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**The official BCAS
Compressed Air & Vacuum
Technology Guide 2018**

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Positive progress

Fifty five Presidents before me have had the responsibility and the honour of guiding BCAS in its role as unbiased advisor to manufacturers, distributors and end users of compressed air and vacuum systems throughout the UK and Europe on legislation, technical standards, education, compliance, safety and environmental matters. Priorities in the industry have changed enormously since 1930 and the economic climate has been diverse. Today we find ourselves in the midst of enormous change, but one factor that is constant is BCAS' crucial role in driving positive progress within the compressed air industry. We're doing this in a number of ways.

Training & Development

"Education is the most powerful weapon which you can use to change the world"
Nelson Mandela

BCAS should be top of the list when people think of compressed air (non product) training. To help deliver this objective, a Training Working Group is being set up to create new courses and drive training for BCAS members, end users and other trade associations for all skill levels. In the main, compressed air courses are voluntary and we need to reinforce the value they can bring. In terms of end users (i.e. our customers), there are a lot of people that potentially come into contact with compressed air that should have some CERTIFIED competency training. Employers have a duty of care for their employees and to that end, the Training Working Group will be developing a compressed air health and safety course designed specifically for the end user.

Driven by the Training Working Group, BCAS is also looking to develop a Trailblazer Compressed Air Apprenticeship Scheme. BCAS is ideally placed to set the apprenticeship standard within our industry and to deliver the best possible solution to benefit our members throughout the UK. The key to its success will be the commitment to making use of the apprenticeship standard once it has been developed, i.e. a commitment to take on apprentices

within the scheme once it has been launched. As progress is made, we will provide further updates for consideration and consultation.

Another exciting development is the opportunity for BCAS to work with the National Fluid Power Centre, a recognised training centre for the British Fluid Power Association. We are discussing the option to run some of our existing training courses at their facility and to leverage their expertise and resource in developing new compressed air related training courses.

Expertise & growth

"An investment in knowledge always pays the best interest." Benjamin Franklin

BCAS is an independent source of advice and technical help to ensure that the installation, running and maintenance of equipment is energy efficient, compliant and safe. BCAS also works directly on behalf of the compressed air and vacuum industry to advise on, shape, and at times challenge the creation of EU and UK legislation, directives and standards. Technical support for our manufacturers within ISO standards and European legislation is



James Maziak,
BCAS President

critical. Even at a distributor member level, with the advent of regulations such as PSSR 2000 (see page xx), BCAS offers huge value to its members. The great news is that we are reinforcing our technical team even further with the creation of a new role, that of Technical Development Officer.

The appointment will deliver a number of key benefits, by extending the breadth and depth of our support to members and end users. It will drive the Training Working Group which is at the core of our progress; developing training courses and championing and managing our apprenticeship initiatives. Any trade association should pride itself in its role as gatekeeper and disseminator of best practice and this role will reinforce these activities. Not least, our members and end users will benefit from enhanced technical and general support, including more proactive member engagement through site visits and the like.

Mention should also be made of Samuel Omojola's appointment in another new role of Society officer. He has made an excellent start and is responsible for much of the day to day business of BCAS in support of Vanda. Vanda in turn can focus more energy on BCAS's strategic direction and we can harness her extensive commercial experience.

Adding value

"Strive not to be a success but rather to be of value" Albert Einstein

In the face of today's uncertain economic and political framework, BCAS has a great responsibility to continue to deliver value to its members as the only technical trade association representing the compressed air industry in the UK. Equally importantly, we need to ensure that the end users of compressed air see the value of dealing with a BCAS member. Our recent BCAS survey covered in this guide, gives a little insight into this area.

The question that must be always be answered as BCAS grows and evolves is: "How can we add value?"

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Opportunity knocks

Welcome to this year's Official BCAS Compressed Air & Vacuum Technology Guide. The last 12 months have concentrated the minds of many in industry to stand up and take notice of the growing push for businesses to aspire to a smart engineering vision, and the compressed air industry is not immune from the rapid changes taking place.

However, the recent BCAS survey revealed an apparent indifference towards Industry 4.0 and the rise of new digital industrial technology with only 24% of compressed air end users stating that it is very important at the moment. Therefore is it hype over reality or a lack of awareness?

With industry proposals to boost the UK's manufacturing sector having recently been unveiled at the Manufacturing Technology Centre in Coventry with the publication of the Industrial Digitalisation Review, I do not believe it is hype over reality. Unless we take up the challenge we will fall behind our international competitors. Leading industry figures have said that from a business community's perspective it is clear that establishing how the UK manufacturing and industrial sectors adapt to a highly digitalised future (and benefits from the opportunity this brings) will be a fundamental factor of any future economic success.

The uptake of digital technologies in the industrial sector will be central to our future, by improving our national productivity, creating higher value jobs, and arming our workforce with the digital skills required in the decades ahead.

BCAS' view is that this current trend towards automation and data exchange in manufacturing technologies can only help with energy efficiency, maintenance before failure and therefore improve both service levels and costs moving forwards. Today a smart factory or production facility is available as a retrofit – so you do not have to wait to change your compressor to take advantage of this new technology led revolution.

Although the BCAS survey highlighted that 36% still rate Industry 4.0 as important (the figures increase when asked if it will become important in 5 and 10 years' time), these figures worryingly suggest it may



reflect a lack of urgency to take action in an area where UK manufacturing should take a lead.

