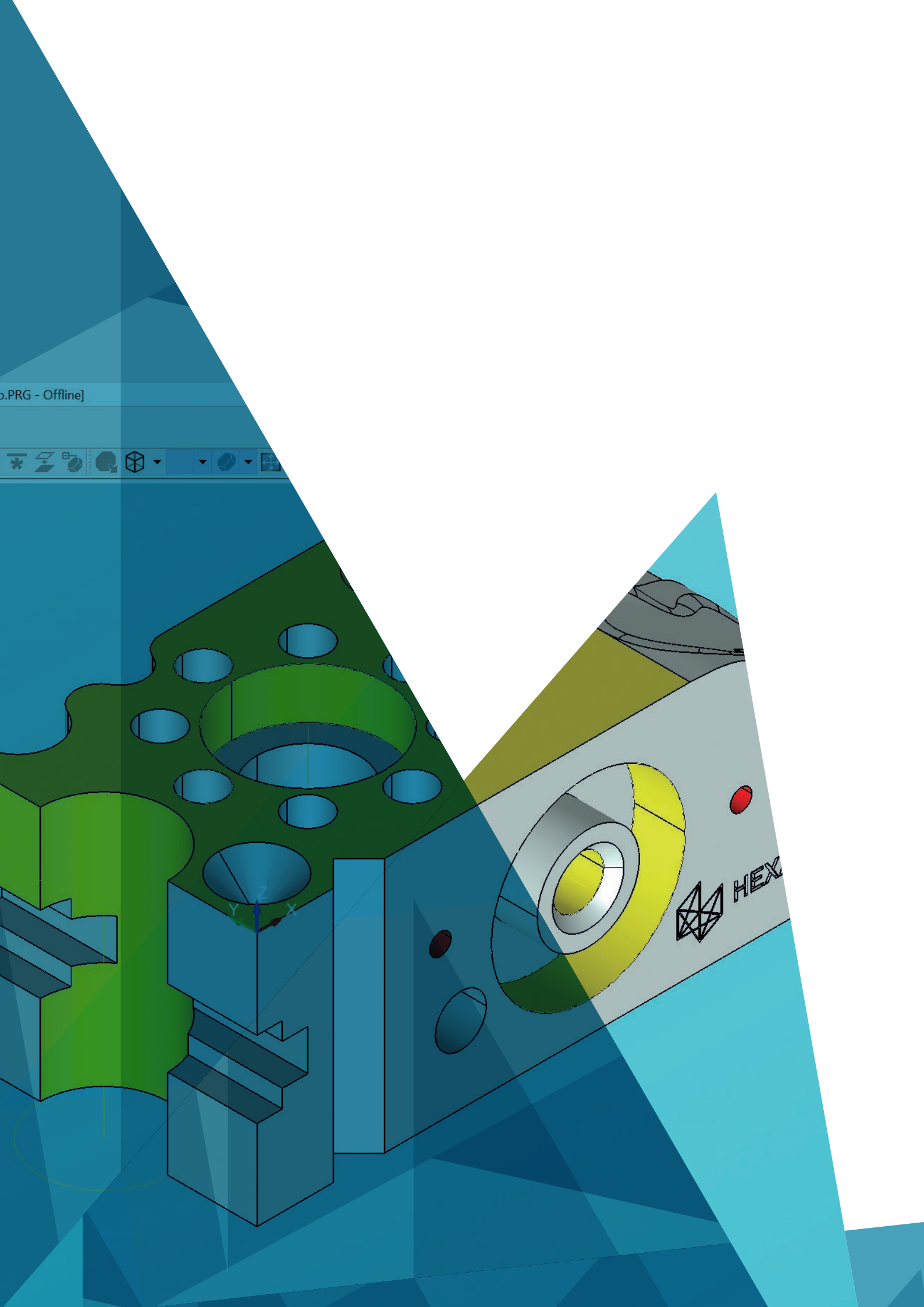
HEXAGON
MANUFACTURING INTELLIGENCE

PRODUCT BROCHURE

PC-DMIS®

ENTERPRISE METROLOGY SOLUTIONS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THE ENTERPRISE METROLOGY SOLUTION

ENTERPRISE METROLOGY SOLUTIONS (EMS) FOR PROCESS CONTROL AND IMPROVEMENT

With PC-DMIS EMS, a metrology information system can be tailored to meet the specific requirements of any manufacturer. The EMS suite is an integrated group of metrology software products based on a common technology, making it flexible and powerful.

