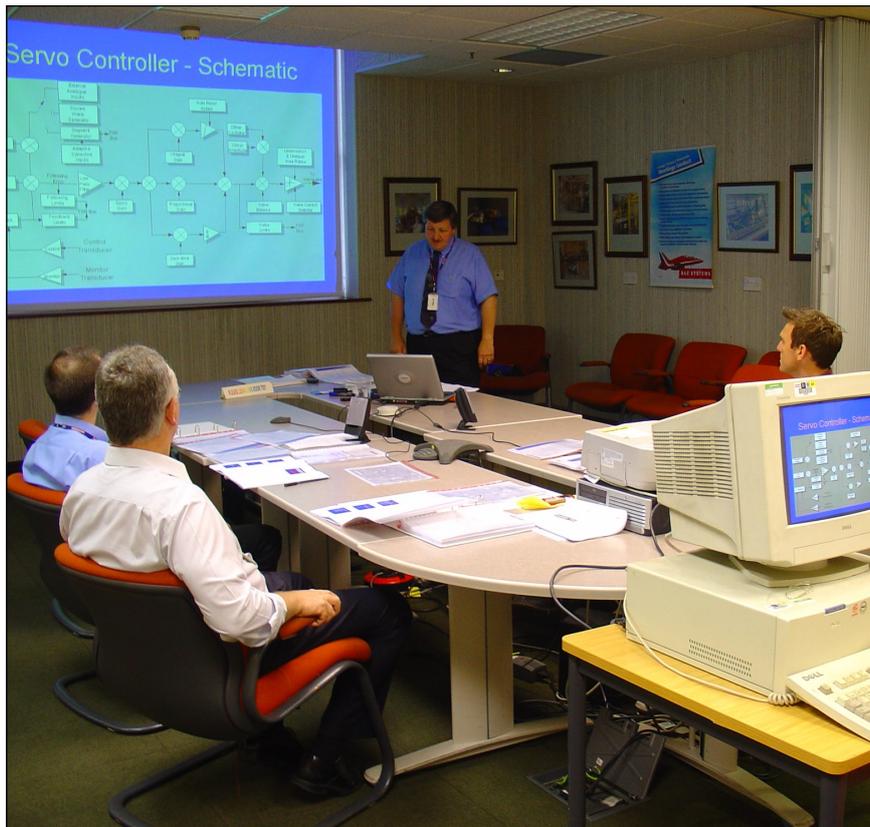


# MOTION CONTROL TRAINING



systems - services

PROVIDING SERVICE SINCE 1982

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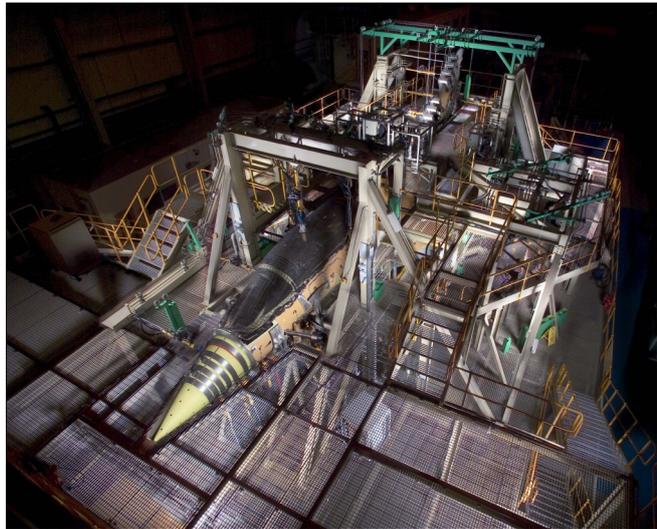
Delivering training courses for improved business performance

# Introduction

Whilst creating a flexible workforce job responsibilities and boundaries become blurred.

In today's destructive testing environments, typically fewer staff now carry out more duties and have to be competent in the use of complex and technically advanced equipment.

Current testing lead times mean that frequently one engineer is responsible for specifying, setting up, running and completing a test, which often includes writing the report as well.