Professor Juergen Maier who led the



Aaron Blutstein – Editor
BCAS Compressed Air & Vacuum
Technology Guide 2018

recent Industrial Digitalisation Review highlighted that Government and industry should create a significantly more visible and effective ecosystem that will accelerate the innovation and diffusion of Industrial Digital Technologies as well as creating more awareness. This includes a National Adoption Programme piloted in the North West, focused on increasing capacity of existing growth hubs and providing more targeted support. Additionally the Review recommends up-skilling one million industrial workers to enable digital technologies to be deployed and successfully exploited through a Single Industrial Digitalisation Skills Strategy.

The UK manufacturing sector has the potential to be a global leader in the industrial digital technology revolution. Government and industry must work together to seize the opportunities that exist in this sector and promote the benefits of adopting emerging digital technologies. This in turn will also create numerous opportunities for the compressed air industry over the coming decades, which can only be a good thing.

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A united voice

Founded in 1930 at the instigation of the British Government, the British Compressed Air Society (BCAS) is the only dedicated UK trade association representing manufacturers, distributors and end users of compressors, air treatment, gas, vacuum, blowers, pneumatic tools and allied products. In these times of change the governmental consultation is once again forming a key strand of our activities.

We provide an impartial united voice in the face of ever-changing needs of industry and legislation.

As an unbiased authority on technical, educational and legislative issues the society provides a reference point for best practice. We actively represent the interests of our industry sector to the UK Government as well as to many European and other overseas institutions. The society and its members provide industry statistics and have an active input into all proposed UK and European compressed air systems' energy and environmental legislation and standards through its membership of the European body PNEUROP, and by its association with the prime voice of the EU engineering industry, ORGALIME. So you may ask why can companies don't do this without trade association membership. The answer is clear, the risk of anti competitive behaviour and the drive to protect the consumer has led to more and more legislation with global reach and large risks for those who do not pay attention. In a trade association competitors can come together in a safe regulated environment to handle the issues of the industry and work together to improve standards, regulations, training and reputations.

Expert guidance and advice

To our members we act as a business information resource not only on legislation but on technical matters too. Compressed air / pressurised air & vacuum is vital for many businesses and BCAS assists its members in ensuring their staff have the right skills for the job and access to specialist commercial and technical information when it's needed. Our training services offer industry specialised courses as well as general business training both online and in a face to face environment. Our fact sheets and best practice guides help members to be best in class as

demonstrated by our recent end user survey results.

Mission

The Society's mission is to be the leading impartial and united voice of the UK pressured air industry, serving as the unbiased authority on technical, educational, promotional and other matters that affect our industry and its customers.

BCAS fulfils its mission through the following primary objectives:

- To promote the safe, efficient maintenance and use of equipment.
- To cooperate with diverse groups such as government departments, regulatory authorities and research organisations.
- To bring industry specific training and the experience of its members to bear on the conduct of business in industry for the common good.
- To develop and publish standards and engineering data and statistical information.
- To engage in cooperative educational and research activities providing development for the next generation of industry engineers.
- *● To cooperate with governmental departments and agencies and other bodies in matters affecting the industry.
- To promote cooperation amongst members for improved production, proper use and distribution of equipment.
- To provide a best practice forum where members can develop their professional competence.

Structure

BCAS is governed by the Board of Directors, elected from member companies under a formula that ensures representation of both small and large companies across the different sectors whilst being led on a daily basis by the Executive director and

supported by the BCAS team.

The Society's Board of Directors is responsible for the strategic direction of the Society, and the President of BCAS also serves as the Chairman of the Board of Directors. The term of office is two years for each position thus ensuring a regular fresh approach as to how the Society can best meet the changing needs of the industry and its members. The articles of association have been recently updated to ensure greater transparency and accountability of the board to the members. The members will now have the ability to vote on board and committee appointments, which previously was not the case.

There are currently Seven permanent committees:

- Compressors,
- Low Pressure & Vacuum
- Industrial & Contractors' Tools
- Air Treatment & Applications
- Distribution
- Statistics
- Training & development

Add to this the working groups from portables and you can see that the Society is very active in driving change in the industry.

The diversity of the our industry gives rise to a wide spectrum of subject areas covered in numerous special committees and working groups that are set up from time to time to address specific issues. The permanent committees, special committees and working groups are made up of member company specialists and representatives, as well as invited experts who can contribute to the scope and output of the meetings.

So this is your Society, and being involved makes a difference. The Society team turn ideas into actions and produce meaningful business change. Support your trade association by being involved.



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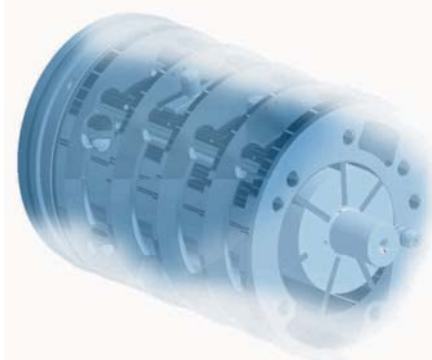
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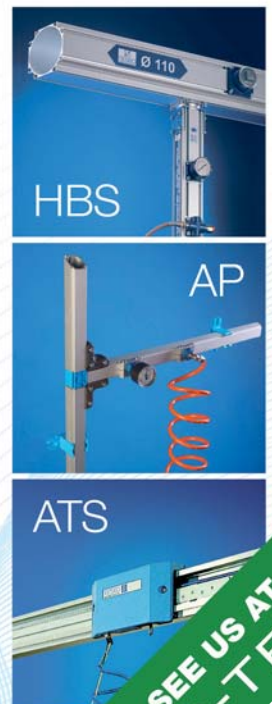
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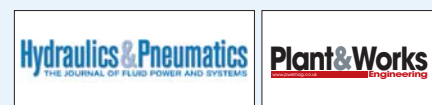
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A year of reflection

Vanda Jones gives her annual BCAS Executive Director's report.