PC-DMIS EMS helps manufacturers build metrology capabilities into multiple stages of the production process from design through production. This interaction at multiple stages improves information availability and allows data-driven decision making that can improve operations.

DATA CLOSED LOOP MANUFACTURING

Each PC-DMIS module uses a standardised programming interface to create inspection programs for a wide range of measurement devices. The inspection routine first tells the inspection program how to inspect a part and then how to analyse the generated data. The results are entered into the PC-DMIS reporting engine, which is standard across all version of PC-DMIS. This means that no matter what the data source, users can easily create and understand the reports and take corrective actions.

DATA AGGREGATION

PC-DMIS' flexible, powerful reporting engine provides in-depth information about individual parts. SPC applications allow analysis of the aggregated results from many parts. To meet that need, PC-DMIS EMS offers DataPage+ SPC software. Analysis of data coming from any edition of PC-DMIS is combined real-time into live dashboards and reports of actionable information.

PC-DMIS ENVIRONMENT
SCALABLE, FLEXIBLE PROGRAMMING TOOLS

ENHANCING PRODUCTIVITY AND QUALITY THROUGH CONSISTENCY, SCALABILITY AND FLEXIBILITY

PC-DMIS EMS provides manufacturers of all sizes a tightly integrated suite of metrology software products. Working seamlessly together, its modules present a consistent look and feel across the full range of measurement operations including inspection planning, program development, part measurement, results analysis, report generation and report distribution.

PC-DMIS EMS MEASUREMENT PRODUCTS

All PC-DMIS measurement modules are based on proven PC-DMIS technology and share a common architecture. PC-DMIS EMS :

- Supports a wide range of measurement machine configurations and device types, from traditional CMMs to portable devices to machine tools.
- Uses a common programming interface and universal conventions across all editions. This shortens the learning curve and reduces training costs.
- Shares programs among different machines and sensor types with minimal editing.
- Stores measurement data and information in a common database, allowing users to analyse their processes over time and across equipment types.
- Uses a common reporting engine that allows the sharing of report templates among part programs and provides quick customization of existing reports and the generation of new ones.
- Features a Quick Start function that lets users start using their equipment with minimal delay.
- Contains a single set of NIST- and PTB-certified algorithms.

CAD IS KEY

CAD has always been an integral part of PC-DMIS EMS. Using CAD:

- Designers embed their inspection requirements into the model.
- Programmers develop their inspection routines.
- Measurement software compares results to the model.
- Reports can include the CAD model for easy interpretation.
- Measurement results are used for reverse engineering and additional evaluation.

PC-DMIS EMS products offer a variety of links to CAD. Most include translators for the major neutral CAD standards (IGES, STEP, etc.). For the most exacting applications, Direct CAD Interfaces (DCIs) and Direct CAD Translators (DCTs) are available for all major CAD systems.

A Direct CAD Interface (DCI) works directly on the native CAD model, accessed through the CAD database, without translation and is the most accurate representation of the original. Using DCI occupies a seat on the CAD system.

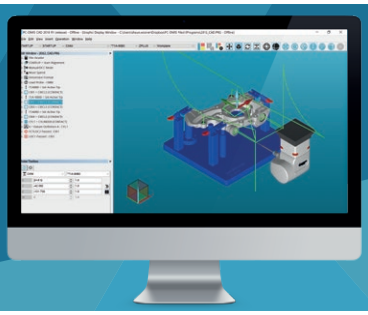
A Direct CAD Translator (DCT) converts the CAD model directly from its native format into PC-DMIS format without using a neutral translation. It does not occupy a seat on the CAD system.

DIFFERENT CAPABILITY LEVELS TO MATCH DIFFERENT REQUIREMENTS

Not all parts have the same measurement requirements. To meet these varying requirements, PC-DMIS EMS offers three configurations of most of its measurement products.

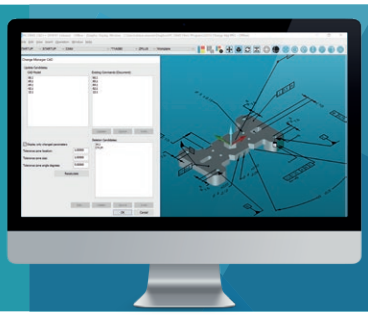
PC-DMIS PRO

PRO meets the basic needs of companies that do not need to integrate CAD and do not need to measure contoured parts. PRO is ideal for newcomers to part programming without CAD experience. Features developed to streamline the process include “guess” modes for automatically identifying the type of features measured and Quick Start routines that automate many basic metrology functions. It also offers a rich set of programming, analytical and reporting tools.