Increasingly, new knowledge is required to complete the tasks to hand. Engineers and technicians need to acquire multi-disciplinary skills.

Servo-hydraulic machinery is complex and dangerous equipment when operated by less than suitably qualified personnel.

Systems Services has extensive practical experience of setting up and running tests. To ensure the tasks to hand are completed well, safely and to time Systems Services provide a comprehensive range of training courses along with commissioning & consultancy services.

For more information please contact [training@systems-services.co.uk](mailto:training@systems-services.co.uk) or call 01205 724242

“Delivering training courses for improved business performance”

# Generic & Customised Training Courses

Systems Services have been supporting companies since 1982 in industries ranging from aerospace to automotive and concrete to polymer composites. Engineers, technicians and managers in major organisations including Jaguar Land Rover, Rolls Royce, BAE SYSTEMS, Alstom & JCB have experienced Systems Services training as part of their organisational development. Our principal trainer has over 42 years varied practical experience in fluid power motion control encompassing over 28 different makes of equipment.



Systems Services offer a range of generic and customised courses to suit all ability levels & requirements. A sample of the courses available includes:-

Non Technician / Non Engineer	Basic Level	Advanced Level	Fault Finding & Maintenance	Safety	Bespoke
Fluid Power Awareness	An Introduction to Hydraulics	Advanced Hydraulics	Fault Finding & Diagnostics Basic and Advanced	Safety in the Test Laboratory	Manufacturer or Facility Specific
	An Introduction to Closed Loop Control	Advanced Closed Loop Control	Hydraulic Systems Maintenance	Safety and Fluid Power	Kelsey Instruments K7000 and K7500
	Accumulators	Multi Channel System Commissioning	Hydraulic Best Practice	Pressure Systems	Moog AeroTEST & PTC
Additionally, modules may be added to encompass site or laboratory specific facilities.					Iron Bird Rig Training
					Assessment of Competence

For more information please contact [training@systems-services.co.uk](mailto:training@systems-services.co.uk) or call 01205 724242

“Technical support you can depend on”

# Training

Every module is supported by full training notes and each course delegate receives a copy of the course notes as well as a package of useful information relevant to the course completed. Each delegate will also receive a course completion certificate to add to his or her training portfolio.

Each of the standard modules is designed to be presented across a wide range of skill levels. Hence the same course may be presented to a group with minimal experience and later to a group with high levels of experience but wishing to cover some topics in more depth.

Often the basic introductory courses are used to ensure that all members of the team have received the same standard of basic training before some members move on to more advanced tuition.

## Competence

### Competence requirement in the test laboratory or hazardous environment.

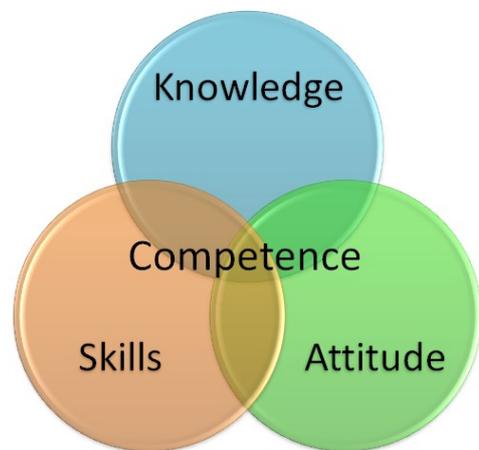
For all companies in today's pressurised work environment the requirement to be competent to carry out any task is essential and in the hazardous environment of the test laboratory competence is paramount.

### Competence assessment

As part of their training process Systems Services offer assessment of competence.

The assessment may take a number of forms (practical, classroom etc.) but will always be based upon a set of criterion agreed with the customer including pass/fail marks.

Successful completion of the assessment will result in the issue of a certificate whose wording will be carefully chosen and will, where required, be time limited.



