



Company Profile  
Manufacturing Technology  
in the hands of the Experts





# About Us

A unique combination of engineering expertise, process knowledge and an innovative approach to software design makes us the leaders in our field



TTL has been one of the leading industry names for CAD/CAM and CNC machining since 1987. As part of the global Starrag group, and a dedicated Siemens UK specialist CAM partner, we provide turnkey software solutions with an emphasis on manufacturing for international businesses in the aerospace, power generation, marine, motorsport, and medical sectors.

Certified to ISO 9001 standards, we take a human approach when providing technology which integrates into your existing business processes to ensure you get the most out of your investment.

We understand the issues of your business and tailor solutions accordingly, with comprehensive aftersales support. It is this approach, together with our range of experience

and knowledge which helped us win the prestigious Queen's Award for Enterprise in the Innovation category for our Adaptive Machining technology.

Innovation remains at the core of everything we do today for our customers, delivering highly efficient advanced software based machining solutions, and first class customer care.

# Adaptive Technology

Lower cycle times, increase accuracy and minimise operating costs by utilising Adaptive Machining in the manufacture and repair of complex components

When coupled with standard CNC machine tools, our Adaptive Machining software provides the capability to machine and blend complex three-dimensional components and features automatically, where geometrical differences exist between one component and the next.

For freeform shapes with complex geometries such as gas turbine components, blades and vanes, our application-specific solutions eliminate human error and boost accuracy for new and repaired parts.

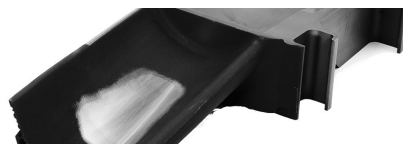
Proven applications for our Adaptive Technology include:

- » Castings and forgings that have inherent variation
- » Parts subject to shrinkage variations from temperature fluctuations
- » Die wear and heat distortion
- » Wear and tear during operation.



## Blisks & Impellers

Our Adaptive Machining techniques use in-process feedback to analyse intended versus achieved results, enabling you to make corrections in order to maximise accuracy and yield.



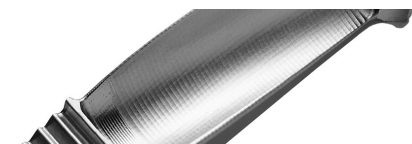
## Compressor & Turbine Aerofoils

By using Adaptive Machining to repair these components, you can reduce cycle times, remove human error, achieve a virtually net finish and benefit from a fast return on investment.



## Moulds & Dies

Adaptive Machining benefits parts that have become worn, or subject to design modification; providing precise cutting, full machine simulation abilities and exacting finishing abilities for complex parts.



## New Part Manufacture

Adaptive Machining also decreases the risk of wasted resources on reworking defective or malformed parts, reducing scrap whilst improving quality and consistency for each component.



## Nozzle Guide Vanes

Our solutions for nozzle guide vanes are unique and take measurement data from gas-path surfaces to automatically make decisions about where to machine inner and outer location features.



## Other Adaptive Applications

Adaptive Machining can play an important role in the analysis and custom manufacturing of any part where the shape, size and form must be tailored individually.



# Siemens NX™ CAM

Solution  
Partner  
Smart Expert  
Digital Industries  
Software

SIEMENS

We provide complete Computer Aided Manufacturing solutions to help you overcome barriers between design and manufacturing



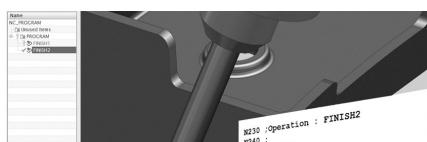
TTL is Siemens Industry Software's chosen specialist CAM partner. With more than 150 years of combined experience in CNC programming, multi-axis machining and an in-house NX driven machine shop, TTL are uniquely placed to provide the expert help and support required to maximise the return on a CAM investment.