It is always useful to reflect – at this point last year I was very new to the organisation and the report written was completed in a very different climate – So in a time of change it is useful to look back at last year's report and update on the achievements and provide a window into our strategic direction.

2016: The Society actively represents the interests of its members and the compressed air industry to the United Kingdom Government and European and overseas institutions.

As such its path has been very clear and it is vital that organisations have a clear voice in the face of ever changing standards and legislation; BCAS has been that voice since its inception in 1930.

2017: It is clear that in an ever-changing environment it is key that we take our voice to Government. Our standards work continues - we may be leaving the EU but this does not mean that the march towards harmonised global standards will cease. In fact we must work harder to ensure the UK's voice continues to be heard in this area, under the EU we perhaps punched above our weight having 18% of the influence when we did not carry 18% of the trade.

Greater end user engagement

2016: Clearly this has to be the Society's focus and without doubt the impact and success of BCAS can be attributed to the passion and drive of our extensive list of

members, who continue to provide and sustain such an extremely high standard and invaluable service to you, the end user.

2017 was the year of greater external activity and our engagement with exhibitions such as EMEX and maintenance Scotland for the first time as well as involvement in providing BCAS expertise to the energy efficiency forum at the ASDA summit.

2018 This publication is therefore dedicated to the end-user and you will see much more from BCAS in this area over the coming months.

That was the promise so what have we achieved:

This year's White Paper in energy management is a very focussed end-user document, and demonstrates that small behavioural changes can have large cost impacts. Buying a new efficient compressor without fixing your leaking pipework system ensures that you more efficiently waste air.

The pressure and leak test guide – written with the specifier and end-user in mind to provide a full guide but to focus on two primary issues:

1. Pipework is often poorly specified in tenders leading to challenges after installation. Now there is a document that M&E contractors, architects and specifiers can work to when drafting the original specifications.
2. The process for testing was not clearly

defined especially when adding an additional drop to a pipe work system.

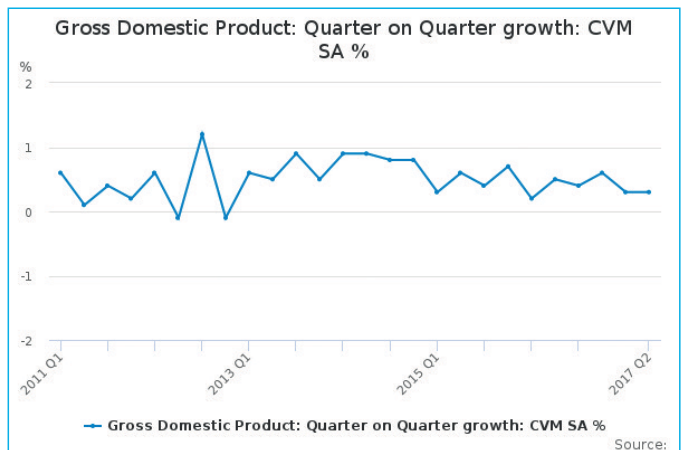
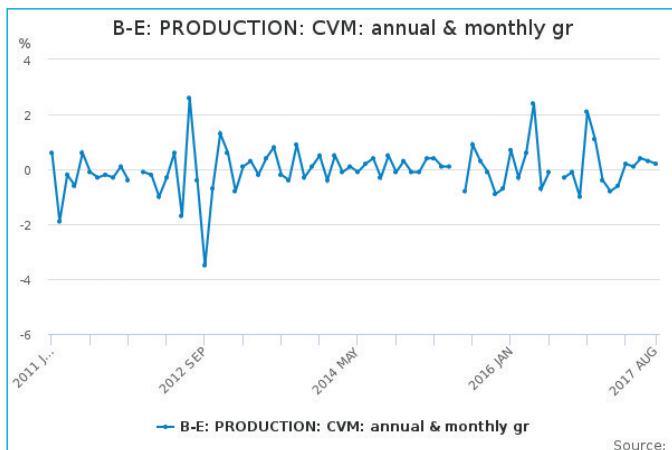
The guide works to deliver a better understanding not only of what should be installed but also to the test the installed product.

We also attended external events providing expert speakers and advice in the end user arena. Visit the BCAS web site for a full list of events.