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“Delivering training courses for improved performance”

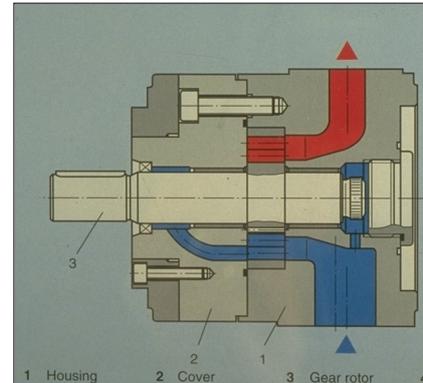
# Fluid Power Awareness - Course Syllabus

## Introduction

A one or two day course ideal for non technical staff, company administrative and support staff, shop floor personnel and those people who need an introduction to fluid power principles and systems at an entry level.

## Aims

- To understand the need for fluid power
- To introduce basic principles of fluid power
- To introduce basic fluid power theory in a practical way, physically handling core components (valves, actuators, servovalves, transducers etc.)
- To understand the safety issues around fluid power
- To gain a core glossary of terms used within hydraulic fluid power and control
- To understand the costs associated with fluid power technologies



## You might benefit from this course if:

- You have no previous knowledge or experience of hydraulics or fluid power
- You are buying hydraulic components / equipment
- You are working on projects that utilise hydraulic equipment and would benefit from an improved overview of hydraulic elements
- You are managing a team where hydraulics are utilised but you have no knowledge of the field

## Course content

- What is fluid power?
- Why use hydraulics?
- Basic principles and terminology
- Valve types, oil types, servovalves and transducers
- Filters and filtration technology
- Safety and fluid power
- Why does it all cost so much?
- Glossary of terms

The content of this course will be tailored to suit the needs of the customer.

Systems Services incorporate the following for each delegate in each training module:

- Full training notes including a copy of the course notes and attendance certificate.
- An additional package of useful information relevant to the course completed.

For more information please contact [training@systems-services.co.uk](mailto:training@systems-services.co.uk) or call 01205 724242

“A very useful course for the beginner”

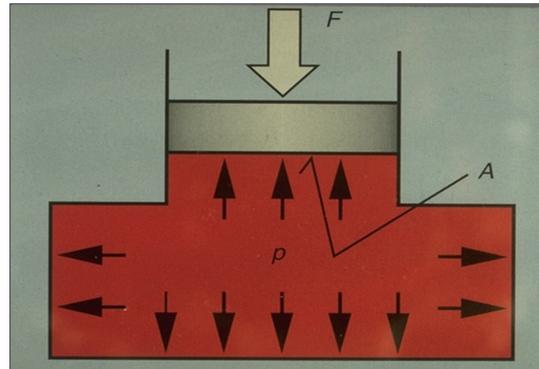
# An Introduction to Hydraulics - Course Syllabus

## Introduction

A one or two day course ideal for all personnel who are new to hydraulics and have direct hands on involvement with hydraulic systems and components.

## Aims

- To impart a basic understanding of hydraulics and safety
- To allow participants to become familiar with fluid power technologies such as pump flow, cylinder speed and forces
- To introduce basic hydraulic theory in a practical way, physically handling core hydraulic components
- To introduce basic principles of hydro-mechanics, hydro-statics and hydro-kinetics
- To gain a core glossary of terms used within hydraulics



You might benefit from this course if:

- You have no previous knowledge or experience of hydraulics
- You are buying hydraulic equipment
- You are working on projects that utilise hydraulic equipment
- You are an engineer with other skills who would benefit from an overview of hydraulics
- You are managing a team where hydraulics are utilised but you have no knowledge of the field

## Course content

- Why hydraulics?
- Basic principles of hydro-mechanics, hydro-statics and hydro-kinetics
- Hydraulic circuits and symbols
- Hydraulic fluids, pumps, cylinders
- Accumulators and accumulator applications
- Valves: Non return, Directional, Pressure Control and Flow control valves, including the servo valve.
- Filters and filtration technology.
- Glossary of terms

Systems Services incorporate the following for each delegate in each training module:

- Full training notes including a copy of the course notes and attendance certificate.
- An additional package of useful information relevant to the course completed.

