Agenda

Who are PTC?

Engineering…

- What is it?
- Is it important?
- Is there a problem?
- What is PTC doing about it?

PTC DesignQuest Education Programme

- Existing curriculum projects including micro-hydro
- Projects under development - robotics
- Can schools replicate modern engineering design - PLM

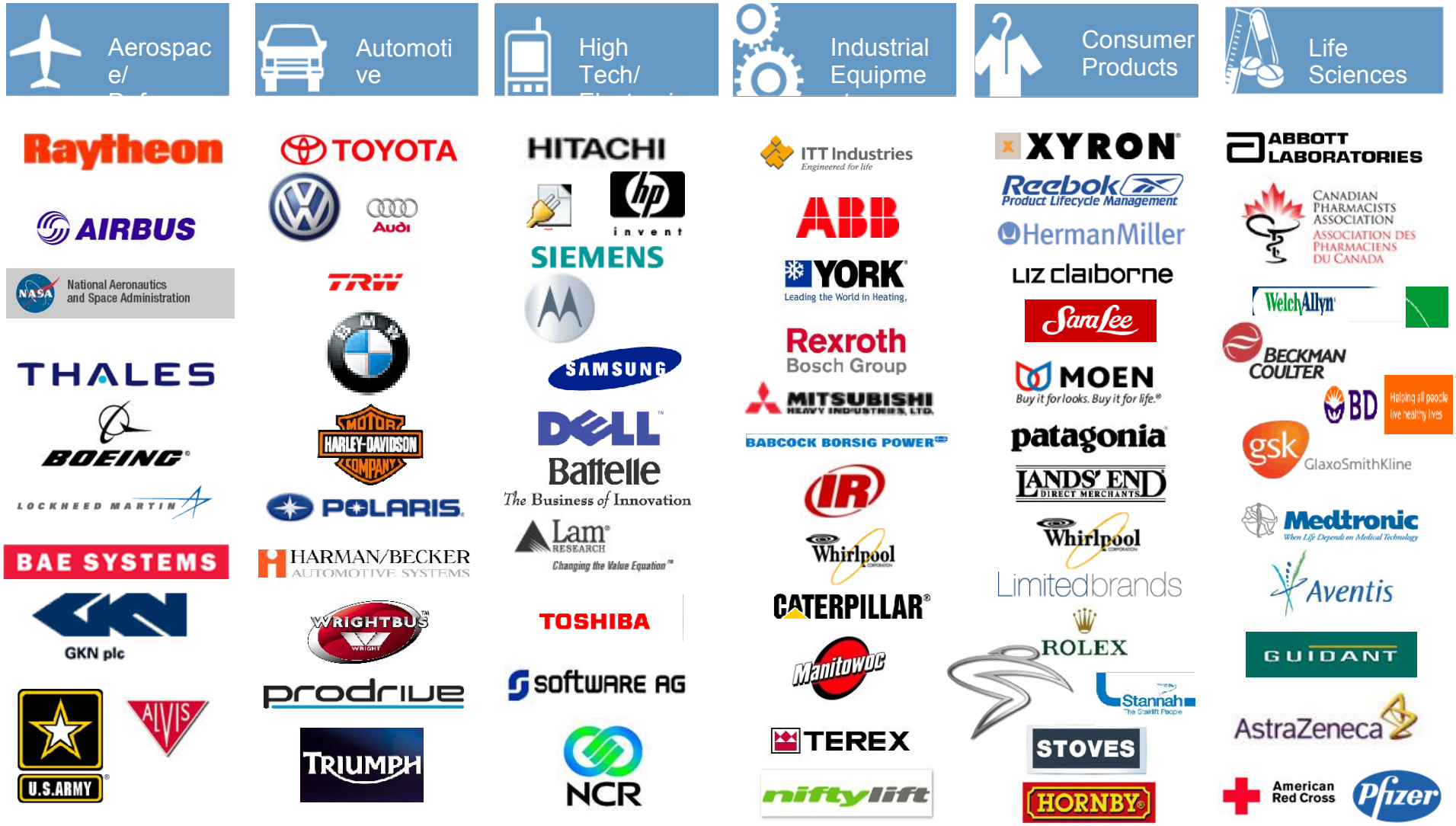
Who are PTC ?

PTC: The Product Development Company

PTC help companies optimise their product development processes and win with superior *physical and information* products.

- Founded in 1985
- Developed Feature-based, Parametric Solid modelling
- Headquarters in Needham Massachusetts
  - 6 UK offices: Sales, Research & Development, and Education
- Global Leader
  - 5,000 PTC employees in more than 30 countries
  - 50,000+ worldwide customers
  - Deep partnerships with leading system integrators, software partners and hardware providers
  - Worldwide educational programme that helps educators provide the best product development education for students

Significant Customer base



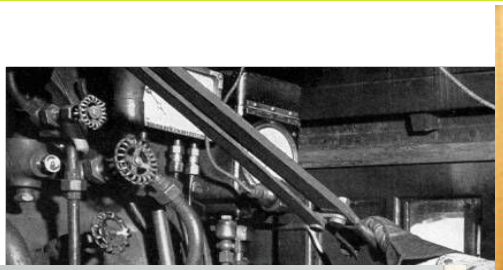
Engineering – what is it?

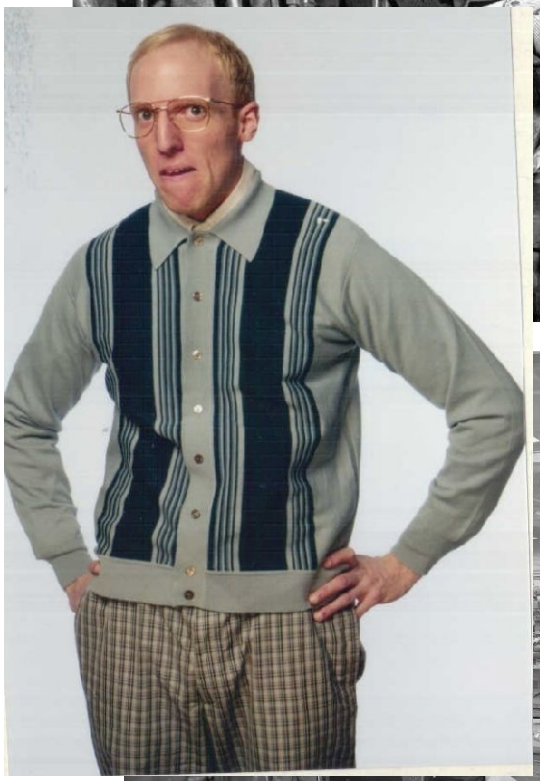
What is an ENGINEER?

- The operator of a railway locomotive?
- The person who fixes your central heating boiler?
- A person who uses scientific knowledge to solve practical problems?

Neil Armstrong

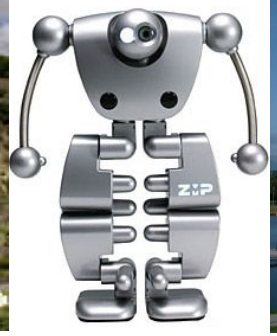
Engineering: myth





Transport - Extreme Gravity racers

Engineering: Reality



Engineering: Reality – Engineers of the 21st Century

Dean Kamen

Adrian Newey

Alice Delahunty

Marissa Mayer

Pearl Odinga

Marek Reichmann

Engineering – is it important?

The importance of Engineering & Manufacture to the UK

- 2.9 million employees
- Aerospace & Automotive engineering annual turnover of £160 billion
- UK Aerospace industry second only to US
  - £19.81 billion, R&D investment of £2.7 billion
  - Supports up to 70,000 jobs throughout UK
- 55% of UK exports
- 75% of R&D expenditure
- Exports worth £220 billion
- Gross Value Added over £150 billion

British Industry NEEDS more Engineers & Scien

Vital to UK economy!

British Engineering: World class

7 out of 11 Formula One teams are based in the UK

Every Airbus flies on British wings

Iconic products

- Jaguar, Land Rover
- Triumph Motorcycles
- Aston Martin
- e2v (world leaders in imaging, RF & sensors)

Great British Design : Great British Engineering

British Design: World class

Product Design

Innovative and ground breaking products

- Seymour Powell (PTC customer)
- Scalextric, Hornby, Airfix (PTC customer)
- Murphy Richards (PTC customer)
- Heal Standard (PTC customer)

Great British Design : Great British Engineering

Engineering – is there a problem?

In many industries 54% of the workforce is over 45 years old

33% will be eligible to retire in five years

Less than 10% of high school students pursue undergraduate degrees in engineering.

Of the 10% who enter engineering courses, on average, only 50% earn a degree in engineering.

Is it an image problem?

- Perception versus reality
- Media portrayal
- Pupils reject most jobs on the basis of perception by the age of 12/13*
- Career aspirations influenced by 'celebrity culture'

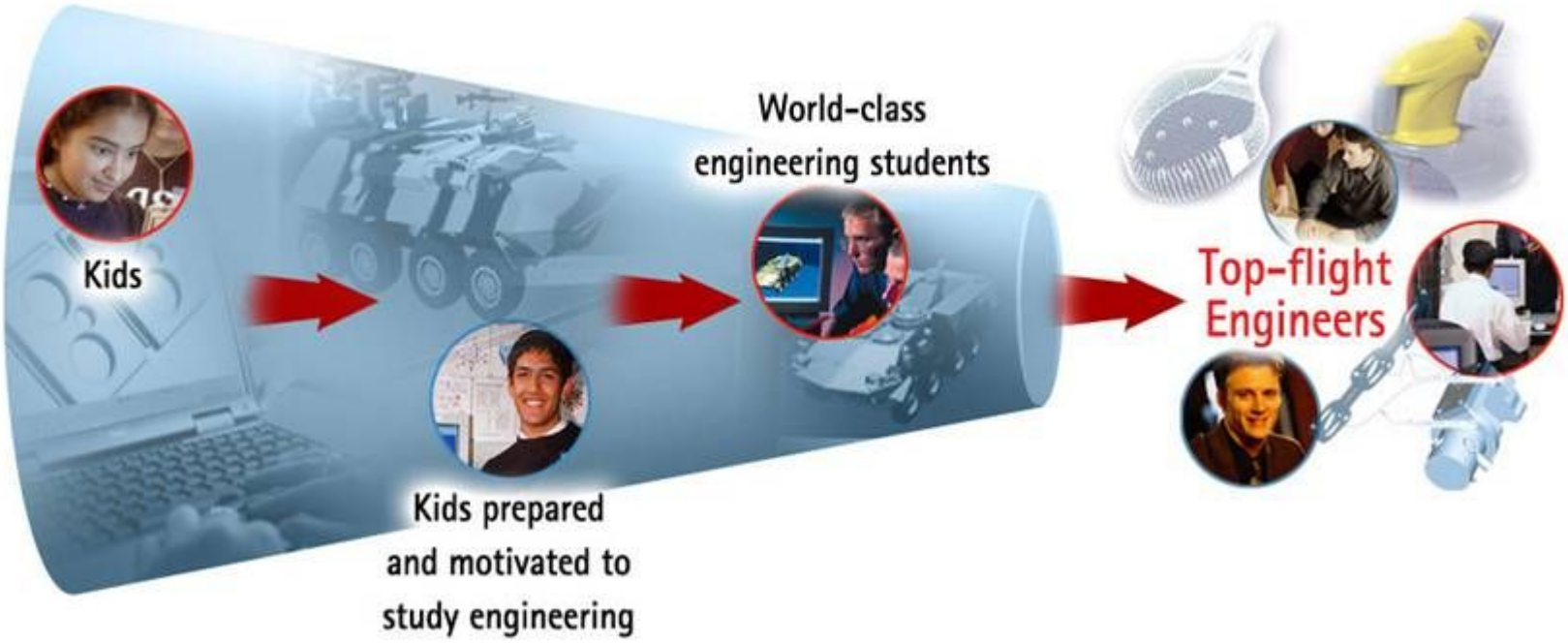
* Foskett, N.H. and Hemsley-Brown J.V. *Career Perceptions and Decision Making.* Southampton: CREM / Heist Publications

What are PTC doing in Education?

PTC DesignQuest

- Preparing students for college and university engineering programmes
- Helping teachers inspire students to embrace technology and pursue technology related careers
- Accomplete 'programme'
  - Software, training, curriculum
- From High Schools to Colleges, Universities and life long learning
- World leading commitment to education
- Building on 10 years of experience
- Building the engineering pipeline

Why are PTC committed to *High School* Education?



PTC is focused on developing technological literacy skills through 3D design, technology, pre-engineering and engineering programmes.

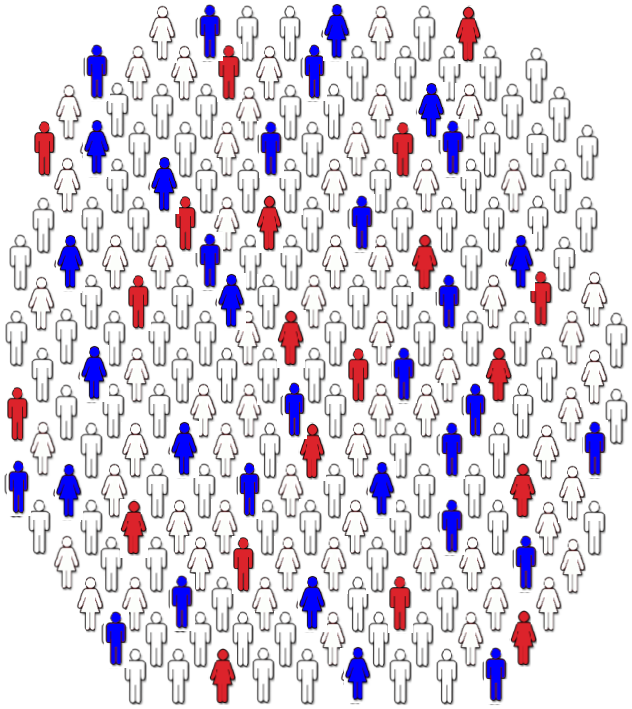
PTC Education Programme

Annual High School year 200 students (average)

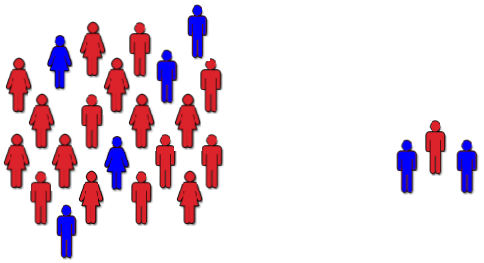
10% of students pursue degrees in Engineering

50 % earn an engineering degree

10% enter engineering



PTC DesignQuest
Education programme



Industry needs more engineers

Industry
Including PTC customers

PTC Design & Engineering applications – High Schools

Pro|ENGINEER Schools Edition

- **Donated** software for certified middle and high school teachers
- Affordable teacher training workshops taught by certified train… y teachers). Upon successful completion of training and follo… a teacher becomes certified.
- For classroom and students' home use (up to 300 s… l)
- Features include
  - Pro|ENGINEER
  - Ability to create parts, assemblies and dra…
  - Ability to import Pro/DESKTOP, DXF… EP, STL… Parasolid files
  - Ability to export IGES, STL
  - Ability to plot files to printe…
  - Pro|ENGINEER Mech… namics
  - Pro|ENGINEER … lling
  - Pro|ENGINEE… ndering
  - Pro|ENGIN… im ation
  - Sheetmetal …

Commercial price £4,500 per seat

300 seat site license £1.35,million

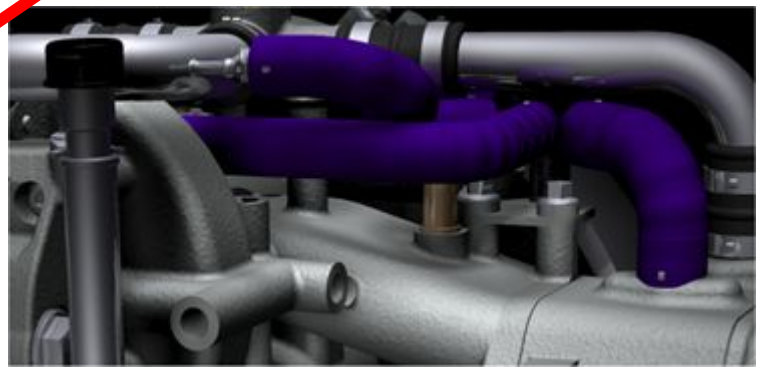
Pro|ENGINEER WILDFIRE® 4.0

PTC Design & Engineering applications – High Schools

Pro|ENGINEER Schools Advanced Edition

- £425 for a 35 seat perpetual classroom license (UK only)
- Complete CAD/CAM/CAE solution for schools
- Includes technical support and access to web-based train
- Features include:
  - Pro|ENGINEER Foundation Advantage (everything that's in the S
  - Pro|ENGINEER Advanced Assembly
  - Pro|ENGINEER Interactive Surface Design
  - Pro|ENGINEER Advanced Rendering
  - Pro|ENGINEER Cabling Design
  - Pro|ENGINEER Piping Design
  - **CAM**
  - Pro|ENGINEER Production M
  - Pro|ENGINEER Tool Desi
  - Pro|ENGINEER NC
  - **CAE**
  - Pro|ENGIN ynamics
  - Pro|ENGINE l Modeling
  - Pro|ENGINEER anica
  - Pro|ENGINEER Advanced Mechanica