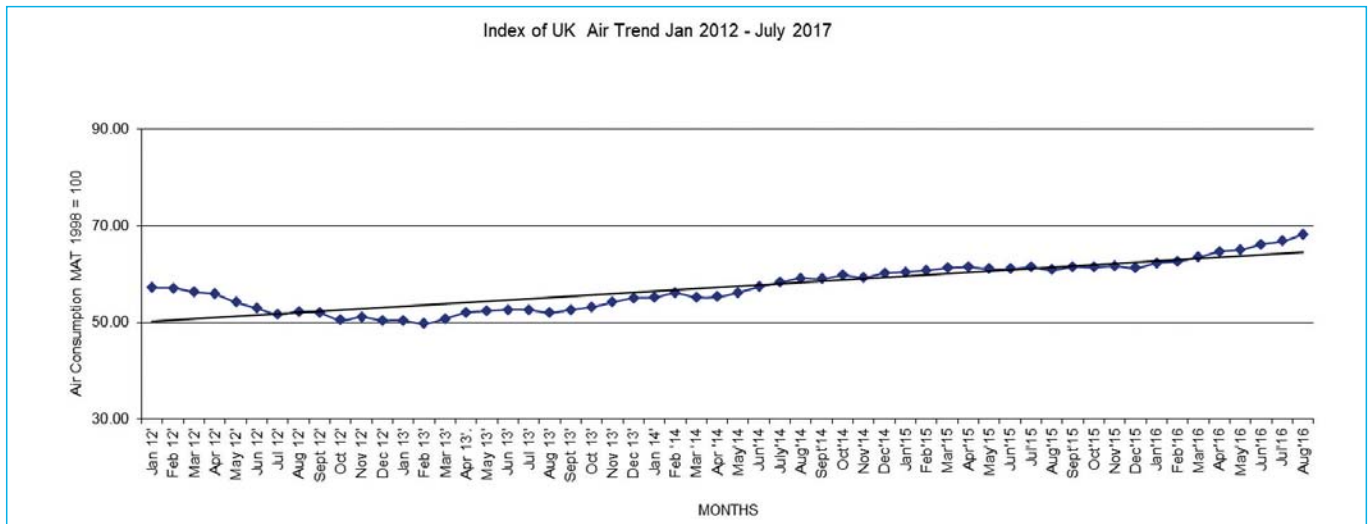
Statistical bulletins from the Office of National Statistics (ONS) present the monthly estimates of the Index of Production (IoP) for the United Kingdom production industries. The IoP measures output in the manufacturing (the largest component of production), mining & quarrying, energy supply and water supply & waste management industries – all of whom are significant end-users of compressed air systems and again it declined in the last quarter of 2015.

For end-users there have been several occasions in the past when legislation has had a major impact and it is our belief that we are once again approaching a similar scenario.

Legislators and non-government organisations have been voicing concerns about energy saving for many years now, hardly surprising when 10% of the electricity generated globally is used to produce compressed air. Newly introduced legislation is now having a major impact on the industry, as last year larger organisations were faced with having to carry out total energy audits in



UK Compressed air market: Growth in adversity



So why is the BCAS Air trend showing an increase?

accordance with the Energy Savings Opportunity Scheme (ESOS), as mandated by the adoption of the EU Energy Efficiency Directive by the UK government.

The .GOV web site details the new requirements:

“ESOS is a mandatory energy assessment scheme for organisations in the UK that meet the qualification criteria. The Environment Agency is the UK scheme administrator.

“Organisations that qualify for ESOS must carry out ESOS assessments every 4 years. These assessments are audits of the energy used by their buildings, industrial processes and transport to identify cost-effective energy saving measures.

“Organisations must notify the Environment Agency by a set deadline that they have complied with their ESOS obligations. The deadline for the first compliance period, 5 December 2015, has now passed.”

A part of the ESOS assessment includes compressed air systems, for which there was no accepted industry process for carrying out such an audit. Recognising this BCAS, working with industry, developed a new standard - ISO 11011.

ISO 11011:2013 sets the requirements for conducting and reporting the results of a compressed air system assessment and considers the entire system, from energy inputs to the work performed as the result of these inputs. It considers compressed air systems as three functional subsystems: supply which includes the conversion of primary energy resource to compressed air energy; transmission which includes movement of compressed air energy from where it is generated to where it is used; demand which includes the total of all

compressed air consumers, including productive end-use applications and various forms of compressed air waste.

ISO 11011:2013 sets out the requirements for analysing the data from the assessment, reporting and documentation of assessment findings, and identification of an estimate of energy saving resulting from the assessment process; it also identifies the roles and responsibilities of those involved in the assessment activity.

In the light of this new legislation we now have a tool, designed by experts, to help the end user assess their entire system and to potentially save both energy and money and to be of great benefit to the environment.

New compressed air systems are can be much more efficient – speak to your compressed air supplier about the payback in energy saving and how it can offset the capital cost in a period far shorter than you may imagine.

In addition to ESOS, we are also heavily involved in the energy efficiency directive – a piece of legislation that will affect us all in the future, particularly with regard to new compressors placed on the market in the EU.

You can now see The British Compressed Air Society engaged on a much broader level with the end-user, we have facilitated surveys and to ensure we listen and really understand what is required from us in this period of change the latest copy is now available for you to review - see the end users feed back on what is needed.

An early example of the way we have been able to help the end user is as an independent body, able to offer free and impartial advice. We recently hosted a major global organisation in our offices in London. They were caught between two pieces of advice, the first from the company that

performed their inspections under PSSR and the second from a company with the responsibility for carrying out routine service and maintenance. The query started with a call to our technical officer about the methodology applied by the inspecting company to test safety relief valves on air receivers.

Our response, after being challenged significantly by the inspecting organisation, was that the system being used was asking to “testing a box of hand grenades by pulling the pins to confirm which ones were still live.”

Clearly this was a case for the provision of suitable and impartial advice and after a meeting lasting a couple of hours, during which the PSSR regulations and acceptable industry practices were discussed in detail, they were able to formulate a suitable response to ensure that the potentially dangerous practices identified were curtailed. Unfortunately, this is a scenario we come across all too often. The purpose of highlighting this particular example is to demonstrate that we can work with industry to ensure safe practice is carried out at all times, and that by continuing to do so can ensure that the ignorance still evident in some areas of the sector is eradicated.