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“The course was very helpful to me”

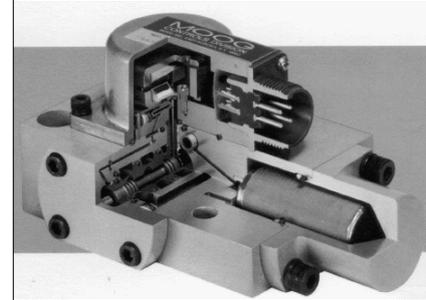
# An Introduction to Closed Loop Control - Course Syllabus

## Introduction

A one or two day course ideal for technical staff involved in fluid power motion control

## Aims

- To define closed loop control
- To inform about open and closed loop systems
- To review feedback, error and control modes and safe operation
- To consider how electronics are linked with hydraulics
- To gain a core glossary of terms used within closed loop control



You might benefit from this course if:

- You have no knowledge of servomechanisms or closed loop control
- You are unfamiliar with transducers
- You manage testing staff or programmes and would benefit from an overview of closed loop control and devices
- You need to specify or purchase testing equipment

## Course content

- Definition of a servomechanism
- Electrohydraulic proportional control systems (Power source, control element, feedback sensor, error activator)
- Servo and proportional valves (including three stage valves if required).
- Feedback sensors - transducers - position, force and pressure etc. (including Rcal. and calibration).
- The error activator - the error path.
- The application of the basic elements in a closed loop control system.
- Step response - marginally stable criteria (include three stage valves if required).
- Electronics - amplifiers - proportional, integrating, differential and damping (PID)
- Digital -v- analogue electronics
- Control modes.
- Dither and servovalve balance.
- Glossary of terms.

The two day course gives the opportunity to run equipment live and to investigate some advanced controller features like mixed mode control, amplitude and gain matching etc.

Systems Services incorporate the following for each delegate in each training module:

- Full training notes including a copy of the course notes and attendance certificate.
- An additional package of useful information relevant to the course completed.

For more information please contact [training@systems-services.co.uk](mailto:training@systems-services.co.uk) or call 01205 724242

“An informative and well presented course”

# Fault Finding and Diagnostics - Course Syllabus

## Introduction

A two day course ideal for plant managers and engineers involved in the maintenance or design of industrial hydraulic systems.

## Aims

- To impart a thorough understanding of basic principles and their application, thereby enabling attendees to safely analyse associated symptoms and logically diagnose faults
- To review typical fault problems and develop a methodology for diagnosis
- To diagnose typical servovalve set up errors and problems



You might benefit from this course if:

- You have not previously received any formal training in fault finding
- You occasionally come across fault issues
- You are working on projects that utilise hydraulic equipment
- You are involved in the maintenance or design of industrial hydraulic systems

## Course content

- Logical approach to fault finding
  - Basic fault finding checklist
- Electrical / Electronic faults:
  - Power supplies, transducer excitation, fuses & fans, basic cable checks. The risks of PCB/module exchanging
- Considering classic fault problems
  - i.e. What happens if the front panel lights are not working?
  - i.e. What if the pump unit will not start or pressurise?
  - i.e. The system pressurises but will not control
- Servovalve faults
  - Balance, common servovalve errors and problems
  - Three stage servovalve set-up and valve current
  - What to look for with valve performance
- Control loop optimisation
- Position & load control mode transfer
- Frequency response

During the course delegates are given the opportunity to discuss their own system problems (ensure circuit diagrams are available).

For more information please contact [training@systems-services.co.uk](mailto:training@systems-services.co.uk) or call 01205 724242

“The presenter was simply fantastic”

# Hydraulic Systems Maintenance - Course Syllabus

## Introduction

Up to 80% of all hydraulic failures can be attributed to contamination. Establishing a proactive approach to maintenance can significantly reduce downtimes. This is a two day course.