Commercial price **£60,000** per seat



Pro|ENGINEER® WILDFIRE® 4.0

High School Curriculum

Developed 'with' teachers 'for' teachers

Leveraging industry best practice

- Understand industry application of the technology
- Terminology familiarisation
- Understand the design process
  - The Product Development Lifecycle
- Inter-discipline design
  - Mechanical, Electronic, Product Design, etc.
  - Multi-discipline, distributed design teams
    - Design in the US, manufacture in China
    - Design for manufacture

Institution of MECHANICAL ENGINEERS

The Institution of Mechanical Engineers recommends this material as a valuable aid to support student learning and believes it will add value and enjoyment to the learning process

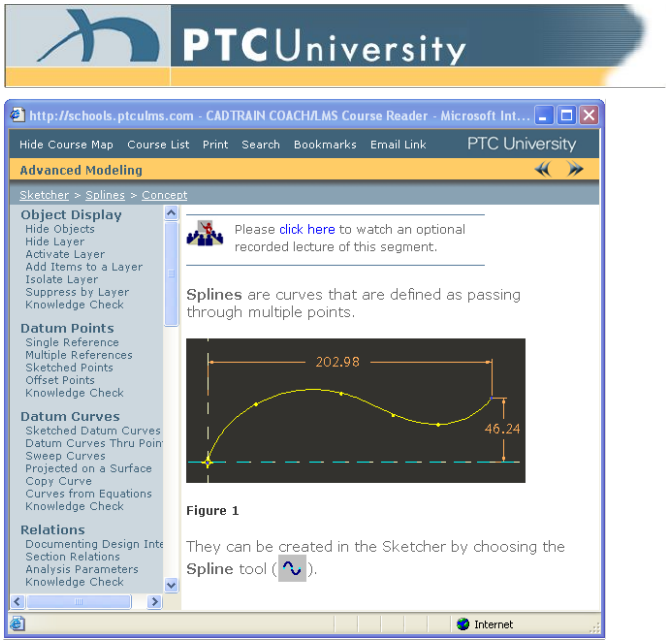
Teacher Training

Training workshops

- Delivered by Teachers for Teachers
- UK government endorsed (DCSF) (CAD in schools)

PTC University Learning Management System

- Improve your knowledge and skill
- Rich, multi-media format
- Self paced tutorials
- Online assessment
- **FREE** access to teachers
  - Participating in the PTC DesignQuest programme
  - High Schools, Colleges & Universities

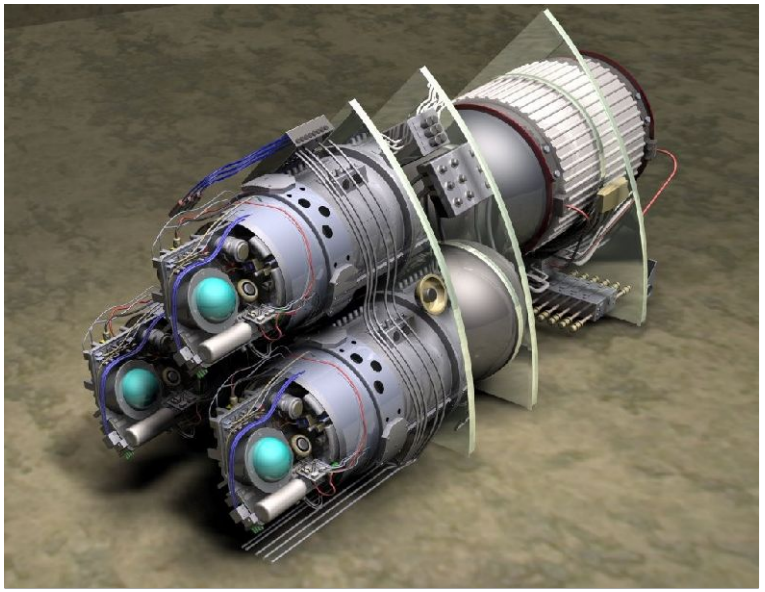


Pro|ENGINEER® WILDFIRE® 4.0

PTC Design & Engineering applications – Colleges & Universities

Pro|ENGINEER University Edition

- £2000 per year for a 500 seat site license
- Complete CAD/CAM/CAE solution for universities
- Includes technical support and access to training
- Features include:
  - Pro|ENGINEER Foundation Advantage
  - Pro|ENGINEER Advanced Assembly
  - Pro|ENGINEER Interactive Surface Design
  - Pro|ENGINEER Advanced Rendering
  - Pro|ENGINEER Cabling Design
  - Pro|ENGINEER Piping Design
  - Commercial to Education format conversion
  - **CAM**
  - Pro|ENGINEER Production Machining
  - Pro|ENGINEER Tool Design Option
  - Pro|ENGINEER NC Sheetmetal
  - **CAE**
  - Pro|ENGINEER Mechanism Dynamics
  - Pro|ENGINEER Behavioral Modeling
  - Pro|ENGINEER Mechanica
  - Pro|ENGINEER Advanced Mechanica



Pro|ENGINEER® WILDFIRE® 4.0

PTC Design & Engineering applications – Students (College &

Pro|ENGINEER Student Edition £69 - PTC e Store

Features include:

- Pro|ENGINEER Foundation XE
  - 3D Parametric feature-based solid modelling
  - Sheetmetal and weld modelling
  - Engineering drawing production
- Interactive Surface Design
- Assembly Modelling
- Behavioural Modelling
- Design Animation
- Mechanism Kinematics – click-drag animation
- Mechanism Dynamics – simulation of force, velocity, acceleration and torque
- Structural and Thermal simulation (MECHANICA)
- Advanced Rendering
- Tolerance Analysis

Pro|ENGINEER® WILDFIRE® 4.0

PTC Design & Engineering applications – (College & University students)

Pro|ENGINEER Student Edition bundles

- Sold to Colleges & Universities for re-sale to students
  - 25 seat bundle - £1,050 (£42/seat)
  - 100 seat bundle - £3,210 (£32/seat)
  - 250 seat bundle - £5,565 (£22/seat)
- Significant savings can be passed on to students

Pro|ENGINEER® WILDFIRE® 4.0

PTC Design & Engineering applications - Mathcad

Familiar, intuitive Mathematic interface

Natural Mathematics Notation

- Mathematics expressions (equations, formulas, calculations) are represented in standard mathematic notation
- Mathematics expressions can be evaluated either numerically or symbolically

Documentation Interface

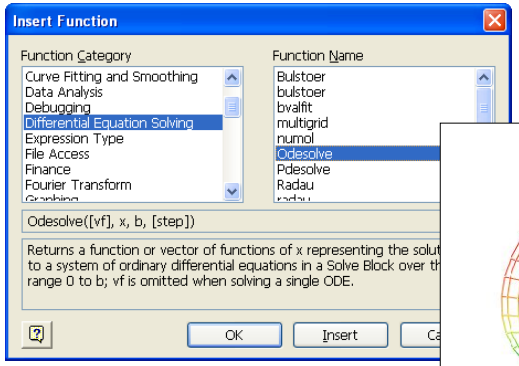
- Students can explain their work as they think through the problem
- Teachers can provide feedback on students' work by annotating the worksheet with their comments

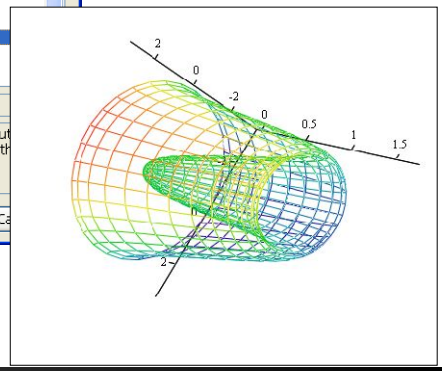
Robust Mathematics Engine

- Interactive and easy to use
  - As changes are made to variables or equations, those changes propagate forward and all dependent results are dynamically updated
  - No scripting, programming, or compilation is required
- Support for Scalars, Vectors, Matrices
- Units Intelligence

Students can create mathematic content and calculate results using standard textbook notation

Students can evaluate mathematic expressions symbolically to visualize how the answers are calculated

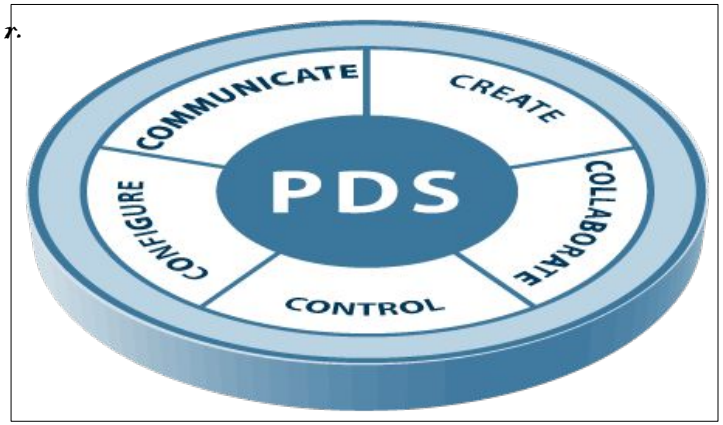




Windchill

Windchill PDMLink/ProjectLink for Pro|ENGINEER – Bundle

- 100 named users of Windchill and WorkGroup Manager.
- 100 Productview and Pro|ENGINEER Adapter



Complete Product Development System

Product Lifecycle Management (PLM)

- Create (CAD/CAE/CAM- Pro|ENGINEER)
- Collaborate (ProjectLink)
- Control (Data Management - PDMLink)
- Configure (Pro|ENGINEER & PDMLink)
- Communicate (ProductView)

Already deployed in leading Universities

First Robotics High School challenge

US Dept. Of Energy Real World De Challenge

ISODraw

ISODraw University – 50 seat bundle

- £2,600 (perpetual license - £503 annual maintenance)

Tailored tool for creating perspective illustrations

Drawing from scratch

Photo tracing

Raster editing

Hotspot creation / intelligent graphics

Data exchange capabilities for 2D vector and raster formats

Industry-leading authoring tools for CGM files

Industry standards

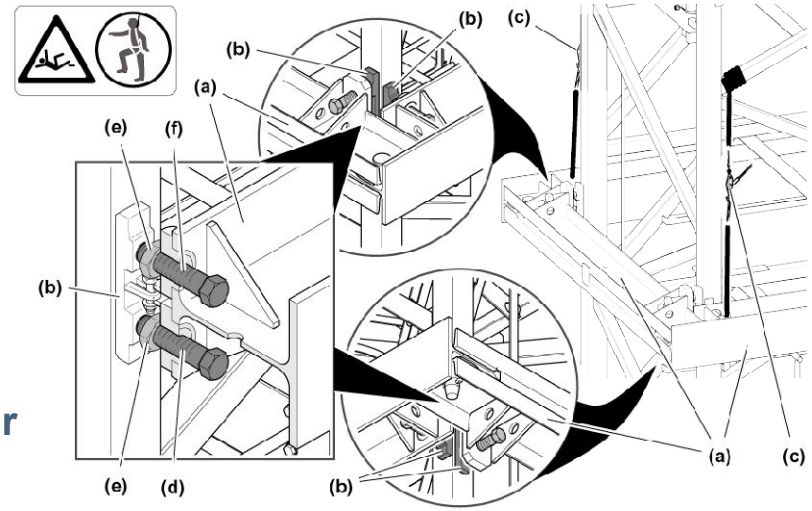
- S1000D, ATA, etc.

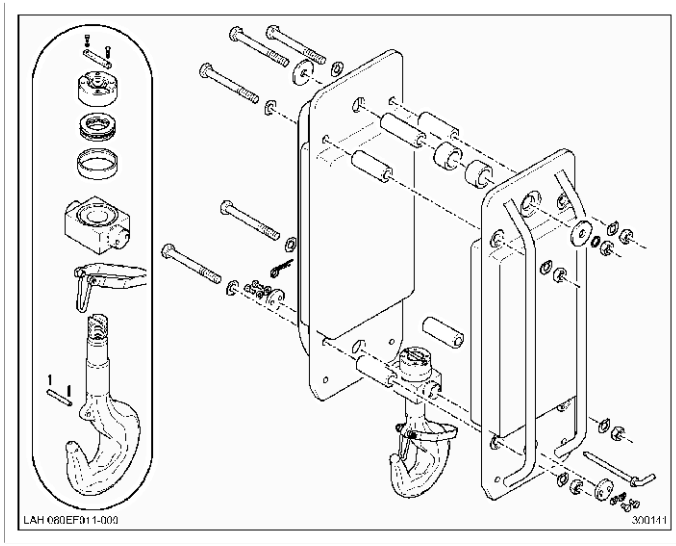
Provides illustrators with easy access to 2D and 3D data; intuitive handling

- extensive manipulation functions for 3D models
- offloads illustration preparation from engineers

HLR and optimisation to high-quality 2D technical illustration

- reduces further editing to a minimum





Arbortext – dynamic publishing software

Arbotext Editor

- Create content in reusable components
- Supports compound documents, reuse.
- Integration with leading content management systems
- Dynamic reuse

Arbotext Publishing Engine

- Import
  - Convert to XML: Word, FrameMaker, RTF, HTML, PDF
- Export
  - Converts XML/SGML to RTF
  - Create stylesheet and publish to Word.
  - Embedded graphics

Dynamic Link Manager

- Improves ease and speed of authoring with links
- Guarantees link validity
- Enables production of dynamic content based on audience, language, media, context..

Arbotext adapters

- Documentum, IBM DB content Manager

Sell to Universities for their use. COMMERCIAL sale

- Development curriculum etc.
- UNISA- South Africa (like the open University – correspondence courses)

Pro|TOOLMAKER

Pro|TOOLMAKER University – 50 seat bundle

- £2,600 (perpetual license - £503 annual maintenance)

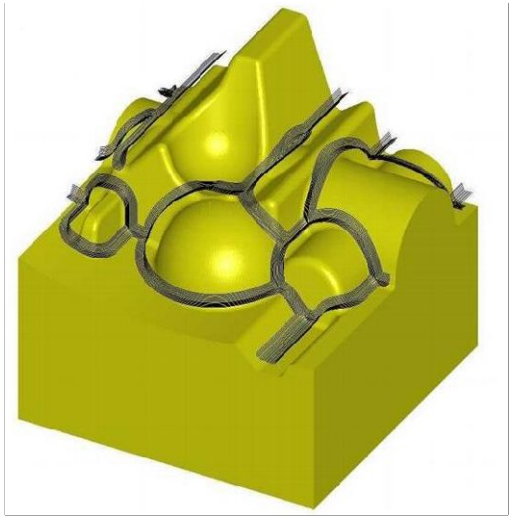
Very easy to use

Powerful 3D machining

- Ideal for mold & die
- Core/Cavity Machining
- Die casting die
- Forging die
- Injection mold and blow molds
- Electrode machining
- Modelling and prototyping
- Medical parts
- Jewelry

Stand alone CAM package

- Can be used alongside ANY other CAD package



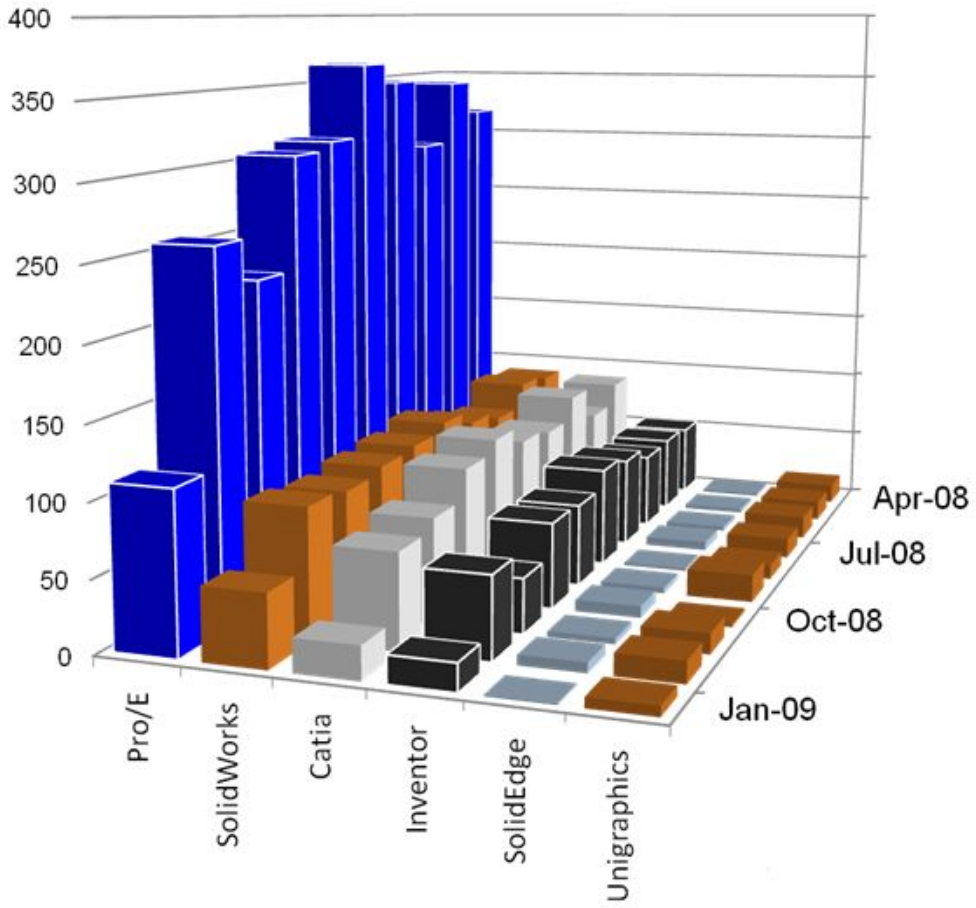
Why should schools & universities teach PTC technology?