In summary, our future is in broader engagement and we look forward to your questions and hopefully, future membership. As an end-user supplied by a BCAS member you are entitled to free membership of the society without charge. In joining you will gain access to a broad range of services and support, ensuring that you remain fully up to date with the latest developments, legislation and best practices relating to the world of compressed air. We look forward to welcoming you in the future; remember BCAS can help you to Be Compliant and Safe.

Continuing participation

The past 12 months has seen the continuation of BCAS participation in international standards and also the Pneurop arena on the European side. Tim Preece, BCAS Technical Officer, reports.

Pneurop is the channel by which BCAS inputs to EU policy for compressed air equipment, and also wider business issues common to the industrial sector in general. In air compressors, Pneurop Committee PN2 formed a Joint Working Group (JWG) to address the Ecodesign of compressors – LOT 31.

All Ecodesign & Energy labelling measures have slowed as the EU Commission re-considers whether Ecodesign is still the appropriate instrument and the increasing importance of resource efficiency aspects not purely energy. CEN and CENELEC have a JWG 10: 'Energy-related products - Material

Efficiency Aspects for Ecodesign'. The move towards the circular economy takes into account all the impacts of product – a "cradle to grave" approach. The world's resources area not infinite and the throwaway society is not sustainable long term.

This will affect compressed air systems more than energy labelling which has been the main focus of time, energy and effort within Lot 31. Like other industries the compressed air sector will have to re-think its business model based on ever increasing sales and aim for the opposite – maximising lifetime of equipment.

Consumers will be given far better information about the whole life cost and

environmental impact of goods and services. There will be incentives to consider whole life ownership and the suppliers will have to respond accordingly. The new procurement standard published April this year; ISO 20400:2017 - Sustainable procurement – Guidance indicates the increasing importance of the purchasing as a key activity in improving productivity and sustainability.

Via Pneurop BCAS inputs to regulation, Directives being mandatory. In another separate but related aspect of the Technical Officer role, BCAS is deeply involved in the international standards world, where it represents its members and the industry as a whole, on a number of ISO (International Standards Organisation) committees. BCAS achieves this via BSi British Standards Institute.

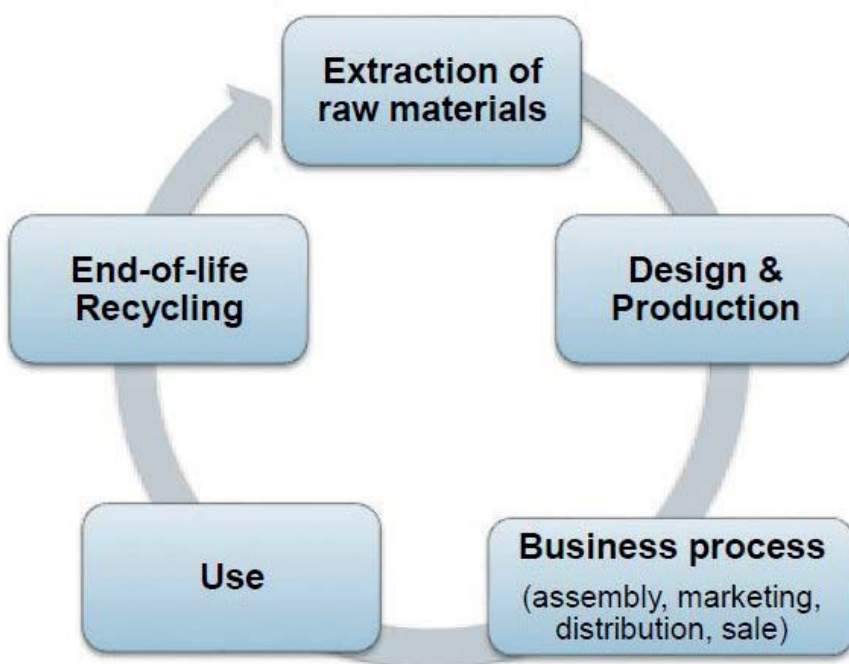
ISO was founded on the question: "What's the best way of doing this?" There are economic benefits for manufacturers and business to standardise. Furthermore consumers can be confident that their products are: safe, reliable and of good quality.

International Standards

International standards are generally voluntary, though they may be cited in certain regulations as mandatory to fulfil compliance with that regulation. Each of the Technical committees (TCs) is responsible for the maintenance of existing standards to ensure their relevance and usability. They are also responsible for the development of new standards to meet changing market needs. It is important that a range of stakeholders take part in standards development, i.e. end users as well as the usual experts and manufacturers.

Within the compressors sub-committee,

Products' life-cycle stages





a new standard is under development NP 22484 – a performance test code for low pressure compressors. The need for a standardised method of testing that allows for the comparison of different low pressure air compressor (blower) package technologies was brought to the attention of the compressed air industry by users of the product. Neither ISO 1217 nor ISO 5389, the two existing standards for positive displacement compressors and dynamic compressors, respectively, provide clear and concise means of comparing different technologies. This International Standard will provide a simplified wire to air performance test methods that measure true package performance of low pressure air compressors (blowers). Currently manufacturers can use different methods

to arrive at a performance figure for output versus energy consumption.

BCAS continues to provide information and advice on the Pressure Systems Safety Regulations 2000 the key piece of legislation in our industry. Because the regulations like most legislation are not prescriptive as to how you comply then certain regulations and their clauses are open to interpretation. Much of the implementation decision is made by the Competent Person, even though the end user is ultimately responsible. Therefore it is important that the end user can select a Competent Person who fulfils the Approved Code of Practice profile. Due to the confusion and enduring myths about who is considered “competent” within the context of the Approved Code of Practice - Safety of Pressure Systems, in early 2017

BCAS published a factsheet containing definitive guidance on the description of the “Competent Person”.

