- **$20M investment in Canada** approved in 2017
- **Canada will support commercial and military customers** and be the exclusive provider for the V2500-E5 (Embraer KC-390)
- **1st engine scheduled for Dec 2017**
- **Potential to support over 100 engines p.a. with up to 500 staff, 175 of which are engine mechanics**
- Growth and ramp-up speed **constrained by availability of qualified gas turbine technicians**

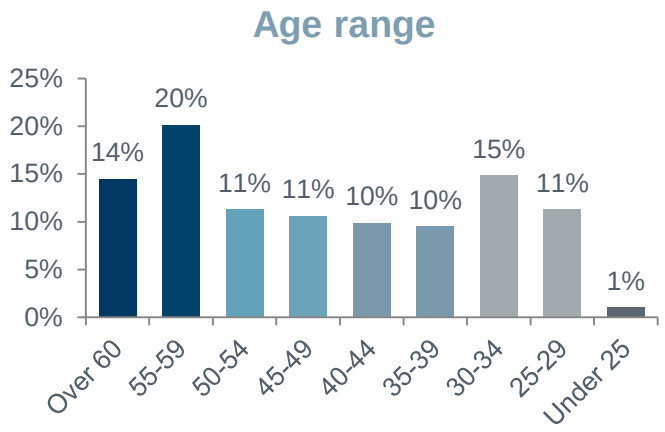
V2500 facts



- MTU Aero Engines is a RRSP and MRO network partner in IAE's V2500
- International Aero Engines is a JV between Pratt & Whitney, MTU and Japanese Aero Engines Corp.
- Applications: A320 Family, Boeing MD-90, and Embraer KC-390
- 6,200+ engines in service, 1,000+ shop visits p.a. worldwide until 2025 and 400+ engines currently serviced at MTU

The workforce challenge: MTU Canada growth and ramp-up speed will depend on the availability of qualified gas turbine technicians





- Major issues: aging workforce and general shortage of skilled mechanics
- **Only viable option is in-house training**: long-standing, strong relationship with BCIT, re-established its 18-months apprenticeship program this year
- **Available candidates not sufficient to meet requirements** and a career in aviation doesn't seem to be very appealing to a lot of young people anymore

Key question: How can we align the Gov'ts interest to support millennials as well as the aerospace industry?

What is Germany‘s dual training system?

The dual system is firmly established in the German education system. The main characteristic of the dual system is cooperation between for the most part small and medium sized companies, on the one hand, and public vocational schools, on the other. This cooperation is regulated by law.

The Vocational Training Act of 1969, which was amended in 2005, introduced this tight-knit alliance between the Federal Government, the federal states (Länder) and companies with a view to providing young people with training in occupations that are recognized nation-wide and documented accordingly through certificates issued by a competent body, i.e. chamber of industry and commerce or chamber of crafts and trades respectively.

The German dual system offers an excellent approach to skill development, covering initial vocational education and training, further vocational education and training, careers, employability, occupational competence and identity. Thanks to the dual system, Germany enjoys low youth unemployment and high level skills.

In Germany, about 50 percent of all school-leavers undergo vocational training provided by companies which consider the dual system the best way to acquire skilled staff.

Retrieved from: The Federal Ministry of Education and Research: https://www.bmbf.de/en/the-german-vocational-training-system-2129.html

Germany‘s dual training system: Facts and figures

- **More than 1.4 million apprentices** support German companies, 83% in companies with less than 500 employees
- On average, one certified trainer trains 2.2 apprentices
- Almost **90% of large companies employ apprentices**
- About **455,000 companies** take part in vocational education training
- More than every fifth German company employs apprentices
- Almost **566,000 signed new apprenticeship contracts**
- More than 530,000 apprentices take part in final exams, of which 95% successfully pass
- The average age of a graduated apprentice is 22. Apprentices are on average 19.5 years old

Retrieved from:
Germany Trade and Invest (GTAI) - Vocational Training “Made in Germany” Germany’s Dual System of Vocational Education and Training (VET)
https://www.gtai.de/GTAI/Content/EN/Invest/_SharedDocs/Downloads/GTAI/BLG/blg--most-wanted--dual-vocational-training-in-germany-pdf.pdf

Vocational training at MTU Maintenance Hanover

- Vocational training in four trades
- 5 training supervisors
- 563 apprentices since 1990
- Annual project activities
- International exchange program
- Every graduate is offered a job*