Industry leading technology

Future employment opportunities

- Product Design & Engineering
- Diverse range of industries
  - Automotive
  - Aerospace
  - Medical
  - Consumer products
  - Product Design

Employment: UK demand for Pro|ENGINEER



Statistics from **Monster.co.uk**.

(Keywords: Pro/E, SolidWorks, Catia, Inventor, SolidEdge, UG/Unigraphics)

Why should schools & universities teach PTC technology?

Engineering *is* the Future

The future of the human race doesn't depend on Accountants, Lawyers, Footballers, Rap Artists, Celebrities, etc.

Global Challenges

- Energy Security
  - Renewable energy
    - Wind, Water, Solar…
- Water Resources
  - Increased global demand
- Food
  - Increased global demand
- Climate change
  - Reduction of CO2 emissions
    - Energy efficiency
    - Transportation
- Sustainable Development

Why should schools & universities teach PTC technology?

Industry and government recognition

PTC is partnered with government, industry, educational and professional organisations, and Universities.

Endorsement of the PTC DesignQuest programme and curriculum.

department for children, schools and families

Institution of Mechanical Engineers

IET

D&T the design and technology association

Specialist Schools and Academies Trust
EXCELLENCE AND DIVERSITY

University of Strathclyde Glasgow

DIVA digital media & ICT vendor alliance

Scottish Qualifications Authority

Cynghrair Technoleg Cymru
Technology Alliance Wales

INTAD

FIRST

Hornby Scalextric

Battelle
The Business of Innovation

What's in it for PTC?

In many industries 54% of the workforce is over 45 years old

33% will be eligible to retire in five years

Less than 10% of high school students pursue undergraduate degrees in engineering.

Of the 10% who enter engineering courses, on average, only 50% earn a degree in engineering.

The welfare of our commercial customers is linked to the availability of technologically literate students

Progress to date: Global Impact

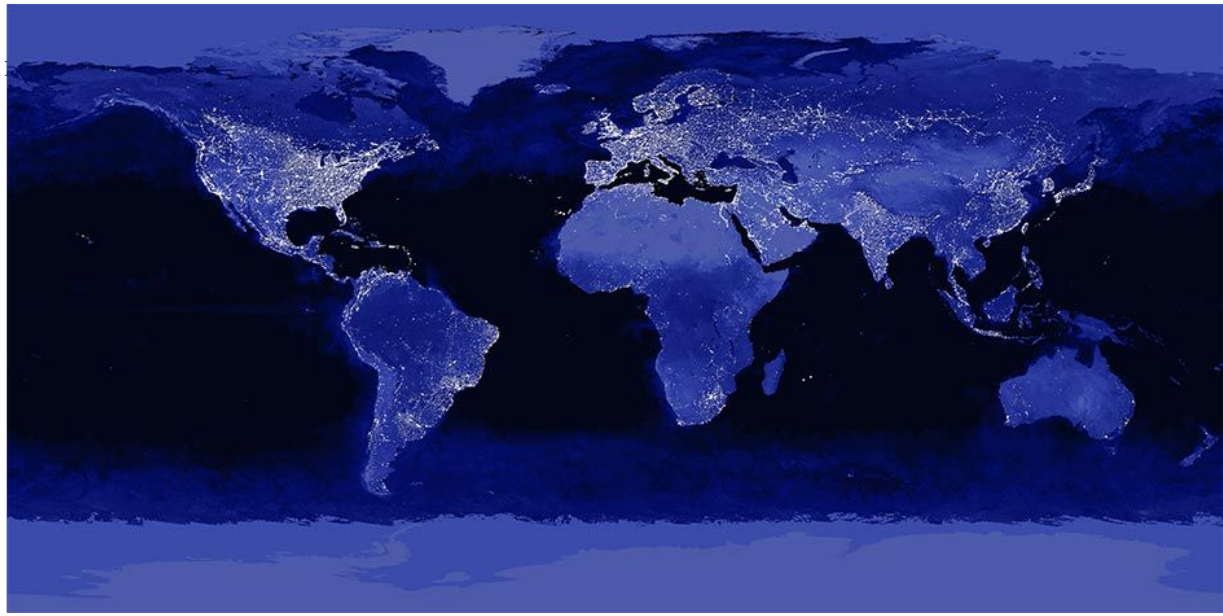
23,000 teachers trained – and counting

Over 12,000 high schools

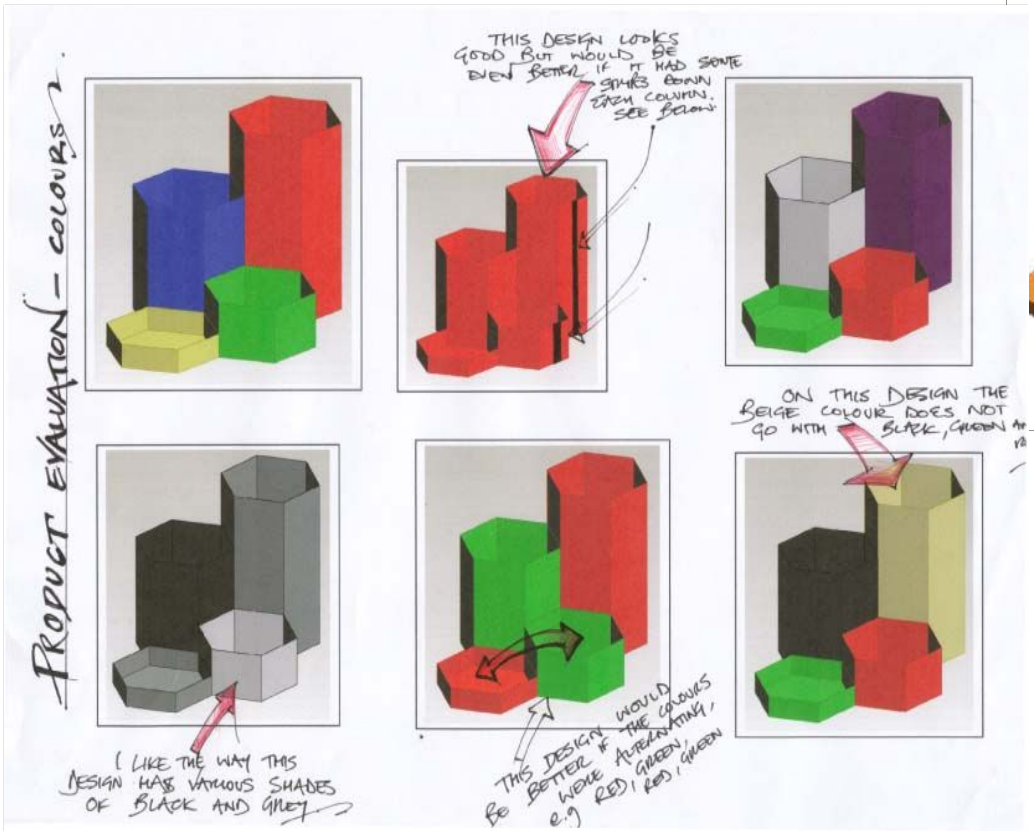
5 million students – and cou

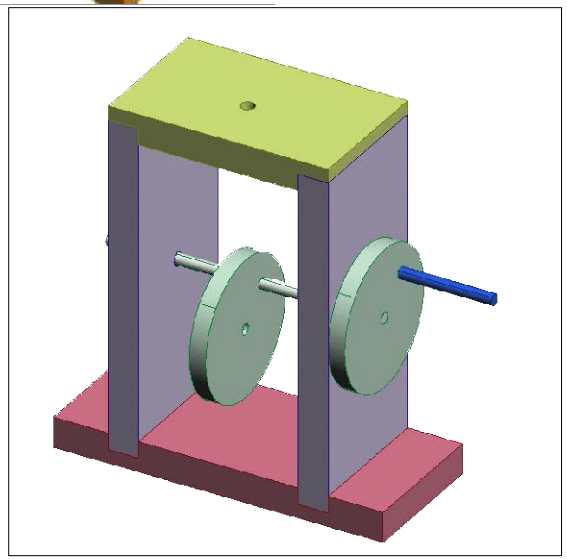
28 countries

- North America
  - 9,800 teachers trained
  - 4,500 secondary schools
  - 400 Universities / Colleges
- Europe, Middle East & Africa
  - Over 10,000 teachers trained
  - 5,200 secondary schools
  - 455 Universities / Colleges
- Asia/Pacific
  - Over 3,500 teachers trained
  - 2,350 secondary schools
  - 700 Universities / Colleges

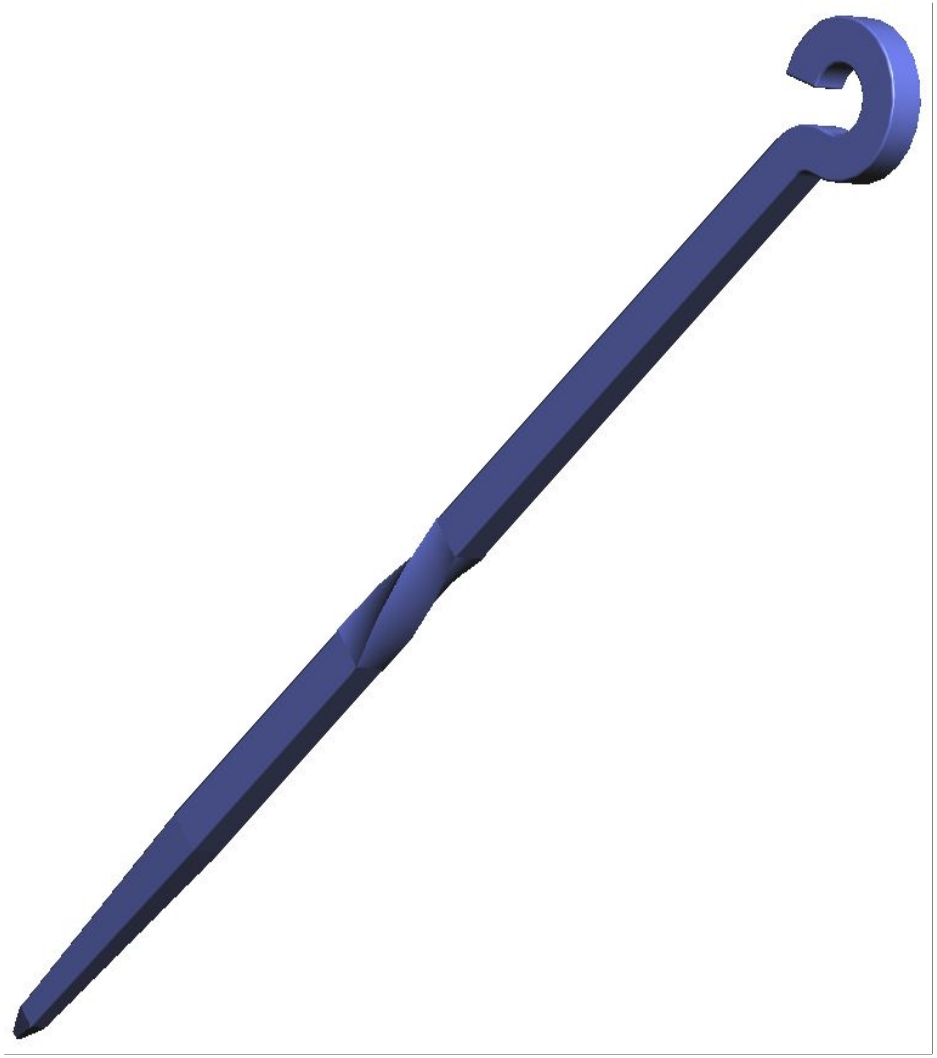


Is this engineering?

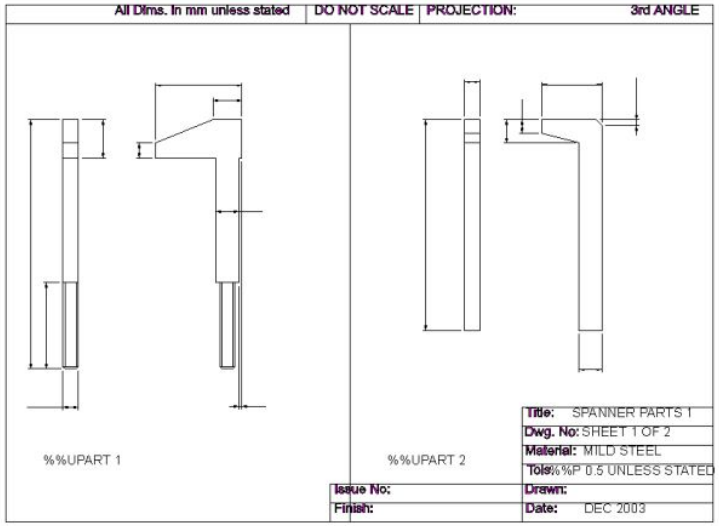


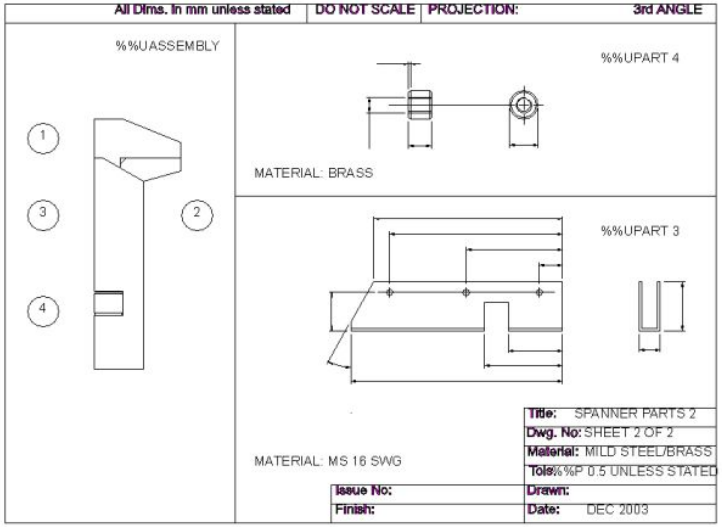


Is this engineering?



UK ‘Official exemplars’





SEMTA/DCSF

Engineering – what is new technology?