At BCAS committee level 2017 has seen the creation of two new groups

- Mobile Power Working group
- Low pressure & Vacuum Committee

The scope of mobile power is portable compressors and onboard compressors within vehicles. One area of interest is datasheets as it is for stationary compressors, to ensure that the information for the consumer is calculated in the same way and gives transparency of equipment performance.

The low pressure and vacuum working group may eventually be split to form two separate working groups if the first meeting results in agreement as to the scope of each.

A key publication update this year was Pressure & Leak Testing guide where it was revised to reflect current practices:

- Hydraulic (hydrostatic) method removed
- Jointing techniques updated
- More explanation of test pressures
- Clarification of leakage test vs integrity test
- Greater emphasis on supplier selection and the importance of competent personnel

Committees

TC = Technical Committee / SC = Sub-Committee / WG = Working Group

TC 118 - Compressors and pneumatics tools, machines and equipment

- TC 118/SC 4 “Compressed air treatment technology”
- TC 118/SC 4 /WG1 “Compressed air purity specification and compressed air treatment equipment”
- TC 118/SC 6 – “Air compressors and compressed air systems”
- TC 118/SC 6/WG1 – “Performance specifications”
- TC 118/SC 6/WG2 – “Safety”
- TC 118/SC 3/WG4 “Pneumatic hand-held tools - Tightening of Threaded Fasteners”

Technical Development Officer report

In 2017 the BCAS Board and Executive Director Vanda Jones approved the decision to create and appoint a new role within the organisation. For the first time in its history BCAS will have two people in the Technical Support Office.
Roy Brooks, BCAS Technical Development officer, reports.

In addition to the role of Technical officer a new position of Technical Development Officer was created. I was fortunate enough to be offered this new and exciting opportunity.

While the Technical officer (Tim Preece) will concentrate on BCAS continued involvement in support and participation of ISO, BSI Standards and regulations, my main role will be to develop and deliver training materials to our BCAS membership and the Compressor and Vacuum industry in general.

In November 2013 the Department for Business, Innovation & Skills and Department for Education announced the first apprenticeship Trailblazer projects – putting employers ‘in the driving seat’ to pilot and test the development of new apprenticeships standards and the high-level assessment approaches. BCAS will have a role in development of Trailblazer within the industry of compressors and vacuum and I am pleased to say this is already underway.

Engineering in the UK needs apprentices BCAS has a will and desire to ensure our industry attracts those apprentices and that the training provided will be of the highest level available.

The training initiative is intended to supplement but not replace the training offered by manufacturers specific product training, the challenge for BCAS and the wider Compressed air and Vacuum industry is to find new ways to engage a younger generation into the wonderful and exciting world of engineering.

BCAS has recognised the industry has

challenges ahead relating to training in an industry where many of its newer and younger employees are inexperienced, our aim is to create training programs aimed at raising the standards and skill levels across the UK compressor and vacuum industries.

BCAS has long offered advice and training to our members and end users, however the need for faster more cost-effective training for our members employees and end user employees is a challenge BCAS has recognised to be vital for the future of our industry.

BCAS has in place a “Staircase of knowledge” approach to training packages with online courses such as “Working safely with compressed air”,

To make users aware of safe working practices the British Compressed Air Society (BCAS) has developed this course in conjunction with safety practitioners in the field:

<http://e-learning.bcas.org.uk/Course/Category?reference=3bf727eb-9723-44a1-883c-d21e455ec248>

This course takes an hour to complete and covers the following subject areas:

- Hazards of compressed air as an energy source.
- Hazards arising from various air tools, including noise, vibration, fumes, hoses and connectors etc.
- The use of Personal Protective Equipment.
- Employer and employee responsibilities with respect to Health and Safety when using compressed air.

- Specific hazards and risks associated with blow gun use.
- A list of safe working practices to be followed.

In brief, a course which will help the participants to fulfil employers’ health and safety obligations and provide evidence by the online assessment that the individual has understood safe working practices and their responsibilities.

There are many layers of training and development to address over the next 12 months, which include the increase in online learning courses BCAS would like to make available. Technology can provide us with the opportunity to deliver the right training, which will assist the individual development of all employers and employees to ensure the industry is maintaining its responsibilities.

By appointing a Technical Development Officer BCAS has committed to achieving the following benefits for its members and employees.

To improve personal safety at work, improve employee skills and motivation, less disruption to normal working days of employees, low cost training, and improve opportunities for career development by achieving certification from a recognised body.

I look forward to assisting in bringing these BCAS initiatives to fruition over the coming months and years.

Please contact me via the BCAS Technical office. I look forward to offering support to all who use the Society.

Looking ahead to a 'smart' future!

BCAS Board members spoke to Aaron Blutstein to discuss some of the key issues and trends facing the compressed air industry.

With the growing push for businesses to aspire to a smart engineering vision, there is little doubt that the 'smartening' process of manufacturing is going to change the face of global industry forever. David Gillies, Ingersoll Rand UK & Ireland Country Leader – Sales & Service, says significant developments have been made in the industry over the past 12-18 months including advancements in remote monitoring, use of modelling in R&D and rules based analytics. He adds that major challenges continue to include cyber security, employee skills, clear use of data, lack of standards and speed of change. Compressed air users, according to Gillies, will see significant benefits including greater productivity, increased efficiency and reliability as the industry accelerates progress in this regard.