## Why Siemens NX CAM?

As manufacturers face shorter product development cycles, faster

development of CNC programmes for parts, moulds, tools and dies are necessary to continuously innovate designs. Siemens NX CAM provides one of the most powerful, scalable and feature-rich approaches to manufacturing technology to improve productivity throughout tooling, fixture design, and NC machining processes.

Break down the barriers between design and production in your business and make better parts faster.

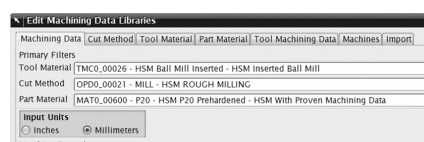


## Post Processors

Post processors need to be written to suit individual machine tools and specific workflow requirements.

NX post processors provide the ultimate in customisation capability compared to those supported by other CAM systems and we can tailor them to incorporate any individual requirement, providing post processors for all types of CNC machine tools, multi-axis milling and complex mill-turns.

TTL is one of few companies that can configure and support NX Integrated Simulation and Verification (ISV) modules to allow true G-code real-time validation of the part machining process within the NC programming session.



## Software Configuration

We configure and customise NX CAM software to suit the individual needs of your business and boost your efficiency.

Whether you have an unusual machine tool configuration, a highly demanding type of work, complex materials that are difficult to machine, or are looking for ways to make NX CAM more productive, we customise NX CAM to enable it to respond to your individual needs.

Our team can implement re-usable code to your solution, customise the user interface and configure the software so it fits around your business. With best practice built into every solution we configure, you realise the powerful flexibility of NX CAM, without the worry of complicated programming.



## Technical Support

Our service doesn't end once we have delivered your CAM software. We understand that investment in any technology is a long-term commitment and we partner with you through every step of the journey.

We provide after sales support to make sure that you are always using NX CAM efficiently.

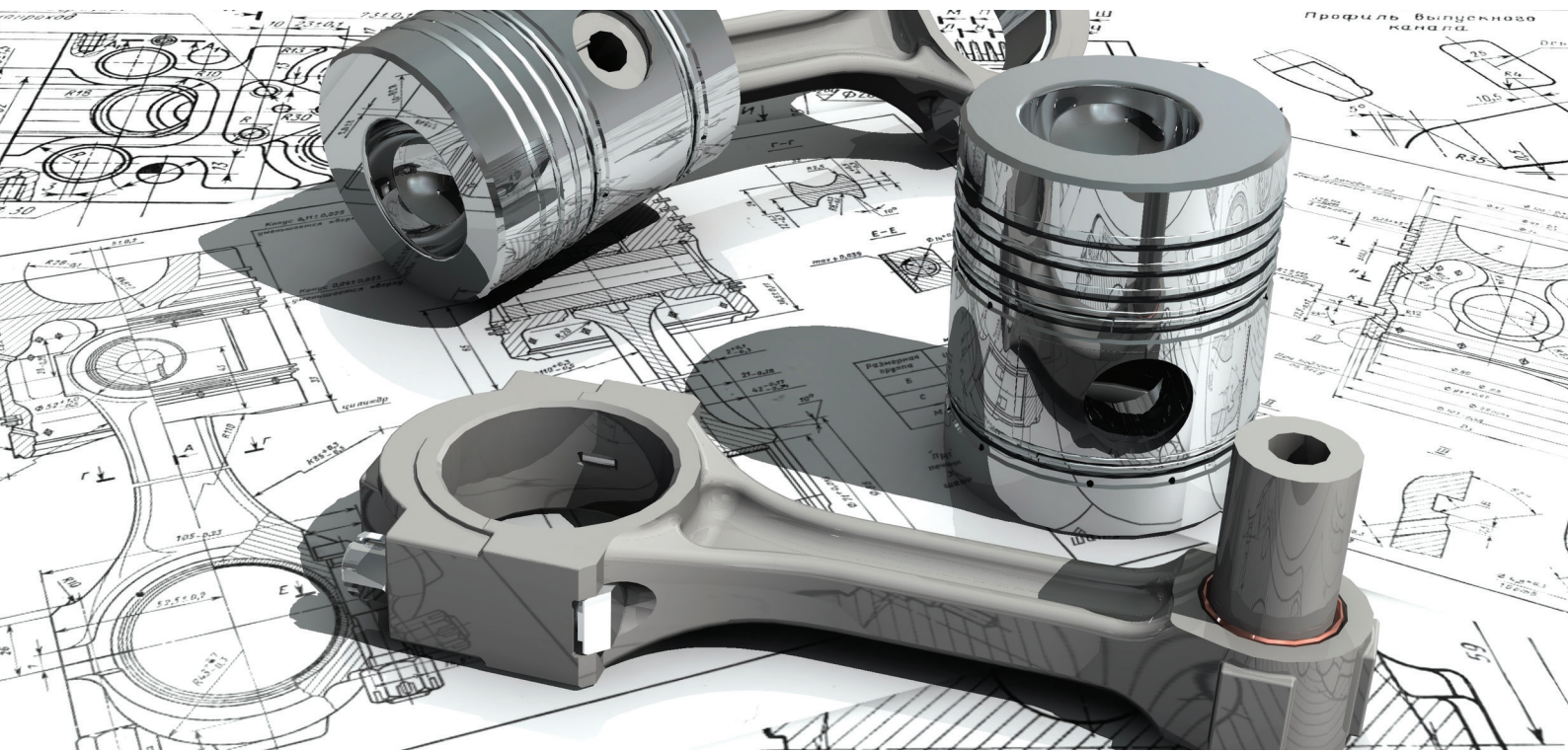
As users of the technology ourselves, we are uniquely positioned to provide expert support to our customers and to share our own experiences of the solution. Our technical helpdesk is available to answer any questions you have about NX CAM and resolve issues quickly and efficiently.