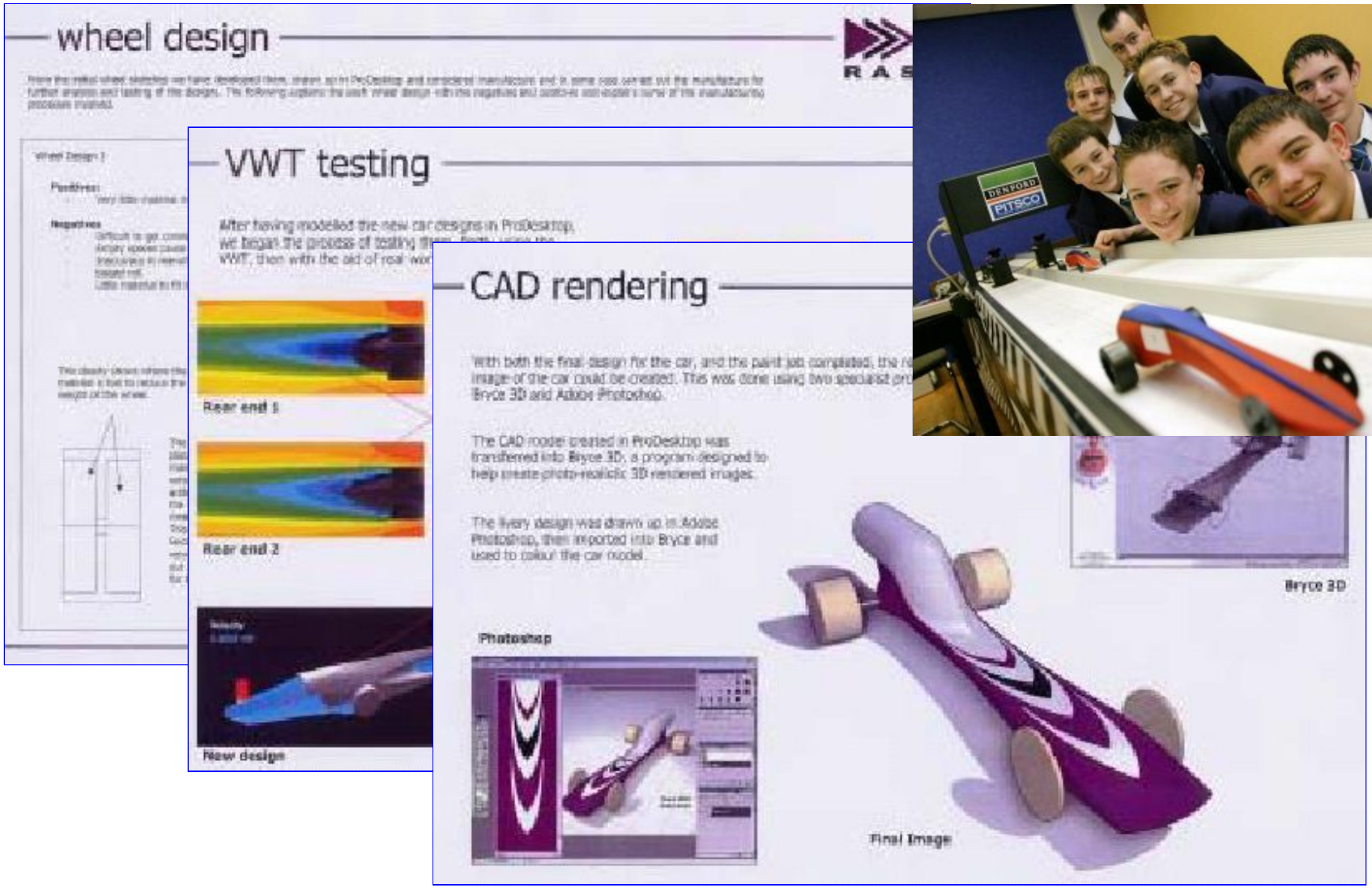
Sterling engine

- Engineering workshop theory & practice
- Circa?

Sterling engine

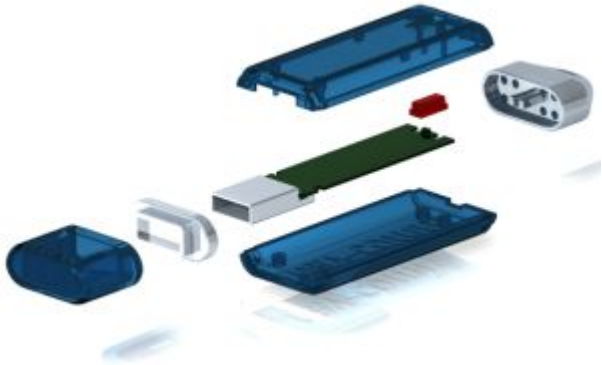
- Local power generation
- Circa?

F1 in Schools

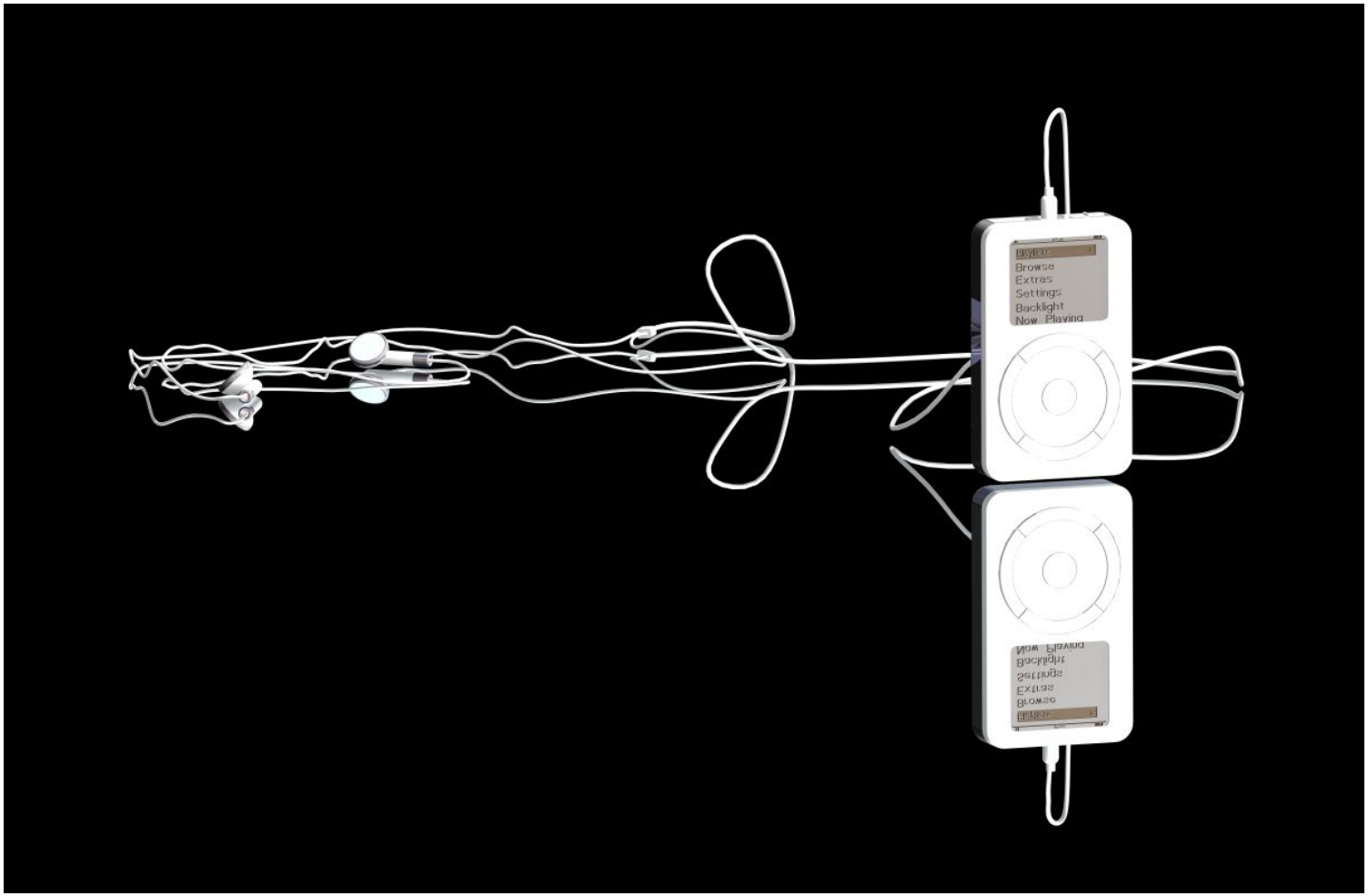


Modelling in context + RP

USB memory pen

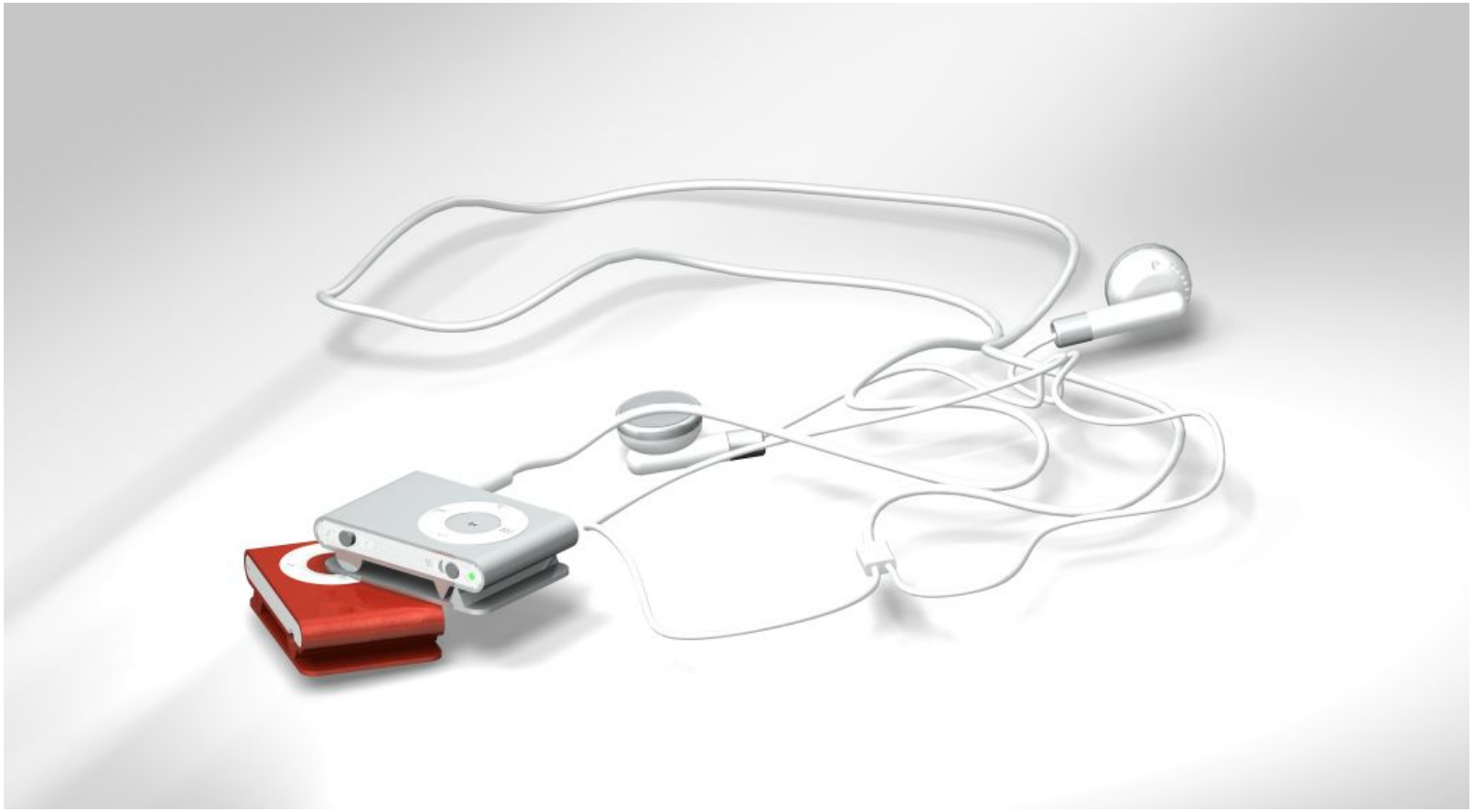


PTC DesignQuest – Student examples



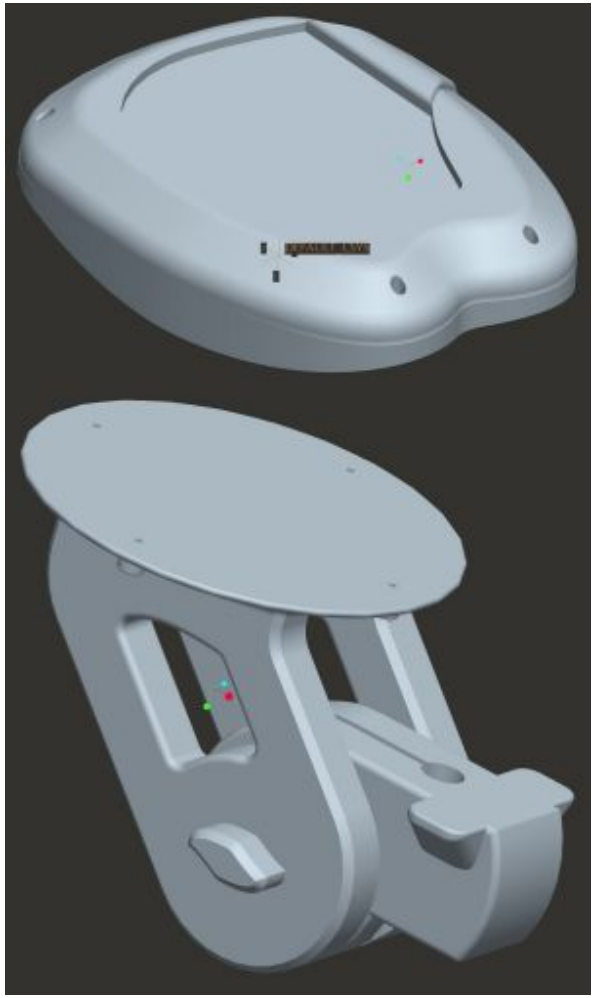
Ripley St Thomas High School, Lancaster, England: Matthew Cronshaw

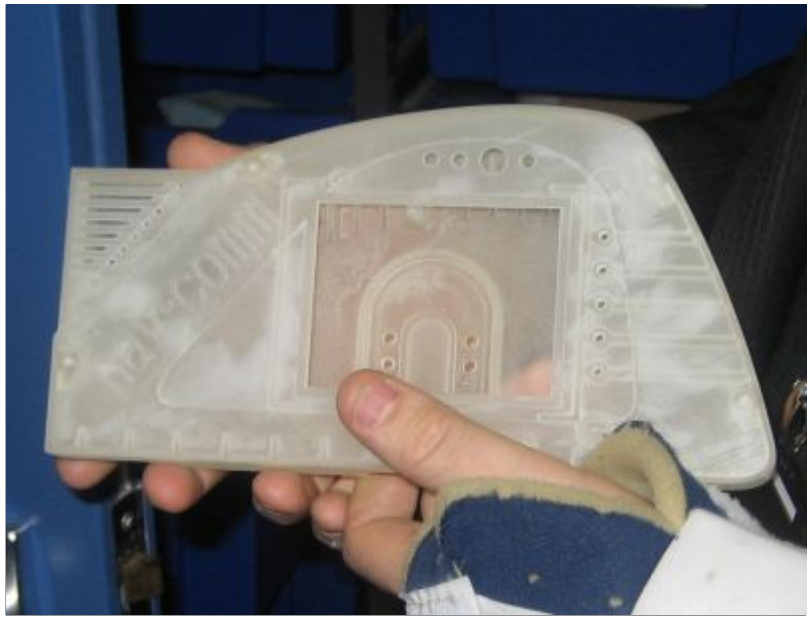
PTC DesignQuest – Student examples



Ripley St Thomas High School, Lancaster, England: Matthew Cronshaw

Modelling – Aesthetic + technical





Stuart Douglas – Ripley St Thomas School

PTC DesignQuest – Student examples

Ripley St Thomas High School, Lancaster, England

PTC DesignQuest – Student examples

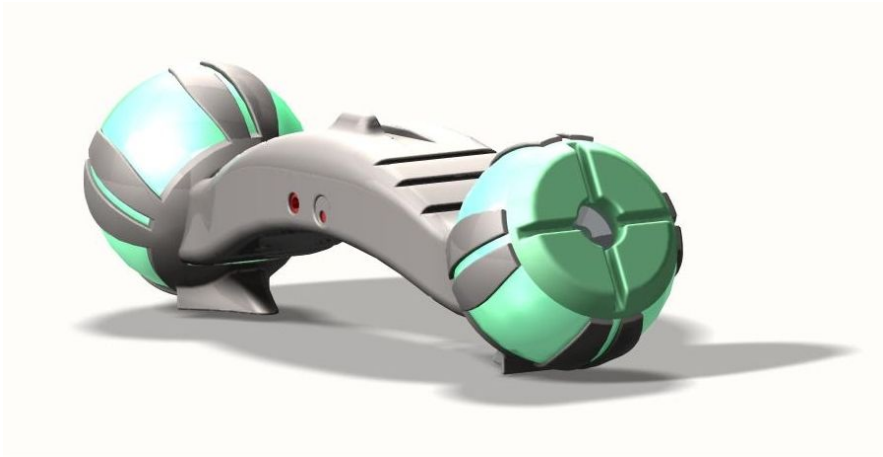
Ripley St Thomas High School, Lancaster, England