## Aims

- To impart a basic understanding of maintaining hydraulics
- To increase the knowledge of personnel who are actively engaged in the repair and maintenance of hydraulic systems
- To systematically review the key maintenance activities, such that these can be competently and safely completed in line with establishing a hydraulic system maintenance programme
- To impart the approach of total cleanliness control of hydraulic fluids and good hydraulic housekeeping



## You might benefit from this course if:

- You have no previous knowledge or experience of hydraulic maintenance
- You are responsible for hydraulic equipment
- You are working on projects that utilise hydraulic equipment
- You are a maintenance / project engineer
- You are managing a team where hydraulics are utilised but you have limited knowledge of the field

## Course content

- Oil issues
  - Changing filters, taking an oil sample, checking oil level & oil temperature
- Routine maintenance
  - Pre-charging accumulators, hose maintenance, pressure gauges, checking seals, setting torque loading for bolts and fittings
  - Pump electrical systems (star -delta)
  - Thermal overloads, fuses etc.
- Problem solving
  - Setting system pressure - relief valves
  - Local pressure reduction - reducing valves
  - Blocked filter indication - what it really means
  - Overcoming cooling problems, curing leaks

During the course delegates are given the opportunity to discuss their own maintenance problems (ensure equipment details are available).

For more information please contact [training@systems-services.co.uk](mailto:training@systems-services.co.uk) or call 01205 724242

“An informative and well presented course”

# Safety in the Test Laboratory - Course Syllabus

## Introduction

The uniqueness and variation of the test laboratory can result in the potential of dangerous situations. This course covers key safety aspects to be considered. This is a short one day course.

## Aims

- To impart a core understanding of safety in the test laboratory
- To allow participants to become familiar with both dynamic and static safety issues
- To cover hydraulic, pneumatic and related safety issues

## You might benefit from this course if:

- You are new to working in the test laboratory
- You are managing a test laboratory where hydraulics and pneumatics are utilised but you have no knowledge of the field
- You have worked with hydraulics or pneumatics for a long time and a refresher on safety would be beneficial

## Course content

- Hydraulic and Pneumatic
  - Bolt torques, flow, hoses, leaks - high pressure jets, oil spills.
  - Pressure and pressure ratings, relief and reducing valves - purpose and setting, the power in hydraulics, valve port identification and venting pressure, stored energy - accumulators (pressure systems).
- Safety systems
  - Calibration of safety equipment.
  - Emergency Stop buttons, their location and effect.
  - Isolation procedures, electrical and mechanical.
  - Overriding safety interlocks - when and when not to.
- Personal safety
  - Eye protection, fire risks, guarding - restricting access, health risks - COSHH, keeping hands clear, loss of control, moving parts, noise, personal hygiene, PPE.
  - Safe lifting and working practices.



Systems Services incorporate the following for each delegate in each training module:

- Full training notes including a copy of the course notes and attendance certificate.
- An additional package of useful information relevant to the course completed.

For more information please contact [training@systems-services.co.uk](mailto:training@systems-services.co.uk) or call 01205 724242

“Excellent presentation reinforcing basic safety which is sometimes forgotten”

# Safety and Fluid Power - Course Syllabus

## Introduction

The uniqueness and variation of hydraulic and pneumatic fluid power can result in potentially dangerous situations.

This course covers the key safety aspects to be considered.

## Aims

- To impart a core understanding of safety working with fluid power
- To allow participants to become familiar with a wide range of fluid power safety issues
- To cover hydraulic and/or pneumatic and related safety issues



You might benefit from this course if:

- You are new to working in with fluid power
- You are managing or operating facilities where hydraulics and pneumatics are utilised but you have little or no knowledge of the field
- You have worked with hydraulics or pneumatics for a long time and a refresher of safety would be beneficial

## Course content

- Hydraulic and Pneumatic  
Regulatory framework, pressure and pressure ratings, relief and reducing valves - purpose and setting, the power in hydraulics, valve port identification and venting pressure, stored energy - accumulators and air receivers (pressure systems). Bolt torque, flow, hoses, leaks - high pressure jets and injection hazards, oil spills, fire risks.
- Safety systems  
Calibration of safety equipment.  
Emergency Stop buttons, their location and effect.  
Isolation and lockout procedures, electrical and mechanical.  
Overriding safety interlocks - when and when not to. FOD.
- Personal safety  
Eye protection, fire risks, guarding - restricting access, health risks - COSHH, keeping hands clear, loss of control, moving parts, noise, personal hygiene, PPE working at height, lone working.  
Safe lifting and working practices, tool box talks.