PC-DMIS CAD

CAD is ideal for makers of prismatic parts that want to integrate CAD into their inspection operations. It expands on the capabilities of PRO by letting customers program and inspect parts using CAD models ranging from simple 2D blue prints through full 3D solid models. CAD allows full use of all PC-DMIS EMS CAD-linking technologies. It features an intuitive GUI and includes power wizards that guide engineers through the programming process. CAD includes a library of kinematic machine models for simulation and allows users to add new ones if required.



PC-DMIS CAD++

CAD++ lets users measure the most complex parts. It includes all the capabilities of CAD and adds the ability to measure intricate, contoured surfaces including thin-walled sheet metal, plastic, blades, dies and molds. CAD++ supports numerous scanning devices and applications and includes algorithms for managing large amounts of data. It links to CAD, allowing users to compare measurement results directly against models for unsurpassed speed and accuracy. It is feature rich, yet easy to use.

ENHANCING PRODUCTIVITY THROUGH OFFLINE PROGRAMMING

PC-DMIS offers offline licenses of the CAD and CAD++ configurations for shops where machine time is a valuable commodity. Offline versions allow the inspection machines to be used primarily for measuring parts and not for part programming. An offline license means users can develop, test and debug inspection routines offline using CAD models. Simulated program execution is possible on accurate kinematic models of their machines, so programs can be tested before they are used on a physical machine.

PC-DMIS CMM
THE FOUNDATION OF ENTERPRISE METROLOGY

The programming, evaluation and graphics engines from PC-DMIS CMM form the foundation that all other PC-DMIS software versions are built on, making it easy for customers to build an integrated enterprise metrology strategy on a common software platform. PC-DMIS CMM is available as standard software on all new Hexagon Manufacturing Intelligence coordinate measurement machines. It is also easy to upgrade on existing machines, including most non-Hexagon CMMs. PC-DMIS CMM offers fully supported migration paths for many existing Hexagon legacy software products.

FLEXIBILITY AND EASE OF USE

- Make quick checks or program complex parts using a powerful, flexible graphical user interface.
- Configure and calibrate probes of all types quickly and accurately using a built-in set of probe management functions.
- Edit probe paths, add and delete hits, insert clearance moves and modify measurement parameters with the click of a mouse.
- Utilise graphical controls to modify part representations and set measurement parameters.
- Embed full-screen pictures and videos into operator instructions.
- Measure complex, thin-walled features quickly with a rich set of pre-defined routines.
- Develop tailor-made, high-level language routines and configure toolbars and menus according to specific needs and preferences.

LINKING TO CAD

- Manipulating models by mirroring, adding layers, removing, hiding and changing entities and adding grids.
- Using either Direct CAD Interface (DCI) or Direct CAD Translator (DCT) technologies or using neutral formats like IGES and STEP.
- Detecting potential collisions by combining CAD part models with CAD models of both holding fixtures and machines.
- Automatically modifying the CAD orientation to align with the probe direction.
- Importing even the largest CAD files using a powerful state-of-the-art graphics engine.

DATA ANALYSIS

- Repeatable and accurate results
- Conforms to international (PTB and NIST) standards for CMM software.
- Supports GD&T according to ASME Y14.5, ISO 1101 and ISO 8015.
- Supports Custom User Defined GD&T Datum Reference Framing.

POWERFUL REPORTING TOOLS

- CAD models incorporated into reports for easy interpretation. Graphical representations of measured features can be used when CAD is not available.
- Generating inspection reports using either pre-defined templates or customised formats.
- Reporting results directly with DataPage+ SPC analysis and report distribution.
- Reporting measurement data to third-party software packages for additional analysis and processing.

SUPPORT FOR 3D SCANNING

- Quickly defining scan paths and extracting nominal values and vectors.
- Scanning and measuring contoured and sheet metal parts using a wide range of probes including touch trigger, analogue and laser.
- Employing a wide variety of scanning methods and customised scanning techniques and templates.
- Automatically scanning and reverse engineering unknown surfaces and features.
- Using manual CMMs to scan both thin-walled and contoured parts.