PTC DesignQuest – Student examples

Ripley St Thomas High School, Lancaster, England

Alarm clock for the deaf; sends alarm signal via bluetooth to vibrating wristband
Student going onto Brunel University to study Design Engineering

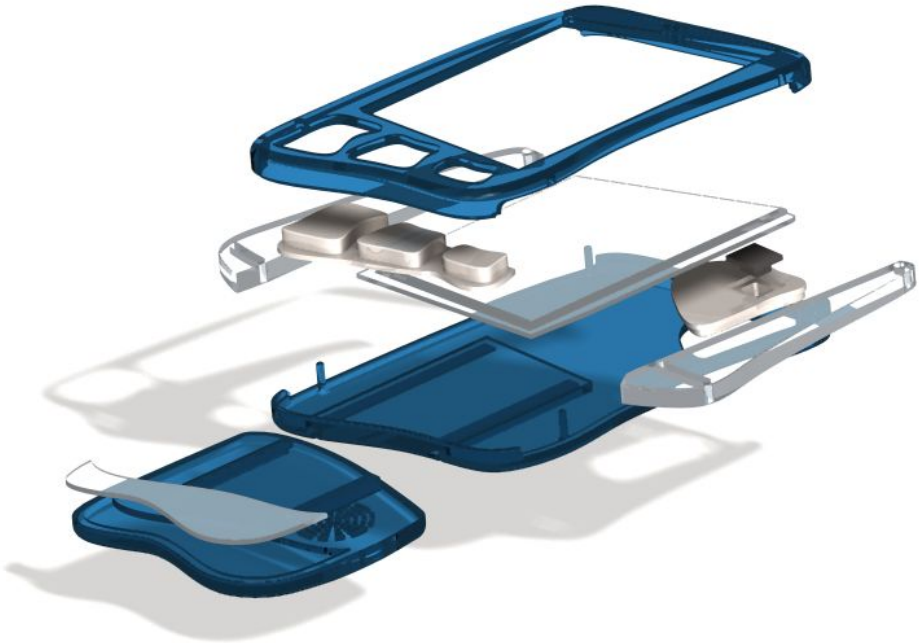
PTC DesignQuest – Student examples



Ripley St Thomas High School, Lancaster, England

ipod docking station & speakers
Student going onto Brunel University
to study Design Engineering

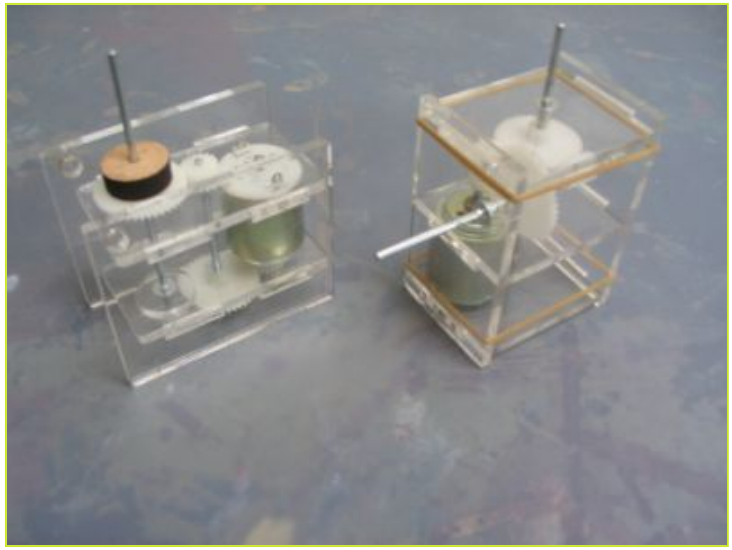
PTC DesignQuest – Student examples

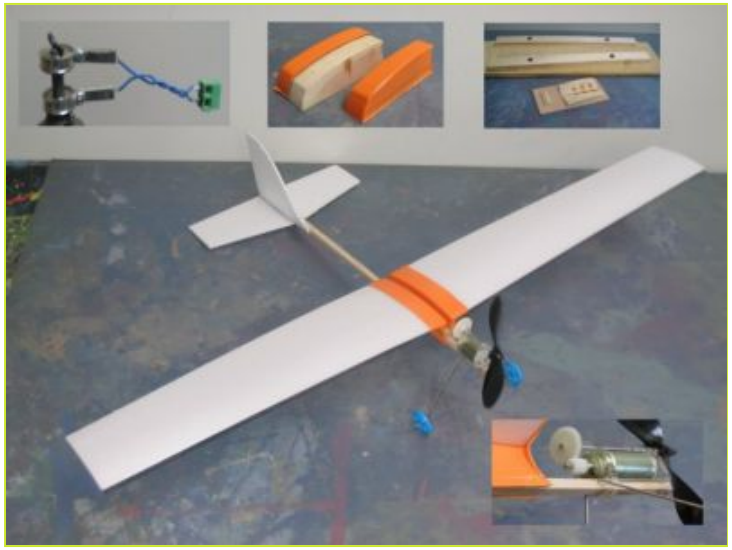


Ripley St Thomas High School, Lancaster, England

Engineering and curriculum innovation at Edgecliff High School

Chris Jarman
David Eyre

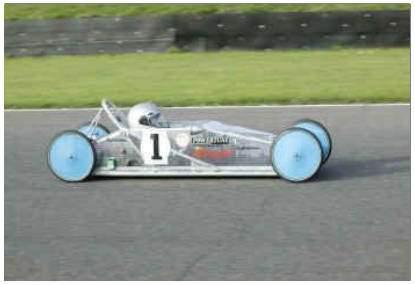




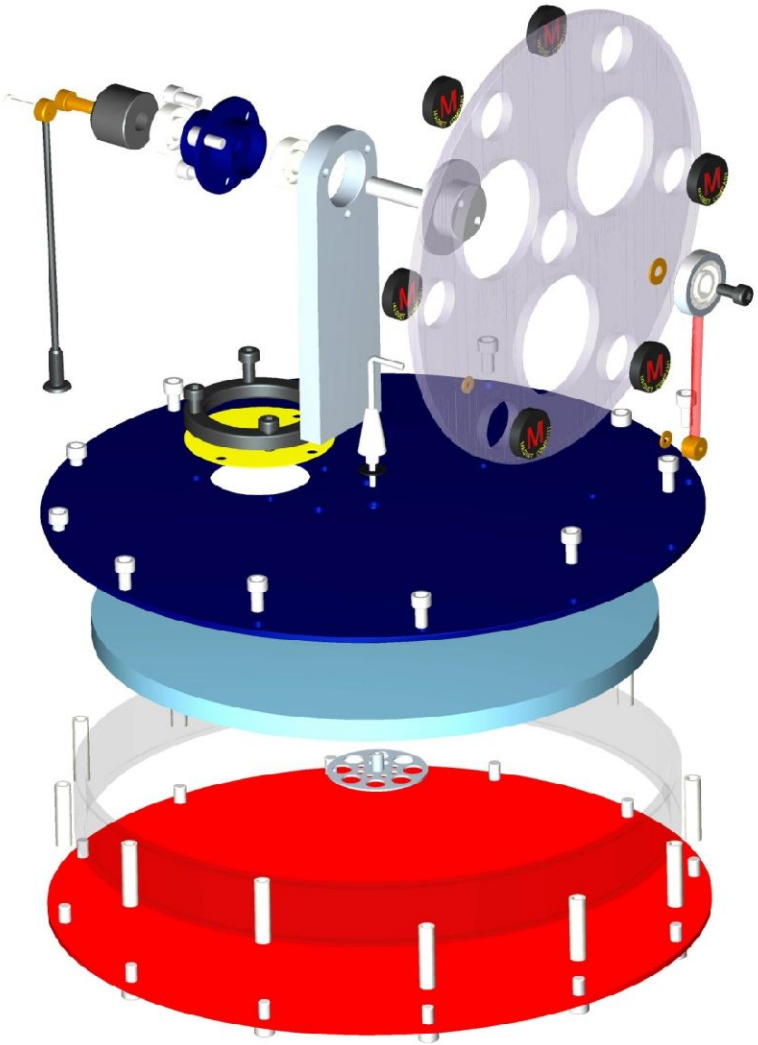
Engineering at Cardinal Griffin RC HS

Dr Tony Wynn-Jones

Greenpower challenge



PTC DesignQuest – Student examples

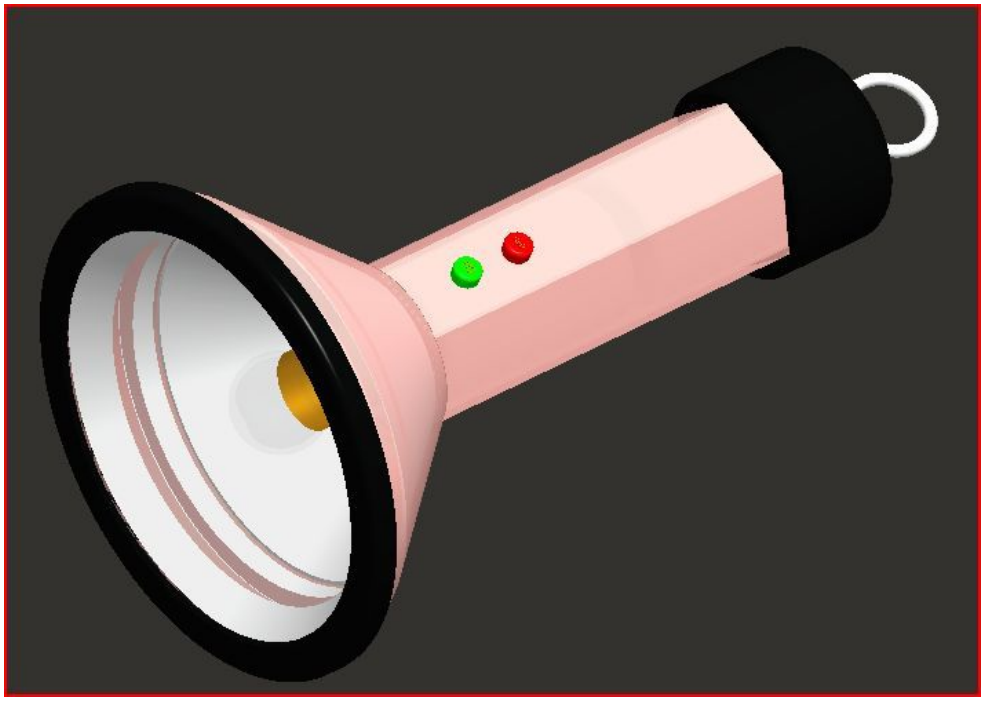


Stirling Engine

Modelled by Curtis, 8 years old

West Sussex, England.

PTC DesignQuest – Student examples



Battery and Torch

Modelled by Lottie, aged 7

Chichester West Sussex, England

Expanding commitment to education

PTC committed to continuous development of educational activities

Identified need for interesting Project Based learning activities

The result of 12 months research and development

- PTC partnership with a British institution
  - Long time Pro/ENGINEER user
- Suitable for children of all ages, from 11 to 80
- Global potential

What is Scalextric?

Slot car racing

- 1:32 scale

Hornby Hobbies – PTC customer

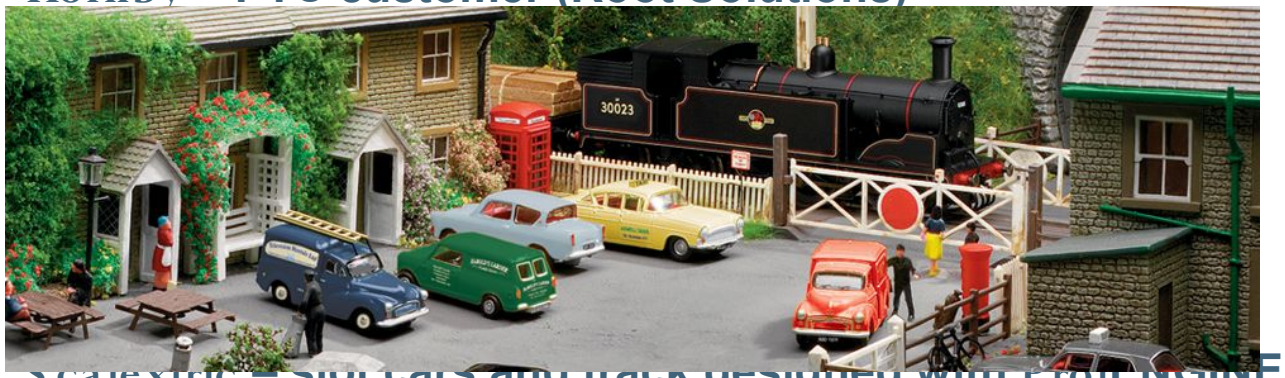
- Model trains – Pro|ENGINEER
- Airfix model kits – Pro|ENGINEER
- Scalextric – Pro|ENGINEER

Scalextric

- Brand leader
  - UK, Spain, Australia, New Zealand
- Oldest Slot Car system
- License agreements
  - F1, WRC, NASCAR..

PTC Customer – Hornby

Hornby – PTC customer (Root Solutions)



Exclusive branding
Support and prizes
Nine regional heats
UK national final

Scalextric – slot cars and track designed with Pro|ENGINEER

Product case studies

Materials and processes

Designers

Scalextric4schools

Why?

- Provide an exciting 'project' for schools
- Expanding our curriculum
  - STEM cross curricula

The Curriculum

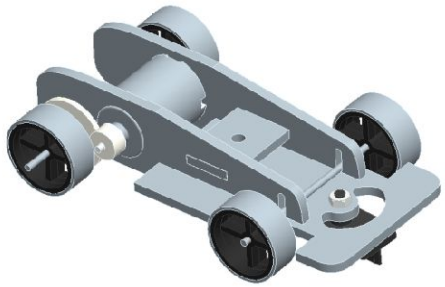
- STEM related project
  - Design and manufacture a slot-car
    - CAD, CAM, electronics, assembly, etc.

The Competition

- Regional races
  - 9 educational regions
- National final

Different Levels

- FORMULA 3
  - Keystage 3 (11 to 14)
- FORMULA Eco (in development)
  - Renewable energy, efficiency, etc.
  - Keystage 4 and engineering diploma (14-19)



Scalextric 4 schools – the website

www.scalextric4schools.org

- Download PTC curriculum
- Download Scalextric components
  - Pro|ENGINEER format
- Rules and regulations
- Register a team
  - Upload team details
  - Upload lap times
- Order parts and track
  - **Significant** discount
    - Education ONLY!