Systems Services incorporate the following for each delegate in each training module:

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- An additional package of useful information relevant to the course completed.

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“Excellent presentation reinforcing basic safety which is sometimes forgotten”

# Competence Assessment

## ISO9001 states:

The organization shall.....determine the necessary competence for personnel performing work.....provide training or take other actions to achieve the necessary competence.....  
(ISO9001:2015, S6.2.2)



## What is competence

**Competence** is a standardized requirement for an individual to properly perform a specific job.

It encompasses a combination of **knowledge**, **skills** and **attitude** utilized to improve performance.

More generally, competence is the state or quality of being adequately or well qualified and thus having the ability to perform a specific role.

## Competence requirement in a fluid power, testing or hazardous environment.

For all companies in today's pressurised work environment the requirement to be competent to carry out any task is essential and in the hazardous environment of the fluid power competence is paramount.

## Competence assessment

As part of their training process Systems Services offer assessment of competence.

The assessment may take a number of forms (practical, classroom etc.) but will always be based upon a set of criterion agreed with the customer including pass/fail marks.

Successful completion of the assessment will result in the issue of a certificate whose wording will be carefully chosen and will, where required, be time limited.

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“Technical support you can depend on”

# Multi Channel System Commissioning - Course Syllabus

## Introduction

A two day course for technical staff and managers involved in commissioning and running multi-channel systems for mechanical testing

## Aims

- To learn how to safely approach and commission large fatigue tests
- To understand the challenges of operating large channel count multi-axis tests
- To understand the trade off between speed and accuracy
- To maximise test speed, accuracy & repeatability



## You might benefit from this course if:

- You are new to or have limited experience of multi-channel multi-axis tests
- You are unfamiliar with commissioning
- You manage testing staff or programmes and would benefit from an overview of the challenges
- You need to specify or purchase testing equipment

## Course content

- Commissioning plans, procedures & checklists
- The basics (system pressure, bleeding, fluid cleanliness, fluid temperature etc.)
- System & channel resolution, accuracy & repeatability, actuator friction
- Channel parameters (including limits)
- Servovalve sizing
- Tuning single channel and multiple channel
- Channel interaction
- Optimisation and limitations of test speed
- Transition times
- Reactive loading, gain profiling
- Calculation channels and their use
- Pressure and return line accumulators
- Glossary of terms

This course requires the use of a training rig or similar for maximum benefit.

Systems Services incorporate the following for each delegate in each training module:

- Full training notes including a copy of the course notes and attendance certificate.
- An additional package of useful information relevant to the course completed.

For more information please contact [training@systems-services.co.uk](mailto:training@systems-services.co.uk) or call 01205 724242

“Everyone came away better equipped to do their jobs”

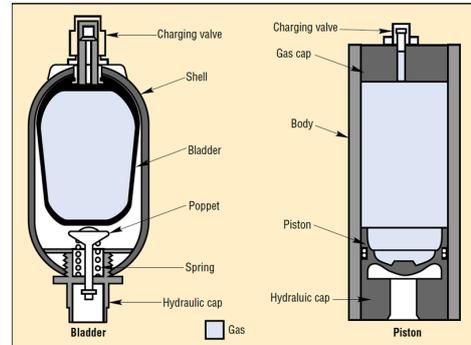
# Hydraulic Accumulators - Course Syllabus

## Introduction

Our Accumulator course is a hands-on introduction to the operation and application of high pressure accumulators, undertaken in a workshop environment. This is a one day course. Additionally the delegates may be formally assessed at the completion of the course and a competence certificate awarded.

## Aims

- This course is designed for personnel who maintain and monitor the operation of pre-charged hydraulic accumulators.
- The course incorporates safety and practical aspects associated with pre-charged hydraulic accumulators within fluid power systems.
- Delegates will be shown how to evaluate the pre-charge condition as well as pre-charging and test procedures.