Mark Ranger, Oil-Free Air Business Manager, at Atlas Copco believes that Industry 4.0 now has a greater exposure and understanding across the wider manufacturing spectrum. The challenge is now, he explains, is to integrate intelligent remote monitoring technology within customer/end user visualisation packages such that the user benefits from the suite of technology enhancements available. "Without doubt the compressed air user will ultimately gain through better operational efficiency and system reliability, whereby his compressed air provider has the potential to offer continuous productivity improvement, without compromising his compressed air supply and quality."

However Tony Wilson, Business Unit Manager, Parker Hannifin Manufacturing Limited, is concerned that the industry is only just waking to the potential opportunities of Industry 4.0. He highlights that traditionally manufacturers in the compressed air industry have a

development resource based heavily around mechanical engineering and are not necessarily equipped to develop "IoT" technologies. Also many end users, according to him, will be unable to integrate such technologies into their customer facilities without major cost/ infrastructure upgrade/ training (distributors may also need to employ engineers from adjacent industries, not their traditional mechanical engineers).

James Maziak, managing director of Maziak Compressed Services reiterates this sentiment by commenting that the biggest challenge will be to get people to invest in new machinery that is capable of communication with new BMS/Industry 4 control systems.

The Smart era

Many in the compressed air industry believe the Smart era will change the industry.

But as Gillies says the use of IIoT and big data analytics has the potential to increase the productivity and efficiency of how we develop, operate and service our customers compressed air systems: "The implementation of smart devices is a part of our everyday individual lives and this change is also starting to occur with industrial customers. Speed of product development, increase in service responsiveness, maintenance intervals based on real time analytics versus rule based time intervals and how our customers access information will provide substantial benefits to our customers in improving the overall operation of their compressed air systems (asset availability, efficiency, reduced costs, etc)"

Ranger believes the 'smart era' will drive faster response times, whether via human or intelligent system intervention, or a combination of both. It is conceivable, he

explains, that routine service interventions could be undertaken remotely from the customer premises in the not too distant future: "3D and 4D remote visualisation software and tooling technology is already out there, it won't be long before the compressed air industry looks at how this technology can be used."

Mark Scot, at Compressed Air Solutions emphasises that the Smart era will particularly affect servicing: "Having the ability for the incumbent service provider to dial into an installation and control/interrogate the equipment offer huge savings to the end user. With this type of feature not only is there the prospect of eliminating expensive callouts, but it can also reduce travel which taken as a whole reduces our carbon emissions."

Colin Mander, Regional Director, Industrials Group, Gardner Denver, also believes that preventive maintenance will be easier "with compressors fitted with service indicators that will be sent messages to the provider's phones/tablets so you are aware of maintenance requirements".

Maziak also believes that remote monitoring and telemetry in the industry is becoming more prevalent, and because of this service, suppliers can be more proactive regarding condition monitoring (Oil levels, bearing temperatures) and therefore can be more proactive in their maintenance and overhaul planning.

Increasing servitisation

The 'value added service ladder' continues to grow, according to Ranger, providing the user with a greater choice of service cover and added operational value. The challenge, he explains is to quantify the genuine value versus cost to the user process: "The Facility Management model works for many end users – although compressed air generation



and air quality cannot be compromised if this model is considered. Buying air alone remains an enigma as it creates many operational and commercial challenges, but enhancements in remote visualisation and monitoring packages are making this option a viable consideration.”

Jason Morgan, managing director HPC explains that trends seen within the German Market shows a marked development towards replacing the traditional sale of the compressed air equipment with a service package whereby the customer buys the air produced at agreed rates. The equipment and service is the suppliers responsibility with the customer providing the electricity.

However he highlights that the UK market place has a traditional “owner” mentality, and movement towards this model has been slow with minimal uptake. But he says it is raised by customers more and more during compressed air requirement discussions and is likely to be an area of growth with the UK Market.

Scott believes that most of the traditional compressors manufactures have been on a transformation journey - developing the capabilities to provide services and solutions that supplement their traditional product offerings, the most obvious ones being; clean-up equipment, pipework and Nitrogen Generation.

Developments

Over the last 12 months, Morgan, believes there have been moves towards true

predictive maintenance as opposed to the traditional time based maintenance schedules. He also highlights the advancement in the control algorithms to monitor both the history of compressed air demand and predict the future demand to ensure the maximum efficiency of the compressed air station, utilising highly intelligent compressor selection, operating optimal speeds and pressures to gain efficiency advantages.

Ranger also says that customers have realised the benefits to having real time operational monitoring, both in the compressor room and/or the distribution network. Whereas not too long ago they were reluctant to have such technology looking at their processes. This acceptance has enabled compressor service providers to up their game with faster response times to system events and delivering more ‘first time’ fixes, thanks to real time data measurement. He believes that going forward better predictive maintenance interventions can be foreseen, thus increasing operational sustainability further.

Brexit

Most manufacturers have moved on from the debate about Brexit actually happening, to the reality that it is clearly going to take place, but the arguments of how to implement it in a way that will ultimately benefit the UK economy are far from clear. David Gillies says we are entering the big unknown. He believes that in some respects

Brexit will be positive: “Businesses will invest to remain productive and competitive in markets outside the EU. Businesses dependent on imports may look to manufacture in the UK rather than the unpredictability around exchange rates that impact their bottom line adversely.” However he explains that in the short term, decisions to purchase new equipment are being delayed until the terms of Brexit become clearer unless there is a pre budgeted, pre-planned purchase or a purchase due to an urgent need such as something that will effect production.