Curriculum - CADCAM

Pro|ENGINEER

Chassis design

Body shape & mould design

Wheel design

Photorealistic render

Testing – structural and thermal

Testing – mechanism dynamics

Animation

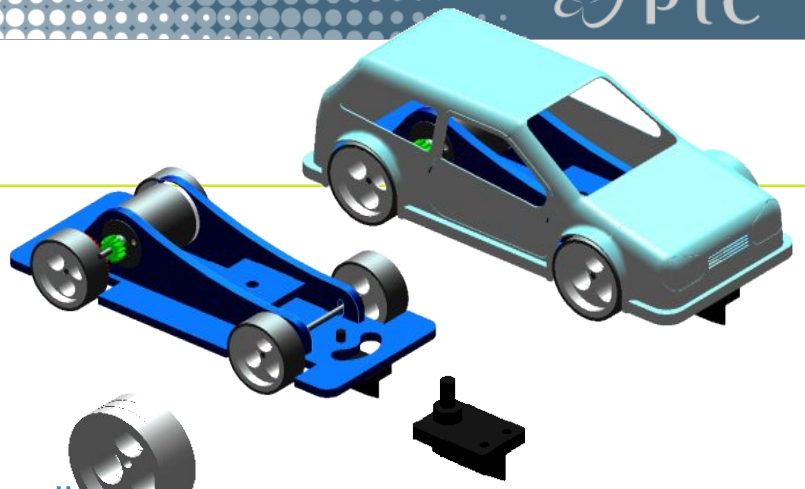
3D drawings

Library of standard components

Flowmerics – CFD analysis

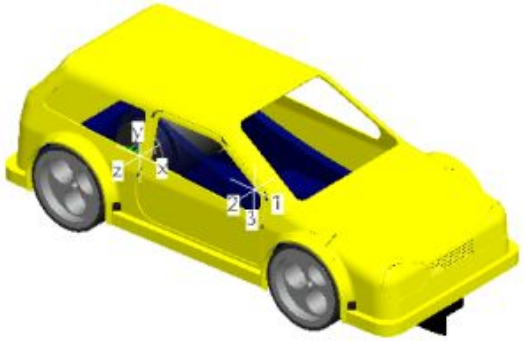
Outcome

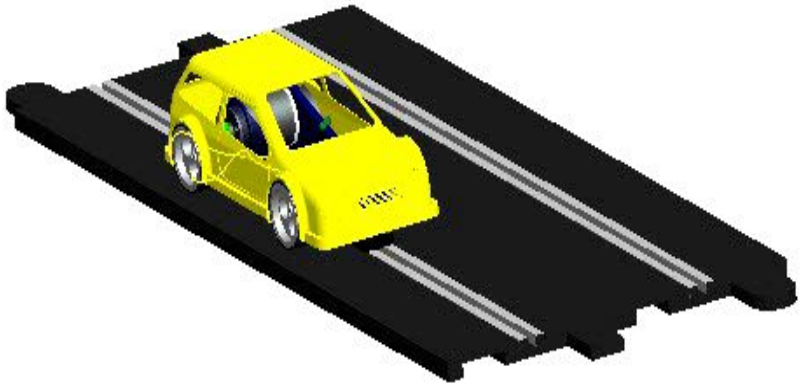
- Laser cutting
- CNC machining
- Vacuum formed bodies
- Injection moulding
- Rapid prototype - casting
- Publicity images
- Proof of concept
- Gearing, acceleration
- Simulation
- Assembly/production



Virtual testing, analysis and simulation

- C of G
- Mass
- Acceleration
- Cornering
- Structure
- Heat





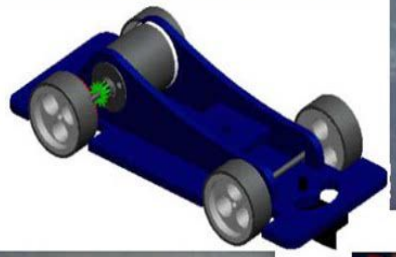
Pro|ENGINEER simulations

SCALEXTRIC

Scalextric4Schools – F3

Pro|ENGINEER - Wildfire 4.0

Schools and Schools Advanced Edition



CYNGHRAIR TECHNOLEG CYMRU
TECHNOLOGY ALLIANCE WALES

SCOTTISH QUALIFICATIONS AUTHORITY

DIVA digital media & ICT vendor alliance

INTAD

department for children, schools and families

D&T The design and technology association

CAD/CAM IN SCHOOLS

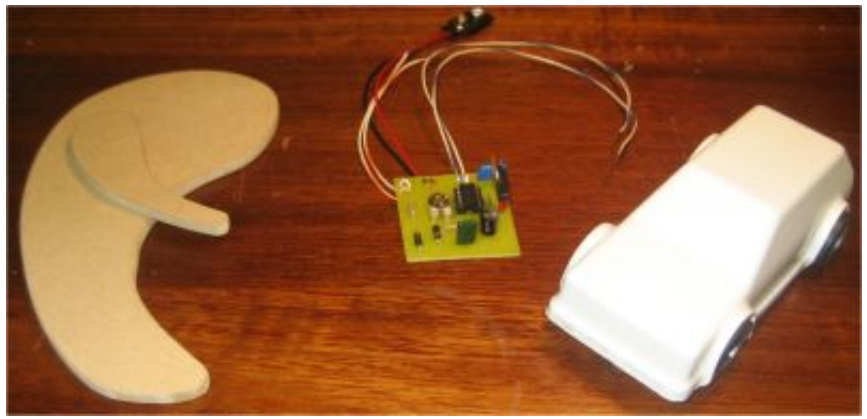
PTC®

Curriculum extensions

Systems and control

- Speed control
- Digital car ID
- Lane change
- Lap/sector timer
- Lap counter
- Efficiency
- Pit stops
- Super capacitors – recharging
- ‘Green’ electricity – generation
- Materials and manufacture

Alleyne's High School



Scalextric 4 schools – progress

Pilot

- 2 schools
- One school immediately committed to deliver to entire year group
- Feedback is amazing

Launch and roll out

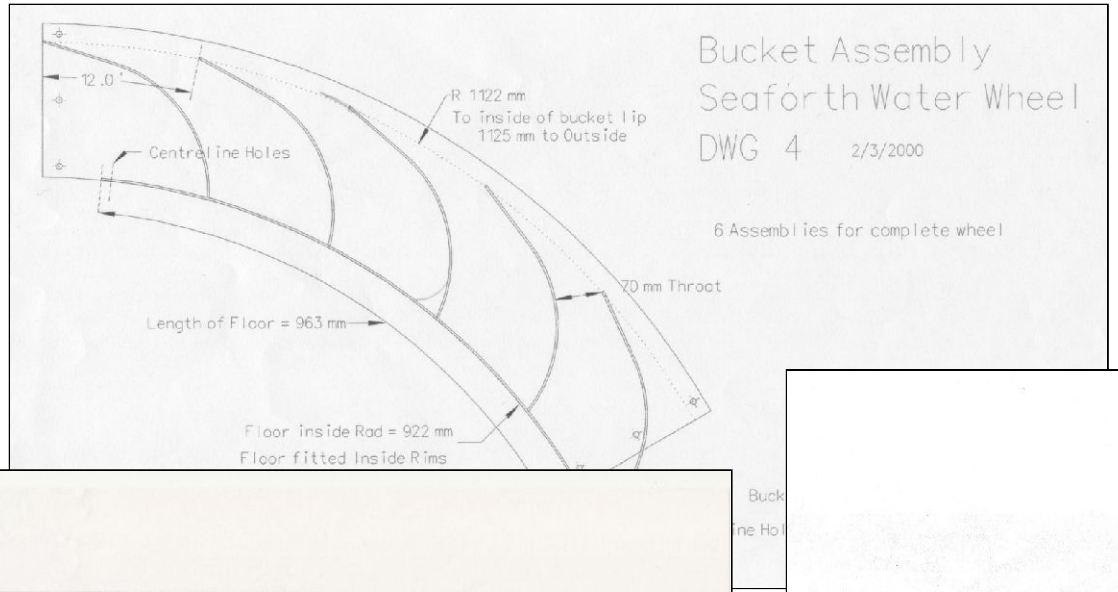
- Curriculum launch – 20th November at the D&T Show
- Competition launch – January 27th 2009
  - John Kelly Boys' Technology College
  - James May – Top Gear
  - James Cleave – World Slot-car champion and D&T teacher

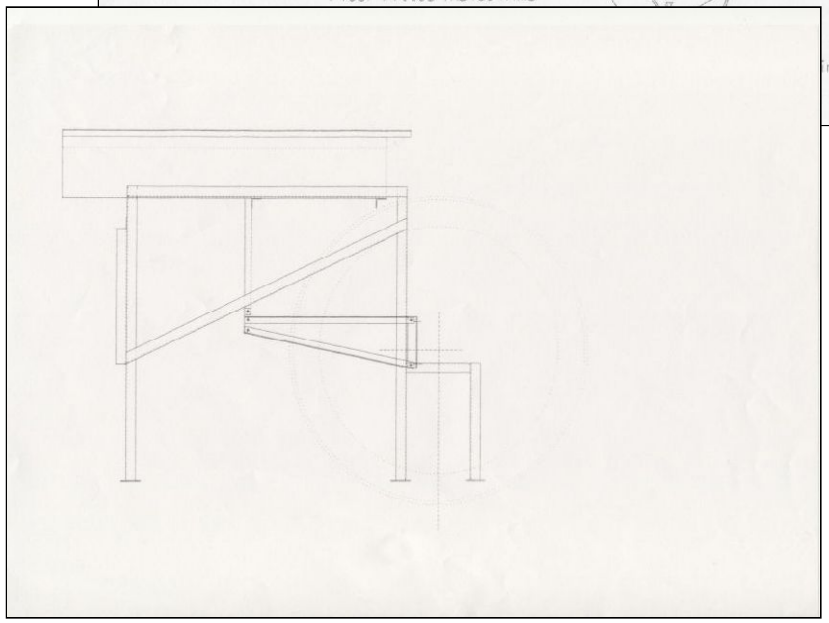
Pedley Trust – Water wheel electricity generation

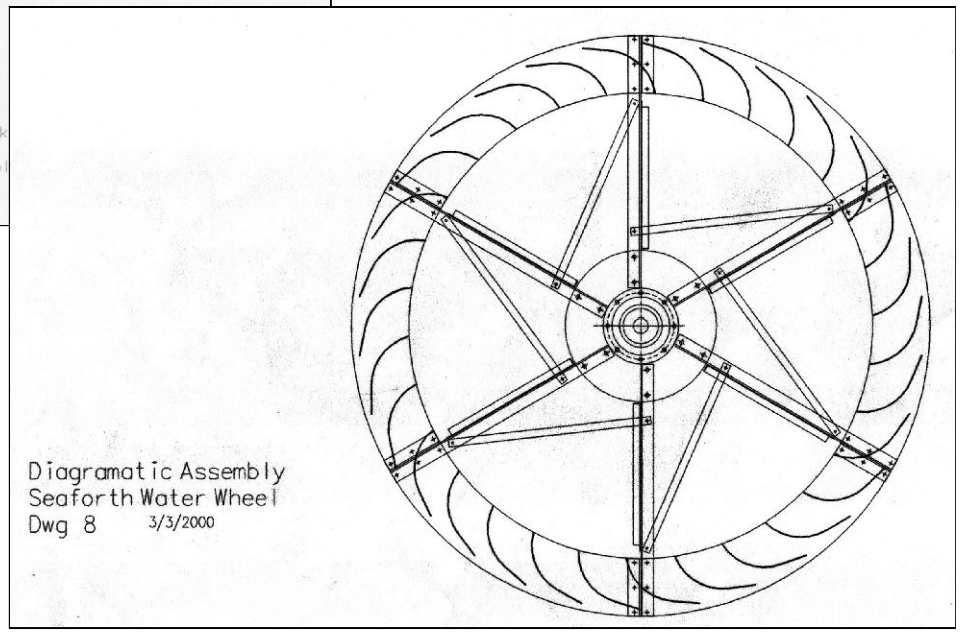
1991 – Wooden wheel

1997 – Steel wheel

Traditional drawings – 4 weeks

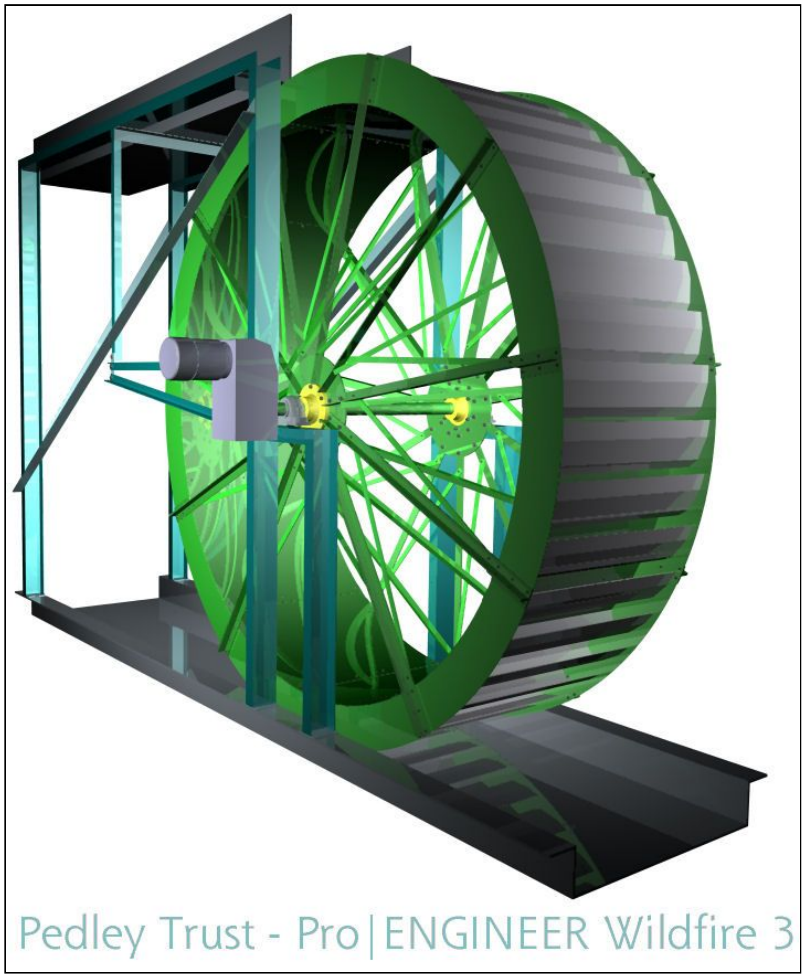




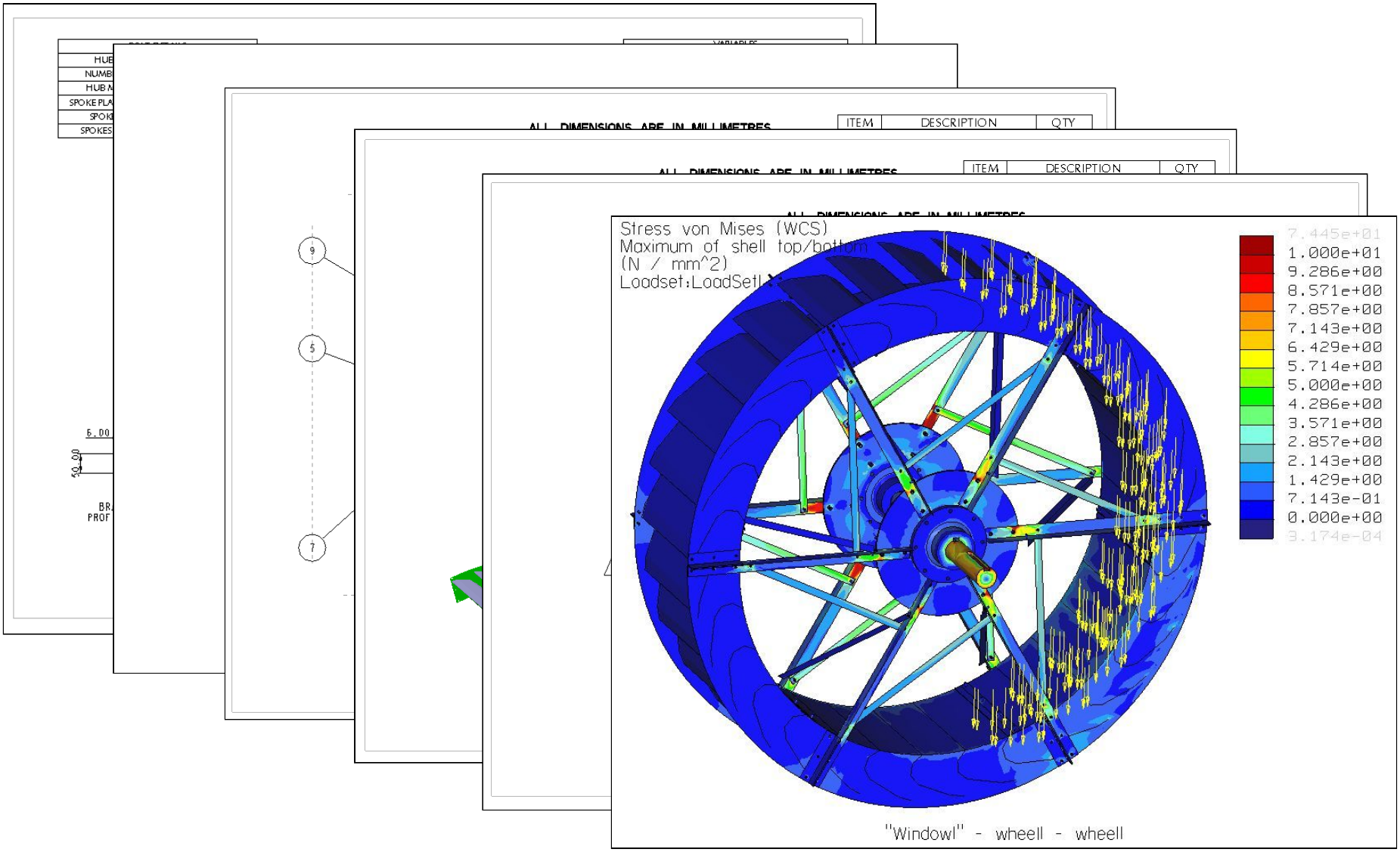


Top-down Parametric 3D model

Pro|ENGINEER modelling



Custom water wheel – 20 minutes



UK Pedley wheels

2002 - Pow Gill Mill, Cumbria

2005 - Stornoway Mill (www.stornowayamenitytrust.co.uk)

2008 – Holywell, North Wales 8 Kw
5 metre diameter – 200 litres sec -1

Sri Lanka

Since 1998 Pedley trust has been bringing electricity to remote villages

Engineering = Science + Mathematics + D&T

Social & Historic context

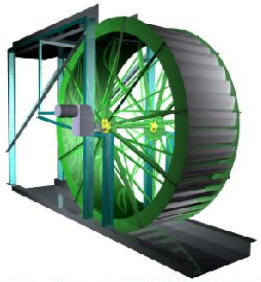
Math & Science principles

Testing & evaluation

Investigations

Renewable energy

Water wheel



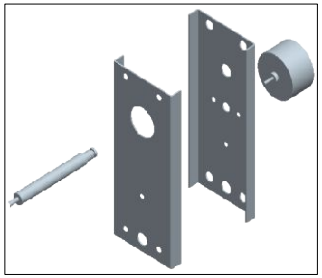
Modelling

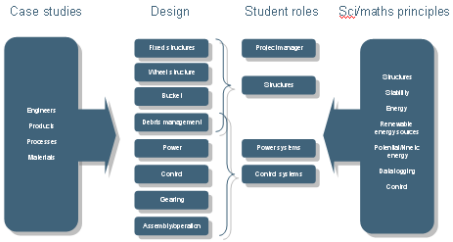
Team roles

Pedley Trust - Pro|ENGINEER Wildfire 3

Software tutorial

Cad model





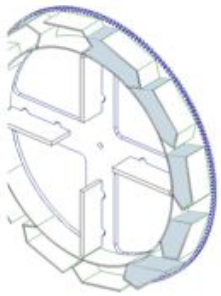
Pedley wheel trust

Physics and maths of water wheels

Adding an extension at the tip of the blade creates more of a bucket shape and now water is retained almost to the bottom of the wheel.