PC-DMIS PLANNER

LINKING DESIGN TO INSPECTION

PLANNING FOR INSPECTION

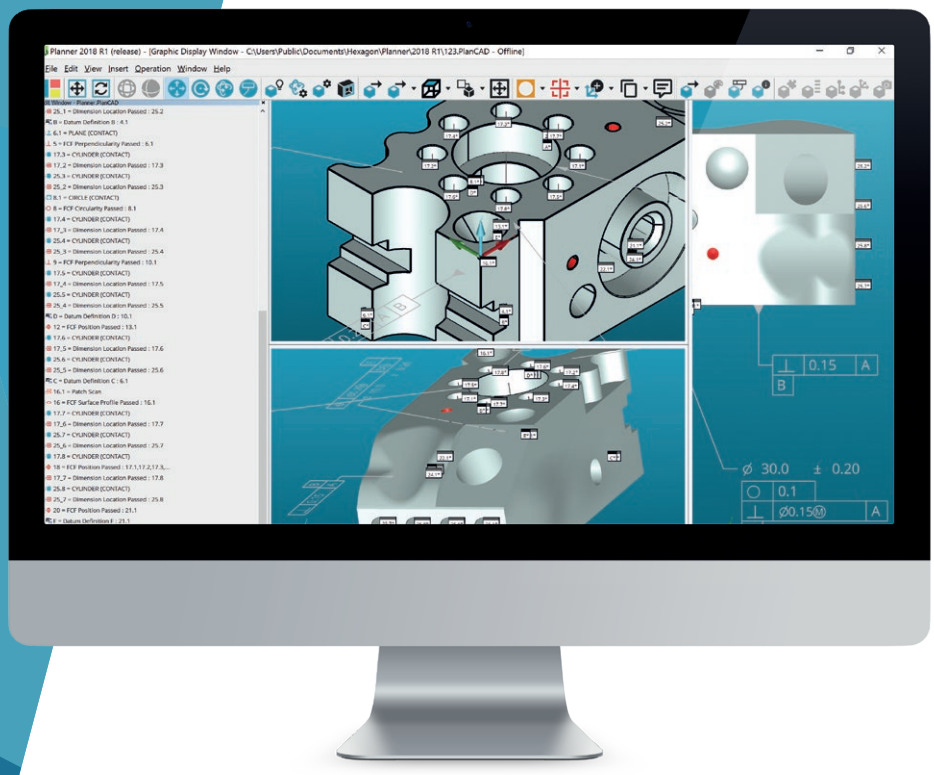
The need for inspection is built into the manufacturing process. PC-DMIS Planner software is a ground-breaking, stand-alone application that automates the flow of information between the virtual world of the design department and the real world of the engineering departments responsible for part manufacture. It creates a bi-directional link between CAD models and their related inspection programs.

BUILDING INSPECTION REQUIREMENTS INTO CAD MODELS

PC-DMIS Planner automates communication of design requirements and modifications from the design department to the shop floor eliminating costly errors.

ENSURING DIMENSIONAL INTEGRITY FROM DESIGN THROUGH MANUFACTURE

Today, design engineers do most of their work on 3D CAD systems where they design “perfect” parts. Manufacturing processes produce parts that are as close as possible to the perfect reference part. Quality can interface with design in the following ways:



Product Design/CAD Database

PC-DMIS Planner, with its optional Direct CAD Interfaces (DCIs) and Direct CAD Translators allows inspection departments to base their plans on the most accurate versions of the CAD models.

Quality Control Planning and Process Design

PC-DMIS Planner enables designers to electronically annotate their drawings by defining features, datums and dimensions allowing users to create synchronised bi-directional communication links between CAD files, inspection plans and part programs, ensuring that parts are evaluated according to the most up-to-date specifications.

DEVELOPED FOR DESIGN ENGINEERS

Key advantages include:

- Elimination of marked-up drawings. All design intent (datums, dimensions, tolerances, etc.) is embedded in the CAD file to create inspection plans.
- Utilisation of CAD files translated from standard formats (i.e. IGES, STEP) or use the PC-DMIS Direct CAD Interface (DCI) or Direct CAD Translator (DCT) technologies to work on files in specific CAD formats.
- Production of inspection plans that are independent of any inspection equipment type and usable by any device running PC-DMIS.
- Generation of basic PC-DMIS part programs automatically from inspection plans using default parameters that ensure consistent feature measurement.
- Exploitation of PC-DMIS' tools for optimising probe paths and inserting clearance moves to produce efficient part programs.