# Training

Solution  
Partner  
Smart Expert  
Digital Industries  
Software

SIEMENS

We help you realise ROI from NX™ CAD/CAM and Adaptive Machining with regular scheduled training courses provided throughout the year



With years of experience in these disciplines, our highly trained and enthusiastic course leaders take a friendly and interactive approach to training, based around modern machining practices. We can carry out training at your site, or you can visit us to see how we are using NX CAM in our own in-house NX driven machine shop.

Call us today to arrange a customised course tailored to your business needs.

## **NX CAD Foundation**

Introduces Design and Parametric Modelling skills.

## **NX CAD Sketching & Modelling**

Looks at some of the more advanced features of the sketch environment.

## **NX CAD Advanced Drafting**

Gives the student a better understanding of the Drafting environment.

## **NX CAM Fixed Axis Milling & Holmaking**

Introduces the Manufacturing Application.

## **NX CAM Turning**

The use of functionality in the NX CAM Turning environment.

## **NX CAM Mill Turn**

Merges Milling and Turning techniques into the one Manufacturing environment.

## **NX CAM Advanced Milling & 5-Axis**

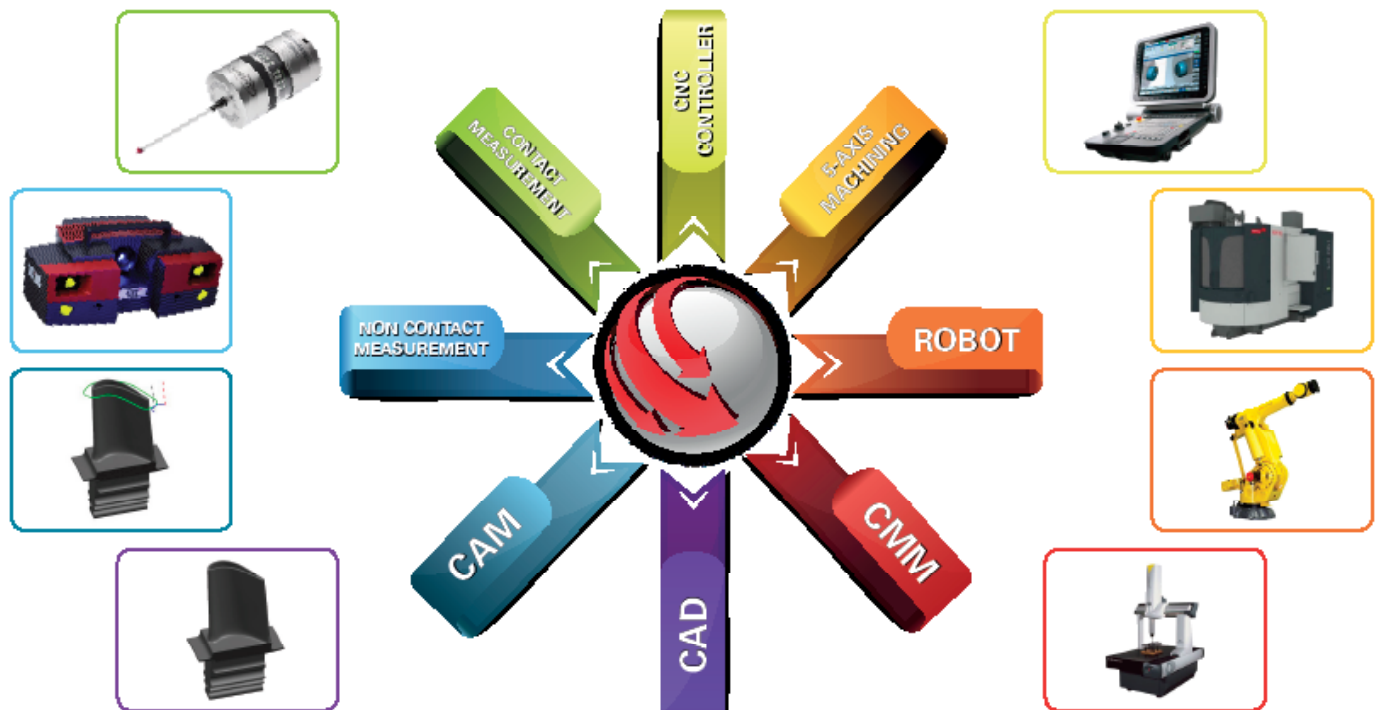
Advanced techniques in creating fixed axis toolpaths and also simultaneous multi axis toolpaths.

*Full details can be found on our website.*

# Process Automation



Eliminate human error from your manufacturing process with our Process Automation tools