How far do you think the lip of the bucket could be extended before there are problems?

Note that we are looking at a static model and have assumed the water supply has enough time to completely fill each bucket.

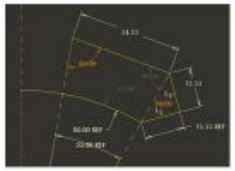


Bucket volume

This is the section sketch that creates the bucket shape for the wheel.

From these measurements it should be possible to calculate the area within the yellow lines.

Knowing the cross section and the width of the wheel it is then possible to work out the volume of the bucket.



inverse colours for clarity

Pro|ENGINEER will do this for us.

Here a CAD part was created inside the bucket representing the water.

Pro|ENGINEER has measured the cross-sectional area of the water.

Environmental impact

Research alternative power generation systems, their efficiency and environmental impact. How would you measure this? How is carbon footprint measured?

Further investigations

Mechanical simulation

Explanation of gearing, efficiency and the different systems tried on the Pedley Wheel.

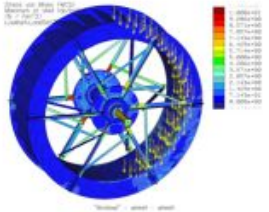
FEA stress analysis

This illustration is the result of a structural analysis using Pro|ENGINEER to show the stresses in a wheel.

The axle is locked and the buckets 'filled' by the appropriate amounts of water. The vertical yellow arrows show gravity acting on the water in the buckets.

Pro|ENGINEER knows what material each component is made from and how that material behaves under stress.

The software calculates the forces on every component and displays the stresses as colours. The greatest stress is shown as deep red colour.



How do you think an engineer might use the results of the structural analysis to refine the design of a water wheel?

CFD flow analysis

EFD Pro Flowmerics module here

D:\PTCData\AA ProE\AA Curriculum\02 High School\02 05 Green energy\02-05a Water power\STEM - Energy from water.doc

Preparations for teaching the diploma in Engineering

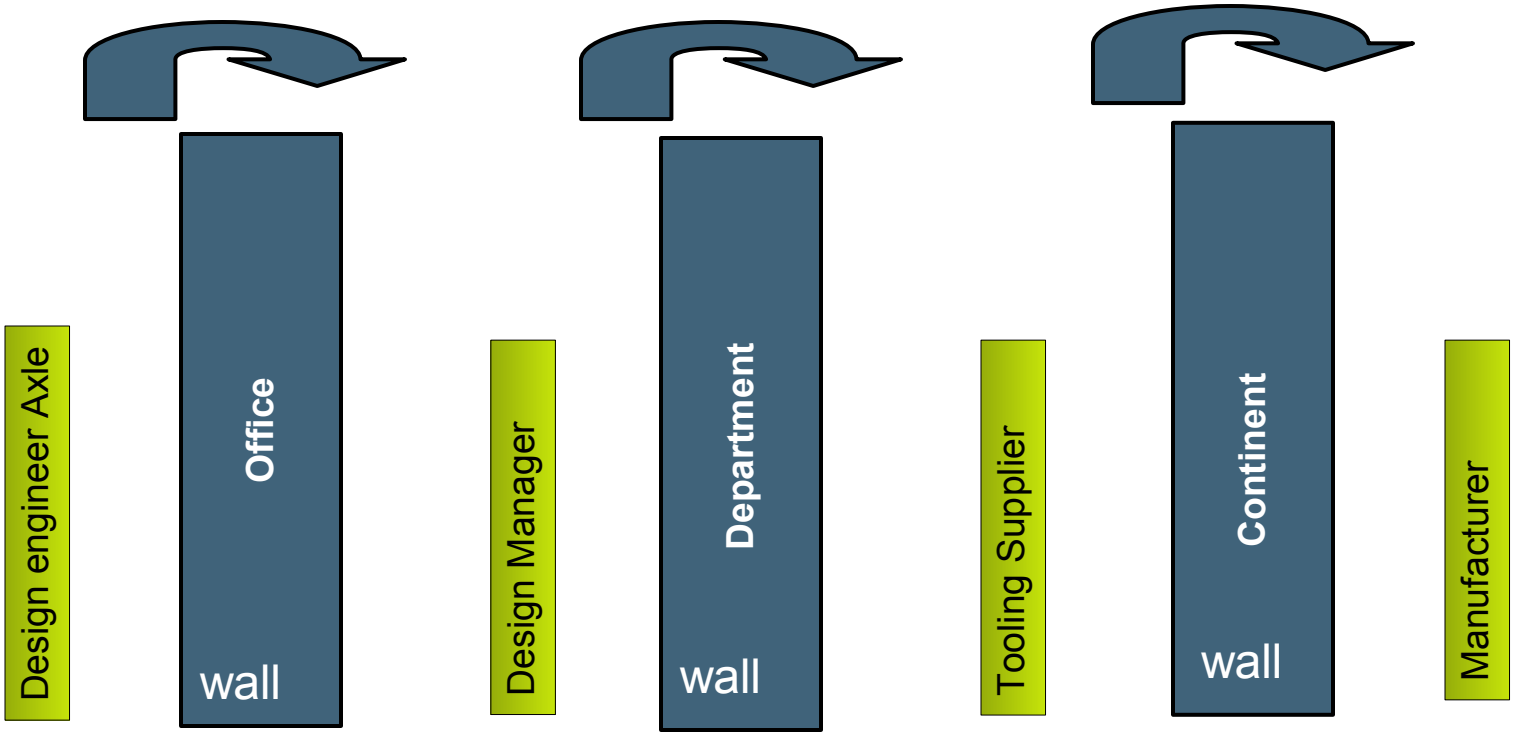
- Explore the issues for schools who are already delivering or considering introducing Engineering
- Identify and document exemplars of best practice
  - Engineers, companies, products, processes
- Agree a definition of (modern) engineering
- Identify the detailed requirements for effective delivery in schools
- Clarify those aspects of modern engineering PTC can help support
  - Identify and prioritise PTC actions in these areas
- Show how engineering can be taught effectively in schools
- Educate decision makers at every level in education
- Devise management strategies for schools planning to introduce the course
- Provide teachers with high quality curriculum, training and support

Stop!

have we missed something?

Old style engineering

‘Over the wall’



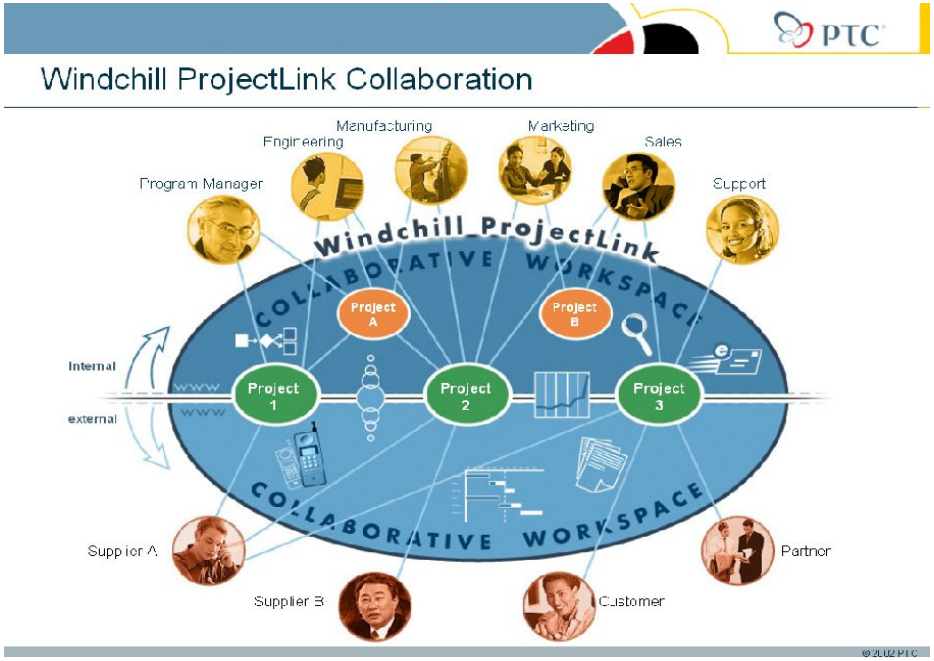
Product Lifecycle Management

Product Lifecycle Management (PLM) provides the tools to successfully manage information, communication and collaboration across the entire product lifecycle from idea through to retirement.

PTC Windchill Project Link

Product Life Cycle Management (PLM)

- Stores all electronic data relating to a product life cycle in a project
- Access to data is controlled so that users can only see/edit information relevant to their role



Project Management

- Create hierarchical team structures
- Schedule meetings reviews and discussions
- Create timelines and milestones

Cross enterprise project management

- Web based UI enables access anywhere

Why teach PLM?

- Product development is a team activity
- Teams are often widespread
- Large data sets for complex products
- Concurrent development – time to market

So is this a PTC brainwash?

- PTC is foremost a PLM software supplier
- Almost no mention of CAD on their home page
- Pro|ENGINEER is just one tool within PLM suite
- PTC provides PLM solutions to the fashion industry

IBM

- IBM's revenue for 2007 = $26.4 billion
- $5.7 billion in sales of software
- Acquired 11 software companies in 2006
- IBM provide PLM applications for companies many of which are not MCAD specific.

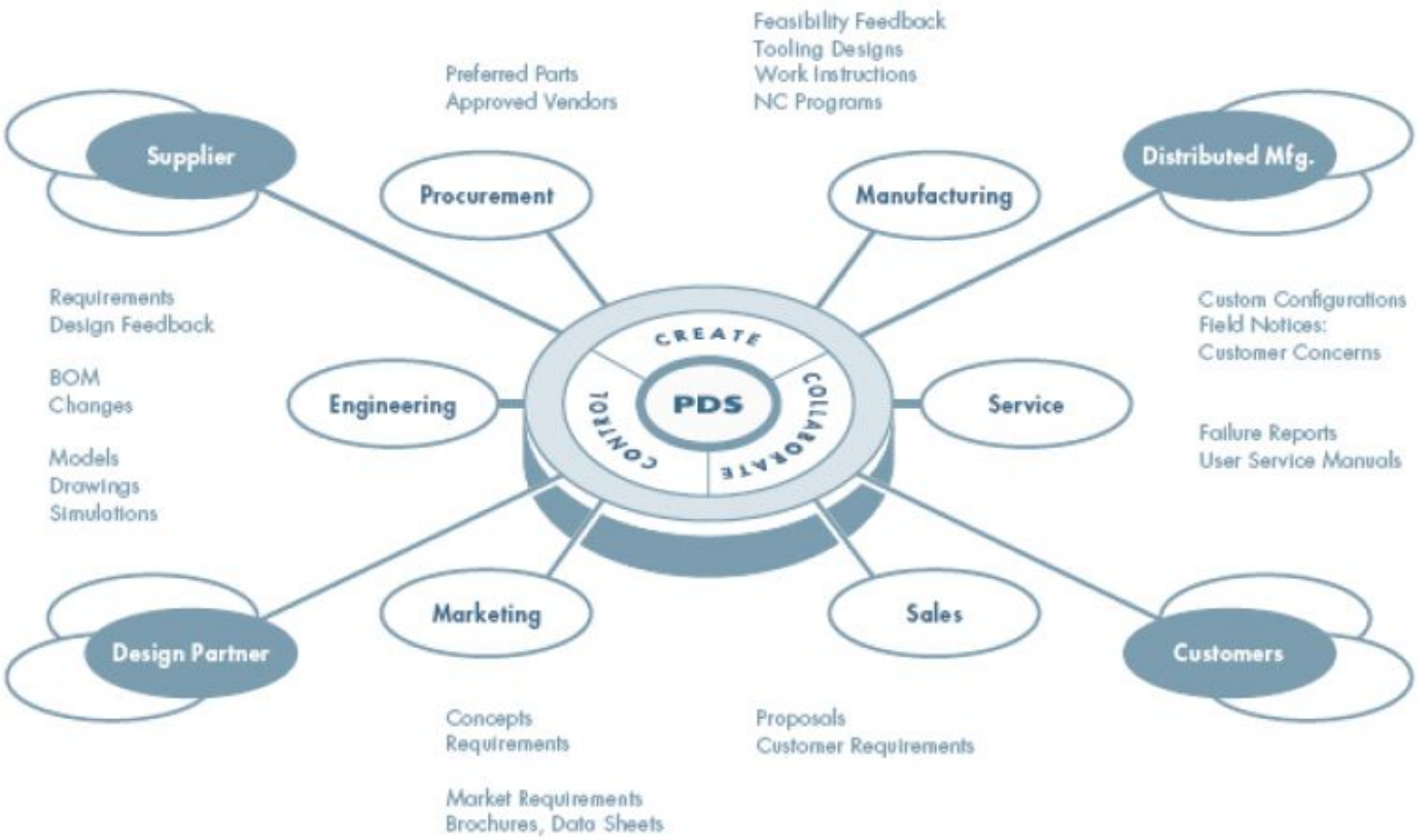
Product development is changing!