TRACKING CHANGES

Changes to CAD models and inspection requirements are a constant in any manufacturing operation. Communicating these changes to the quality assurance organisation is crucial to success. PC-DMIS and PC-DMIS Planner work jointly to automatically track changes in original CAD files and provide tools to keep the associated inspection plans and part programs synchronised.

PC-DMIS Planner Change Manager:

- Compares an inspection plan to its CAD model and automatically recognises any differences between them.
- Highlights differences between models and plans and allows the user to make changes or ignore them.

PC-DMIS Change Manager:

- Identifies differences between inspection plans and their associated part programs.
- Allows users to make changes based on the differences between plans and programs or ignore them.
- Works with PC-DMIS Planner Change Manager providing easy-to-use tools for quickly updating part programs based on changes to either the CAD file or inspection plan.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PC-DMIS VISION
A NEW TAKE ON VISION METROLOGY

BRINGING THE POWER OF PC-DMIS TO VISION MEASUREMENT

PC-DMIS Vision provides vision metrologists with the same tools long available to users of PC-DMIS CMM. These include powerful methods for measuring 3D parts on vision systems. It makes short work of measuring 2D parts, in addition, PC-DMIS Vision users have access to the complete EMS range of additional analytical and reporting capabilities:

FEATURES:

- Allows CAD models to be used as perfect "master parts" for programming and inspection purposes.
- Greatly improved programming and inspection throughput.
- Perform both part-to-CAD and advanced GD&T analyses not possible with traditional vision software.
- Extract information from the CAD model, eliminating errors of data interpretation and input.
- Increase part programming throughput up to 75% by using 3D CAD models to develop, check and edit inspection routines with point-and-click simplicity.
- Import CAD models and export measurement results in a wide range of industry standard and vendor-specific formats.
- Develop programs offline with an optional module that simulates all aspects of the measurement process. Switch between the CAD view and a CAD Camera® view that accurately simulates not only a camera image but also the illumination and magnification parameters.
- Draw on PC-DMIS' feature based programming functions to simplify both feature creation and editing.
- Include standard PC-DMIS reporting tool set allowing CAD images to be embedded in inspection reports for ease of reference.

ADVANCED FEATURES FOR VISION METROLOGY

PC-DMIS Vision also includes a flexible and powerful tool set for controlling cameras, illumination and sensors on vision systems. The programming environment is identical to PC-DMIS CMM, so anyone familiar with that version can easily make the transition by learning vision specific operations.

PC-DMIS Vision Includes:

- Complete portability of part programs. Programs will run on different vision machines, or even other machine types such as CMMs, with little or no modification.
- The revolutionary patent-pending Multi-Capture function automatically finds all features that fit within the field of view and simultaneously measures them, even if the features are of differing types. Multi-Capture then drives the camera to the next field of view and repeats the process. For parts with dense clusters of features, this can increase inspection time by up to 70%.
- A Sensi-light function assists users in selecting correct illumination settings.
- Feature-based programming not only simplifies the creation of features but also their editing.
- Tools automatically adjust critical measurement parameters like lighting and magnification.
- A Teach Mode Execute (TME) function that halts program execution when a problem is encountered and lets users reprogram features on the fly.