Our Process Automation Manager improves efficiency and quality while reducing costs associated with over reliance on manpower, eliminating human error and reducing overall cycle times. It is a framework programming environment and toolkit, used to create and run complex process sequences involving, for example, machine tools, measurement systems and robotics etc.

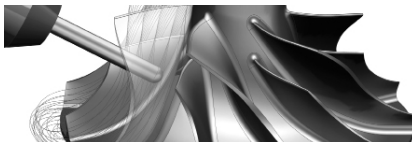
Built upon a standard Windows interface, our solution integrates with any CAD/CAM software that has macro capabilities with built in connectivity to a range of CNC control types (e.g. Siemens, Fanuc, Heidenhain). It speeds up the production process, automating manual tasks such as data analysis and recalculation, to revolutionise the process chain.

Intuitive, easy to learn and fully customisable, our Process Automation Manager is a culmination of our team's experience and knowledge.

To improve consistency of quality in your machining process, reduce costs and reduce cycle times, ask us about Process Automation today and we will show you how we can make it work for your business.

# Other Services

Our knowledge and expertise can be traced back to the very early days of NC programming; today we are expert users of the very latest CAD/CAM systems



## 5-Axis Machining and Probing Solutions

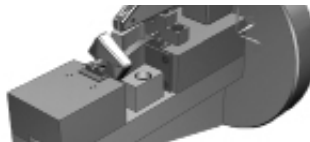
AtTTL, we have been programming 5-axis machine tools for over 20 years. We understand how to generate highly optimised 5-axis programmes and when 5-axis techniques are most beneficial.