You might benefit from this course if:

- You have no previous knowledge or experience of accumulators
- You are responsible for hydraulic equipment that includes accumulators
- You are working on projects that utilise hydraulic accumulators
- You are a maintenance / project engineer
- You are managing a team where hydraulics are utilised but you have limited knowledge of accumulators

## Course content

- Accumulator types
  - Bladder, diaphragm, piston & attenuators
- Applications & choice
- How accumulators work
- Accumulator safety & safety blocks
- The regulatory framework (PED, PER & PSSR)
- The pre-charge & charging accumulators
- Practical applications and installation
- Accumulator maintenance

During the course delegates are given the opportunity to handle and charge an accumulator.

Systems Services incorporate the following for each delegate in each training module:

- Full training notes including a copy of the course notes and attendance certificate.
- An additional package of useful information relevant to the course completed.

For more information please contact [training@systems-services.co.uk](mailto:training@systems-services.co.uk) or call 01205 724242

“An informative and well presented course”

# What Our Customers Say About Our Training

## Quotes - Advanced Hydraulics

“I was extremely happy with the professional manner in which the course material was delivered”

*EADS Astrium*

## Quotes - Closed Loop Control

“I enjoyed the course and feel I have a better understanding of the basics of our Rig equipment”

*BAE SYSTEMS*

## Quotes - Safety in the Test Laboratory

“The course was an excellent refresher for reinforcing basis safety principles”

*Jaguar / Land Rover*

## Quotes - Pressure Systems

“Good course and well run - many thanks”

*BAE SYSTEMS*

## Quotes - Multiple Course Training Package

“My impression of Stephen Barrett from discussions prior to the course was that he was extremely knowledgeable and experienced in the field of servo-hydraulics and a very good communicator. This was confirmed by the course attendees who were all impressed with Stephen’s knowledge and the quality of his presentations. Everyone enjoyed the various modules and came away better equipped to do their jobs. I would recommend this course (and Stephen) to other organisations”

*CORUS*

## Quotes - Bespoke Training

“The course completed by Stephen was extremely useful and very well explained. It is clear that Stephen is not only knowledgeable but is proficient in teaching and getting his point across.

Although the course was squeezed into one day and was quite intense with regards to the amount of data proffered that needed to be learned, I felt that nothing was left out and everything was explained fully. Thanks”

*Global Marine Systems*

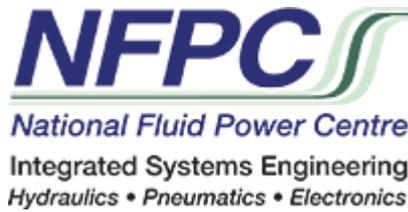
“... the training was well received. This course has been delivered before at Brough, and is well tailored to our requirements. The feedback received from delegates was positive”

*BAE SYSTEMS*

For more information please contact [training@systems-services.co.uk](mailto:training@systems-services.co.uk) or call 01205 724242

“A very useful course for the beginner”

## Some of our Customers



Sheffield University



**Rolls-Royce**

**BAE SYSTEMS**

For more information please contact [training@systems-services.co.uk](mailto:training@systems-services.co.uk) or call 01205 724242

## Contact Details



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### Office

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The Coach House, 303 Willington Road  
Kirton End, Boston  
Lincolnshire, PE20 1NR  
England

Telephone: +44 1205 724242

### Quality Management

Systems Services operate a fully certified quality management system to ISO9001.

Our scope is:-

“Provision of consultancy and training for fluid power motion control systems, including associated servicing, calibration management, commissioning, gas loaded accumulator management and technical procurement services.”

Our system is approved by Lloyd’s Register Quality Assurance. Certificate number 955191.



For more information please contact [sales@systems-services.co.uk](mailto:sales@systems-services.co.uk) or call 01205 724242

“Technical support you *can* depend on”

Systems Services The Coach House, 303 Willington Road, Kirton End, Boston, Lincolnshire, PE20 1NR  
[www.systems-services.co.uk](http://www.systems-services.co.uk) +44 1205 724242 [sales@systems-services.co.uk](mailto:sales@systems-services.co.uk)