- Over **half of companies outsource** a significant portion of design
- Up to **70% of parts** in products may come from suppliers
- 66% of companies **outsource** a significant portion of **manufacturing**
- Up to **70% of a product's cost is determined during early design**
- Customers are playing a more **direct role in specifying** and configuring products
- Over **75% of companies** develop products on **multiple sites**

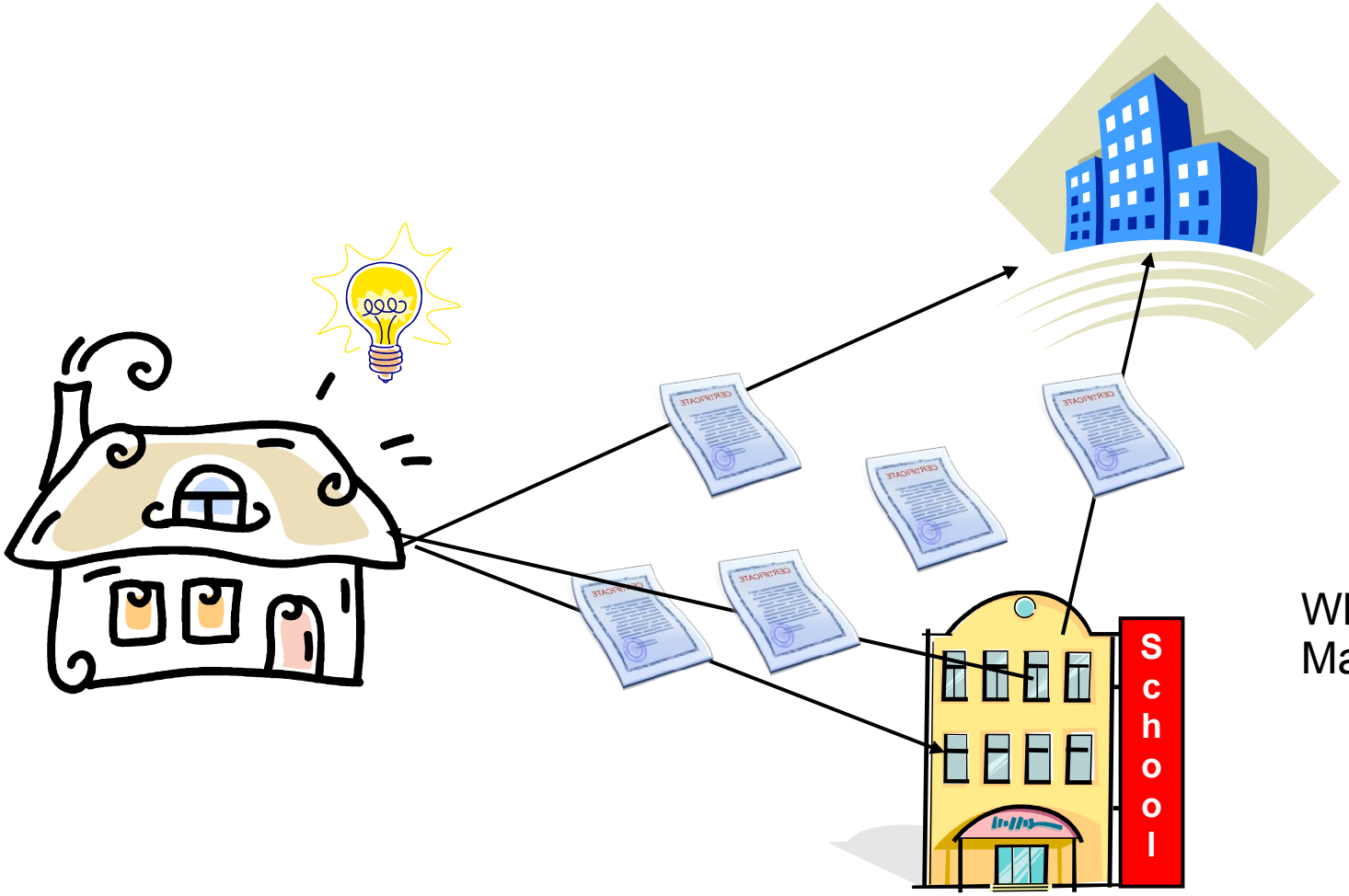
There is ever increasing demand on product development

- Reduce **time to market** for new products
- Improve new product **innovation**
- Improve product **quality and cost** (right first time)
- Create **derivative** products for **niche** segments or specific **geographies**
- **Coordinate** across multiple product development locations worldwide
- Work with globally **distributed manufacturing** locations
- **Support** customers located worldwide

Models of PLM

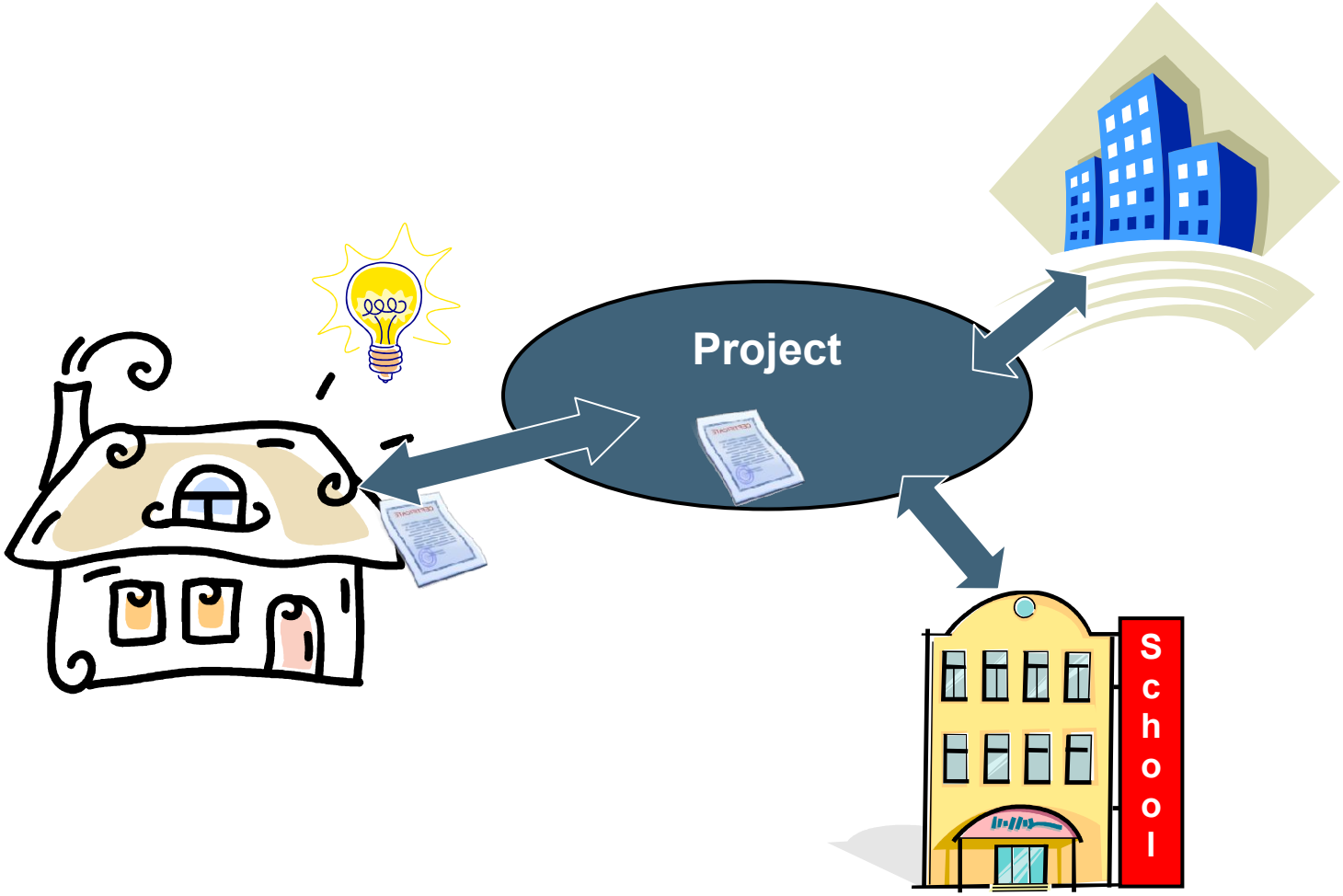


Or…



Where is the Master copy?

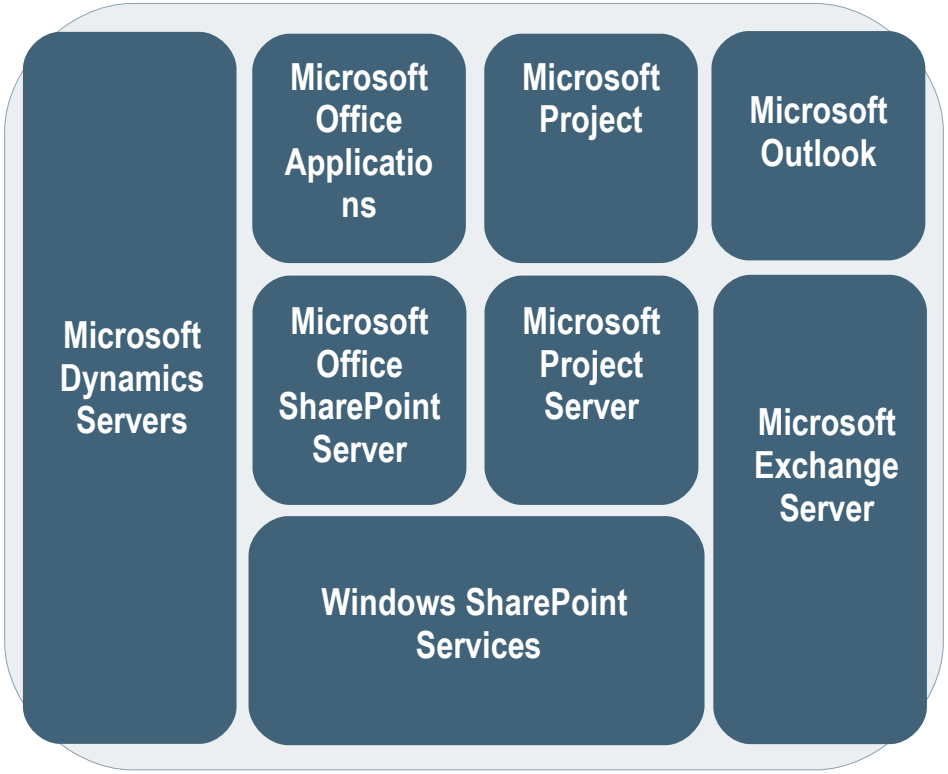
Avoid Communication Failure - Use a ProjectLink Collaboration Workspace



Microsoft productivity suite featuring SharePoint

SharePoint is Microsoft's new "infrastructure for collaboration"

- Basic offering, Windows SharePoint Services (WSS) is included with Microsoft Server
- SharePoint is ready to use, but also a platform for other applications such as Microsoft Office SharePoint Server (MOSS) and Microsoft Project Server



Becoming ubiquitous, available on over 100 million desktops

Microsoft SharePoint

Windows SharePoint Services offers:

- Infrastructure for Collaboration
- Foundation for building web-based applications

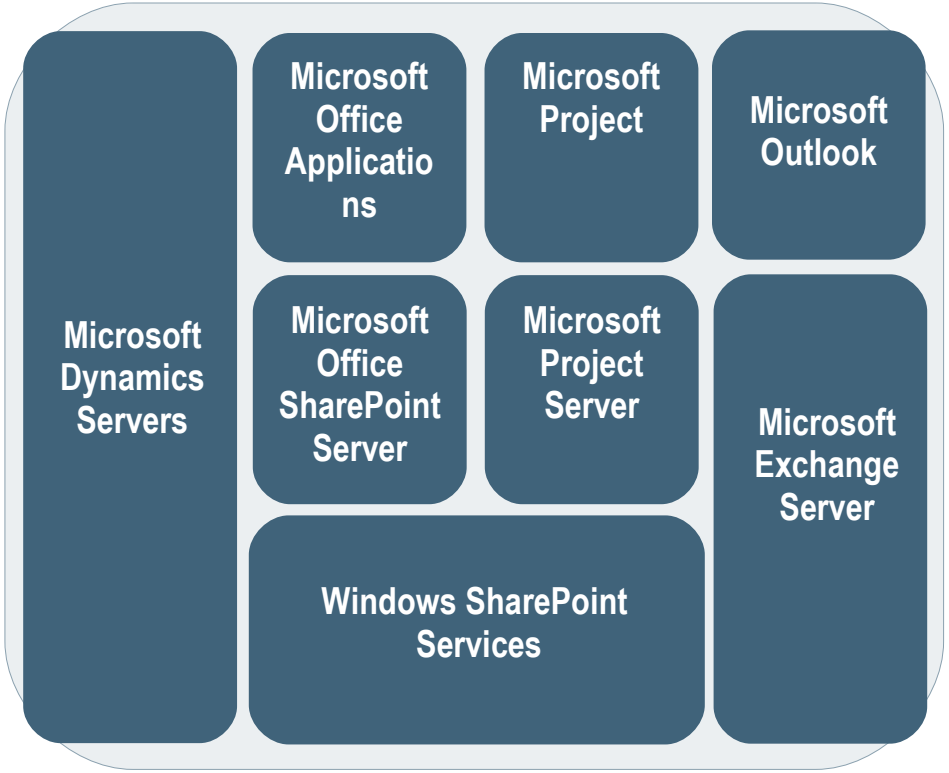
Windows SharePoint Services

Web-based	Easily accessible Web-based workspaces provide team access with just a browser
Collaboration	Announcements, alerts, discussion forums, blogs, wikis, file-based collaboration
Manageable infrastructure	SQL*Server, IIS, Internet Explorer, tight integration with Outlook
Low total cost of ownership	Bundled with all Microsoft Server products

Introducing Windchill ProductPoint

PTC's new Microsoft SharePoint-based solution for product development

- Complements the Microsoft productivity suite
- Unleashes SharePoint for product development



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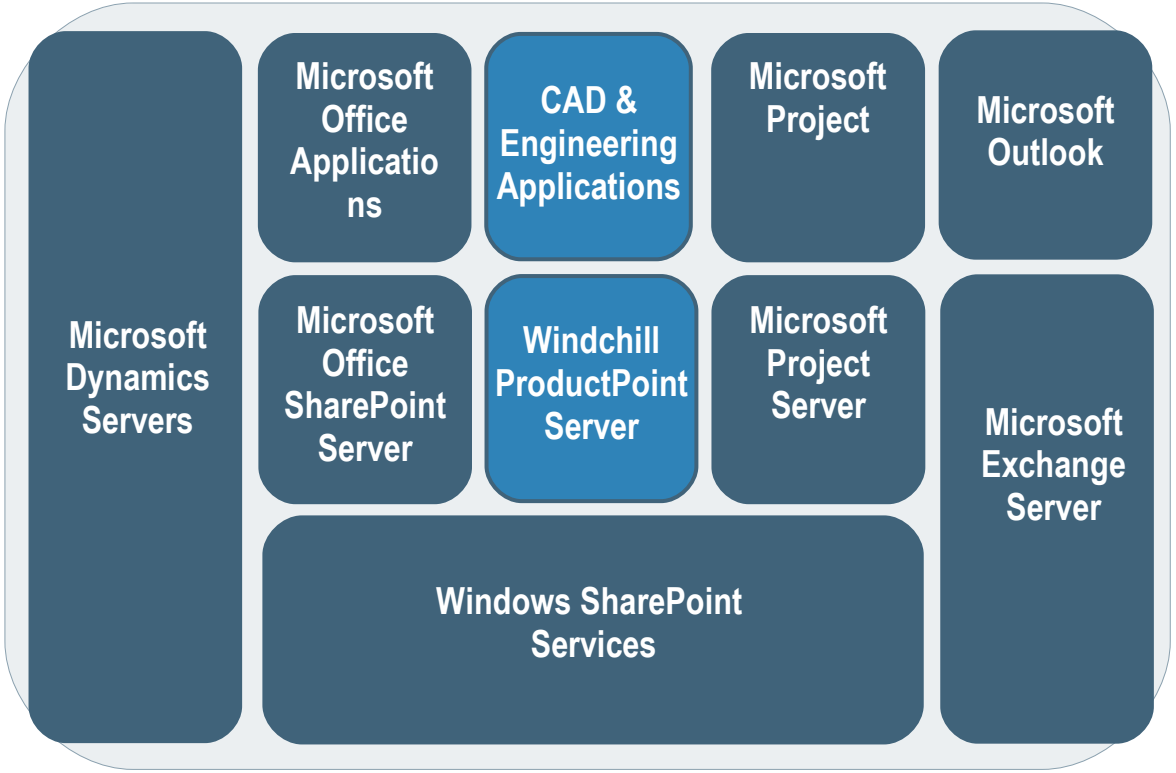

Windchill ProductPoint

Windchill ProductPoint extends SharePoint to product development

- Supports all types of structured information; such as files from Pro/ENGINEER or other CAD systems
- Enables sharing, visualizing, and markup of engineering data
- Works with Windchill-based systems for product development collaboration

Windchill ProductPoint Server

MultiCAD SharePoint Services	Manages multiple formats of CAD files, their structures, and inter-relationships
Windchill Portlets for SharePoint (Web Parts)	Presents information from Windchill systems in SharePoint browser
ProductView SharePoint Services	Publish and visualize accurate, lightweight product viewables
Windchill PLM Connector Integration*	Share CAD data across multiple Windchill PDM/PLM systems

*Windchill ProductPoint 2.0

Windchill ProductPoint appeals to organisations of all sizes

For Small organisations:

- The **shared folder crowd**, who are struggling to manage CAD data but want something fundamentally simpler than conventional PLM
- Organsiations who **need to collaborate** with their customers and suppliers
- Customers of CAD companies who provide **no effective vendor-supplied PLM solution** (e.g., Autodesk customers)

For Medium and Large organisations:

- Organisations that are **standardizing on SharePoint** as a company-wide collaboration backbone
- **Special purpose workgroups** (e.g., CAE, advanced research) that want SharePoint-level capabilities that can, as necessary, interact with a broader PLM suite

Windchill ProductPoint adds value on top of SharePoint

Key Capabilities	Windows SharePoint Services	Windchill ProductPoint
Web-based workspace	☐	☐
Blog, wikis	☐	☐
File-based collaboration	☐	☐
Microsoft Office integration	☐	☐
Basic Pro/ENGINEER data management		☐
MultiCAD file management		☐
Engineering calculations management		☐
Part libraries		☐
Product development reports		☐
Embedded 3D visualization and markup		☐

*Windchill ProductPoint 3D is

Key capabilities and benefits

Quickly search

- Find the latest versions of the right files
- Driving greater team productivity

Extend access

- To engineering content throughout the company
- Enabling more reuse and better decision making

Get up and running quickly

- With a fast and easy deployment, on top of a new or existing SharePoint Server
- Reducing total cost of ownership

Adopt with a minimal learning curve

- Due to the familiar interface and integrated environment