We provide a range of special software modules to solve complex programming issues. Our 5-axis probing programs are closely linked to the machine post-processor and can be generated quickly from within the CAM environment.

Our solution flags up any probing move that collides or interferes with the part in any way, during the programming stage. The problem can then be quickly eradicated by special vector control tools within the software so that the probing program can be verified dynamically.

This provides a quick and simple interactive method of generating complex 5-axis probing routines and therefore reducing the risk of collision.

To simplify your complex 5-axis probing, speak to our experienced team today.



## Fixtures and Tooling

With unique geometries and the struggles associated with holding and locating a part in a precise way, manufacturers, repairers, and engineers face constant fixture design and performance problems.

TTL has the solution. We offer a comprehensive service in the design and manufacture of purpose made component fixtures. Specially developed, our fixtures are designed from first principles using solid modelling CAD/CAM systems where basic fit, function, operation and weight can be analysed. In addition, overall suitability to the machine tool on which the machining operation will be performed is verified.

Our design experience allows for precise component location with high repeatability, rapid loading times, rigid component clamping and wear resistant bearing surfaces. Our fixtures are optimised for fast part changeover, designed to be corrosion resistant and compatible with any machine tool or zero-point clamping system.

Solve your complex work holding problems with our purpose made component fixtures.



## Sub-Contract Programming

Struggling to recruit skilled CNC Programmers? Lean on our expertise.

AtTTL, we have a depth of CAM experience that is rarely equalled, and never beaten. Members of our team have grown up from the early days of NC programming and have developed with the industry. In the world of multi-axis machining for manufacturing complex components, there are few problems we are not willing to undertake – and solve for your business!

In addition to providing subcontract machining services, we also offer CAM programming customisation. We make complex programming tools available to less experienced users in a very application specific and easy to understand way. Our customised user interfaces are developed around your individual processes and can add user defined functionality where required.

Make TTL your CAM partner of choice.



# Industries

TTL's expertise, knowledge and experience can bring significant benefits to a multitude of applications and industry sectors



## Aerospace

We work with businesses throughout the aerospace OEM and supply chain to provide a complete solution for component repair and manufacture to gain a competitive edge. While our NX CAM solution can help aerospace manufacturers with complex machining tasks, our Adaptive Machining technology can help to ensure consistency of quality throughout the manufacturing process chain.



## Power Generation

How are you responding quickly to the demand for reducing costs, keeping quality high, and providing a quick turnaround for turbine parts that have been taken off-line for repair? Automation is essential. Our Adaptive Machining solutions take the human factor out of the process and guarantee an accurate job, every time.



## Medical and Pharmaceutical

We provide a complete range of solutions comprising CAD/CAM, reverse engineering, Adaptive Machining and multi-axis machining to enable us to handle materials that are difficult to machine, such as medical grade titanium and cobalt chromium alloys. We assist with the manufacture of custom made medical products, with high precision, cleanliness, compliance, safety and quick turnaround.



## Motorsport

High performance motorsport depends on reliable, precision-engineered components. We have a proven track record working within Formula One and other motorsports as a trusted supplier of high precision components for vehicles. Our Adaptive Machining technology enables us to eliminate manual operations, stabilise production processes, maximise accuracy, and react quickly to our customers' needs.



## Marine

With individual components all having different geometries, the manufacture of marine gas turbines offers no room for inconsistency. By automating processes, you increase output and reduce cycle times without forfeiting accuracy and consistency. Automation has also proven to reduce costs by up to 50% with reductions in cycle time, non-conformance, labour costs through elimination of handwork and human error.





TTL  
Unit 1a & 1b Haddenham Business Park  
Pegasus Way  
Haddenham  
Bucks HP17 8LJ

T +44 (0)1844 296650

[enquiries@ttl-3d.co.uk](mailto:enquiries@ttl-3d.co.uk)  
[www.ttl-solutions.com](http://www.ttl-solutions.com)