PC-DMIS PORTABLE

BRINGING METROLOGY TO THE SHOP FLOOR

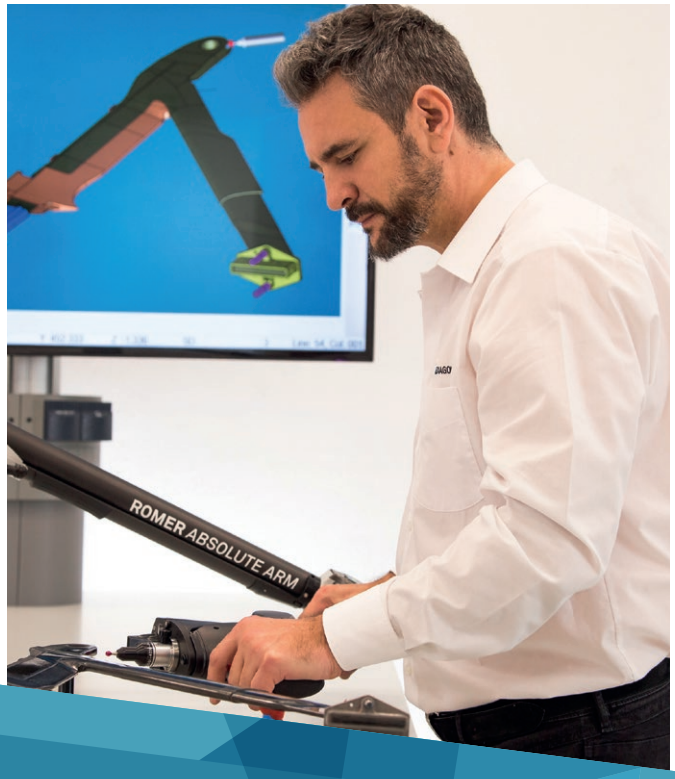
GETTING THE MOST FROM PORTABLE MEASUREMENT

PC-DMIS Portable is a highly sophisticated metrology software tightly integrated with portable metrology tools such as portable measuring arms, laser trackers and total stations. Market leading capabilities deliver peak performance at the point of production.

Whether the task is inspection, building virtual assemblies or solving engineering problems, PC-DMIS Portable gets the job done quickly and efficiently. Special user interfaces tailored for specific device types arrange all the commonly used controls and functions for speed and ease of use.

FEATURES AND BENEFITS:

- Minimises the learning curve with a quick-start GUI that lets programmers and operators make full use of their machines' most frequently used capabilities. When needed, PC-DMIS' full capabilities are only a couple of mouse clicks away.
- Features CAD capability which allows inspection routines to reference the CAD during inspection or programming tasks.
- Has automatic programming which allows part programs to be created during a live inspection for recall and later use.



- Finds the correct nominal data automatically from CAD while the part is measured. There is no need to query the model before measurement.
- Protects part programs from unauthorised changes with a Protected Mode that allows operators to run programs but not modify them.
- Provides device-specific user interfaces that organise the software's capabilities so all controls for a particular device are readily available when the software is used.
- Displays guided inspection prompts through measuring sequences with text, graphics and even movies. Prompts guide the user by indicating on the CAD model which feature to inspect next, increasing throughput and minimising errors.
- Eliminates part-programming bottlenecks with offline capabilities. Using PC-DMIS Offline, programmers can develop inspection sequences independent of the inspection device. This reduces the time taken for inspection or adjustment on-site and minimises downtime.
- A full set of PC-DMIS reporting options are available ranging from simple text-based outputs to fully annotated graphical presentations based on a part's CAD model.
- Features industry-leading GD&T algorithms in support of ISO and ANSI standards. PTB certified.

PC-DMIS INSPECT

AUTOMATED METROLOGY FOR THE SHOP FLOOR

PC-DMIS Inspect lets shop floor personnel check parts without becoming measurement experts by guiding them through part setup and measurement.

FEATURES AND BENEFITS:

- Makes the CMM an attractive alternative to functional shop floor gauging by allowing users to run pre-programmed inspections and review reports without any direct interaction with the underlying PC-DMIS software.
- Lets shop floor personnel select inspection programs by picking them from a graphical or alphanumeric list.
- Guides operators through part alignment and fixturing using pictures of the part and fixture.
- Automatically runs the inspection routines and generates graphical reports showing features of interest, including “good part” and “bad part” flags.
- Keeps a history of all parts inspected.
- Turns the CMM into a measurement device that is as simple to use as a go/no go dedicated gage with the flexibility and analytical capabilities of a sophisticated measurement machine.

OPTIONS FOR PRODUCTIVITY

Options allow users to configure PC-DMIS EMS products to meet specific requirements. Supporting special devices, machine configurations, or higher-level capabilities include:

- Rotary Tables – control a variety of indexable or infinitely variable rotary tables. Built-in routines simplify table calibration and programming.
- Tool and Tip Changers – use any of the most popular tool and tip changers with any PC-DMIS package. This module can manage multiple changers on a single machine and provides easy-to-use utilities for changer and probe calibration.
- Supports ISO DMIS input and output allowing the software to both run and export programs in DMIS format and generate results in accordance with the specification.