*12 months minimum

2016 facts:

14 aircraft engine mechanics

5 industrial mechanics

3 warehouse logistics clerks

MTU Maintenance Canada's apprentice program

- Over 70 apprentices since 1999
- Graduates from AME or GTE programs
- 18 month apprenticeship
- Not an ITA approved trade
- Primary feed is from BCIT
- Supervised by BC Provincial Instructor Diploma (PID) Graduate

APPRENTICE PROGRAM ALUMNI 1999-2017

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Additional Background

Vocational Training in Germany: Advantages

Continuously updated and relevant training classifications and contents:

- There are currently around 330 officially recognized training occupations. Employer organizations and trade unions are the drivers when it comes to updating and creating new training regulations and occupational profiles or modernizing further training regulations.

Benefits for Employers and Trainees:

- Training companies do not only save on recruitment costs but also avoid the latent risk of hiring the wrong employee for the job. Investments in first-class training are a key factor for success in an increasingly competitive world.
- The main benefit for apprentices, in turn, is that they receive market-relevant training while already earning money and gaining hands-on experience with a potential employer. Roughly 2/3 of the trainees get a permanent position with their company. Vocational qualifications are recognized nationally and give the candidate an easily transferrable and highly sought-after qualification

Exporting the German training model

- There is a growing awareness across Europe and all over the world that excellent work-based vocational education and training is vital for competitiveness and social participation. Demand from other countries for cooperation with Germany in this area remains high.
- The Federal Ministry of Education and Research supports, among others, the European Alliance for Apprenticeships initiative launched by the European Commissionis, and closely cooperates with the OECD in the context of work-based learning.
- South Korea adopted a dual system, based on the German vocational system, in the 1990s

Vocational training at MTU Maintenance Hanover

Aircraft engine mechanic — Since 1990

repair and test modules, and perform an overhaul in order to restore the engine to its normal condition after a prolonged period of service

performing all kinds of tests and repairs by strictly complying with service bulletins and manufacturers' manuals

Duration: 3,5 years

Industrial mechanic — Since 1990

install, maintain, operate and repair electronic/electrical and automated equipment or machinery

Duration: 3,5 years

Warehouse logistics clerk — Since 2010

managing the movement of goods and services from one place to another

record keeping, coordination, communication and correspondence as required for smooth transportation of goods from the vendor's place to the recipient's address

Duration: 3 years

Surface coater — Since 2013

Up grading metal surfaces with the aid of electrolysis

Application of protective or colored metal coating

Chroming, copper-, gold- and silver-plating

Duration: 3 years

Apprentice Program Components

Participatory

- Learn by doing
- On-the-job training (OJT)
- Log books
- Shop rotation
- Classroom training
- Pragmatic

Social

- Mentoring program
- Community of practice
- Interactive coaching
- Development of values
- Relationship building
- Foster a learning culture
- Communication & leadership

Metacognitive

- Project based learning
- Reflective journaling
- Promote autonomous learning
- Defining and interpreting culture and context
- Critical thinking

MTU Maintenance Apprentice Program

Theory Based Approach

- Holistic development (Skill/ knowledge/ beliefs/ values)
- Focus on Personal growth and development
- Reinforce self-efficacy (confidence + competence)
- Provide an environment that supports learning
- Team based problem solving
- Challenging the learner to grow

Student project: labeling V2500 engine components

Community of Practice

Social Learning Strategy

- Weekly meeting to build community
- Meeting is chaired by the apprentice team
- Unscripted—open forum
- Sharing lessons learned
- Learning from the mistakes of others
- Networking and relationship development

Weekly COP Meeting

Reflective journaling

A Critical ‘meta-cognitive’ element of the learning cycle
Journal Excerpts:

“I want to be part of a team that focuses on improvement.”
“My goal is to focus on integrity, focus on character, and focus on authenticity...”

“People will tolerate honest mistakes, but if you violate their trust you will find it very hard to regain their confidence...”

“I have very high confidence- I reached todays goals!”

“Emotional experiences can teach us as much as physical ones.”

“I had my ‘aha!’ moment & understood it so well…it was rewarding.”

“What makes a good apprentice? Ask lots of questions, be punctual, don’t be afraid to ask questions, have a good attitude above skillset, learn as much as you can…”