INCLUDED IN PC-DMIS EMS:

- ✓ PC-DMIS Pro
- ✓ PC-DMIS CAD
- ✓ PC-DMIS CAD++
- ✓ PC-DMIS CMM
- ✓ PC-DMIS Vision
- ✓ PC-DMIS Portable
- ✓ PC-DMIS Planner
- ✓ PC-DMIS NC
- ✓ PC-DMIS Touch
- ✓ PC-DMIS Gear
- ✓ PC-DMIS Blade

PC-DMIS EMS EXTENSIONS

SOFTWARE TOOLS FOR SPECIAL APPLICATIONS

PC-DMIS EMS offers a range of extensions to the basic PC-DMIS configurations. These can either be stand-alone variations of the core product or add-ons that either control a specialised hardware device such as a rotary table or perform a particular task or group of tasks. Stand-alone variations make it easy to check parts such as blades and gears or simplify overall software operation for specific environments. These include:

PC-DMIS Gear

- An easy-to-understand, rules driven form to build part programs.
- Measurement of gears according to a diverse set of international standards including:
- AGMA 2000-A88, DIN 3962, JIS B 1702 and ISO 1328.
- Alignment of gears, setup and calibrate probes easily using a combination of wizards and predefined routines.
- Reports using a full set of industry standard output templates.

PC-DMIS Blade

- A simple-to-use GUI that lets users identify parts, select sections and initiate scans with minimal effort.
- Accurately simulates traditional, section-based (guillotine) gages at a fraction of the cost.
- Measures characteristics like contour and twist quickly without compromising accuracy.
- Aligns parts quickly using traditional methods like root holding with XYZ offsets and angle rotation to the stacking axis. Also, it supports iterative alignments using CAD surfaces or 6-points rest.

UPGRADES AND RETROFITS REVITALISE ANY CMM

BRINGING NEW LIFE TO OLDER EQUIPMENT

A PC-DMIS upgrade makes sense whether a measuring machine is used to make a few in-process checks or to inspect the most complex aerospace parts. For a fraction of the cost of a new machine, the latest in measurement technology is available on most older equipment.

Hexagon offers a choice of upgrade packages for all of its CMMs, for most other manufacturers' equipment and for a variety of vision systems. Custom configurations are available to suit all applications and budgets. PC-DMIS upgrades fall into two categories: software-only and software/hardware. Both offer distinct advantages.

PC-DMIS software-only retrofits:

- Interface directly to existing hardware without modifying it, significantly improving measurement capability at minimal cost. Typically, retrofits install in less than a day, and machines can still run existing part programs.
- Take full advantage of PC-DMIS' EMS features by sharing programs and data with other EMS components.
- Link CMM and CAD systems, using any of PC-DMIS neutral translators, DCTs or DCIs.
- Provide modern packages that are continually being developed and updated for the manufacturing needs of tomorrow.

PC-DMIS software/hardware upgrades:

- Bring equipment to current standards. Innovative hardware upgrades for manual and DCC machines in all price ranges.
- Enhance the speed and accuracy of a CMM. New hardware and sophisticated volumetric compensation techniques vastly improve machine performance.
- Interface to the newest measurement devices. Hexagon controllers support equipment such as scanning probe heads, non-contact probes, and fixturing systems.
- Improve maintainability and reliability.
- Eliminate the risk and expense associated with maintaining obsolete equipment.

HEXAGON
MANUFACTURING INTELLIGENCE

Hexagon Manufacturing Intelligence helps industrial manufacturers develop the disruptive technologies of today and the life-changing products of tomorrow. As a leading metrology and manufacturing solution specialist, our expertise in sensing, thinking and acting – the collection, analysis and active use of measurement data – gives our customers the confidence to increase production speed and accelerate productivity while enhancing product quality.

Through a network of local service centres, production facilities and commercial operations across five continents, we are shaping smart change in manufacturing to build a world where quality drives productivity. For more information, visit **HexagonMI.com**.

Hexagon Manufacturing Intelligence is part of Hexagon (Nasdaq Stockholm: HEXA B; **hexagon.com**), a leading global provider of information technologies that drive quality and productivity across geospatial and industrial enterprise applications.

- COORDINATE MEASURING MACHINES
- 3D LASER SCANNING
- SENSORS
- PORTABLE MEASURING ARMS
- SERVICES
- LASER TRACKERS & STATIONS
- MULTISENSOR & OPTICAL SYSTEMS
- WHITE LIGHT SCANNERS
- METROLOGY SOFTWARE SOLUTIONS
- CAD / CAM
- STATISTICAL PROCESS CONTROL
- AUTOMATED APPLICATIONS
- MICROMETERS, CALIPERS AND GAUGES
- DESIGN AND COSTING SOFTWARE

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MANUFACTURING INTELLIGENCE

IMS center
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