Ranger also states that uncertainty remains the short term concern, which has been consolidated further following the Government’s reduced majority in the General Election and what effect this will have on their mandate to push through Brexit policy without objection. However he also highlights that the weak Pound has stimulated investment, adding a cautious note by questioning what will happen if (or when) the Pound strengthens again? Maziak comments that Brexit may mean the UK will have to start producing more at home, therefore increased investment/ opportunities could be created.

Ultimately though as Ranger concludes, post formal Brexit negotiations in 2019 will provide a better picture of how our manufacturing climate will be effected in the longer term, in the meantime there is likely to be a period of sustained uncertainty.

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Working to keep legislation real

BCAS reports on the on-going work from one of the organisations it works closely with, Pneurop.

Pneurop members are national associations representing more than 200 manufacturers in 8 EU Member States, in Switzerland and in Turkey. Speaking on behalf of its members in European and international forums regarding the harmonisation of technical, normative and legislative developments. This relationship will have continued importance as we work through the Brexit debate – seeking to ensure the many years of globally harmonised standards are well understood and maintained has to be an important focus for us all.

Machinery Directive (MD)

The European Commission and its consultant in charge of the study on the review of the Machinery Directive are currently consolidating the responses of stakeholders to the public consultation. The study's final report was expected to be published by mid-2017. However, the Commission's impact assessment process will not start before the end of 2017. The surveillance problem is common to most countries, enforcing the directive and removing non-compliant equipment from the market.

Outdoor Noise Directive (OND)

The review of the Outdoor Noise Directive has been on hold for a few months. The European Commission recently launched the impact assessment study. It aims to assess possible changes in the OND such as stricter noise limits and removal of third party certification, noise labelling and data collection. The Commission legislative proposal to review the OND is foreseen in 2019 at the earliest.

RoHS2 Directive

The European Commission tabled its legislative proposal to revise the scope of

the RoHS2 Directive on 26 January 2017. This review tackles a series of problems that cannot be solved by exemptions and guidance. The proposed amendments are in line with the previous draft and are very positive for the industry: they remove obstacles to the repair of EEE and withdraw the ban on secondary market operations.

As a next step, this RoHS review proposal will be discussed in the European Parliament and the Council.

Energy Efficiency Energy Labelling Directive

Negotiations between the European Parliament and the Council on the proposed new EU Energy Label Regulation are still ongoing. Although negotiators agreed on the rescaling mechanism and timeframe, there are still a few sticking points.

Ecodesign Directive

The European Commission started implementing the new principles set in the Ecodesign Working Plan 2016-2019: they notably tabled Ecodesign requirements to implement the circular economy policy in the draft Ecodesign measure on electronic displays. Although this is specific to a product group, it can be seen as a precedent for upcoming implementing measures. For example, the draft measure requires a specific technique to facilitate dismantling, re-use, recycling and recovery. It also sets information requirements for repair purposes and relevant information for dismantling, re-use, recycling and recovery at the equipment's end-of-life.

Ecodesign Directive - Update on Lots / implementing measures

Compressors, ENER Lot 31: The draft final report on low pressure and oil-free compressor packages has been published on the dedicated study website. The report concluded that energy savings due to

Ecodesign requirements are very low, applying heat recovery offers a bigger saving potential.

Pneurop produced a paper 30 March 2017 showing calculations for heat recovery and summarised the potential limitations of the energy savings achievable.

- Risk of condensation
- Losses in heat recovery - heat exchangers etc create additional pressure losses that increase the energy consumption of the compressor package.
- In sensitive applications (e.g. food, medical) each additional component increases the risk of contamination.
- Transforming low grade heat into useful heat w=not in the immediate proximity requires additional equipment which makes the return smaller and the investment larger.
- Compressors are sometimes placed near the process they supply with compressed air. Recovering heat from many small machines distributed in the system or in remote locations entails complicated setups for minimal returns.

Revision of the Regulation on fluorinated gases (F-gas Regulation)

As regards national codes & standards relevant to alternative refrigerants, the Commission intends to request that the European standardisation organisations support updating relevant standards, ensuring a technology-neutral and consistent approach. It will also ask for a technical report to be delivered on the issue of ensuring a wider but safe use of flammable refrigerants.

The European Environment Agency has published a report showing that the production, import and export of fluorinated gases fell in the European Union in 2015. Larger reductions are expected in the coming years as a result of the phase-down scheme.

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Survey reveals risks of using non BCAS members

A survey of compressed air end users reveals that a significant number of those not using BCAS members experience problems and worse 19% could be left non-compliant with health and safety and environmental standards.

Vanda Jones, executive director of BCAS commented: "Compressed air is referred to as the fourth utility for a reason, many

processes need a reliable supply and it typically uses 10% of an industrial company's electricity.

"Having confidence in the correct specification, installation and subsequent maintenance and service is vital to avoid downtime, save energy and ensure safe operation.

"This survey asked respondents to rate

their suppliers across a number of different factors and also whether or not they used a BCAS member for equipment and maintenance. The results are truly illuminating.

"We were expecting the results to show that compressed air users were happier with BCAS members for equipment supply, service and maintenance, but what surprised us was the number who were dissatisfied with the quality of installation and service received from non-members."

In one of the questions, end users were asked to rate their suppliers from 0 to 10 across a number of factors.

When asked about legal compliance or more specifically whether "They help us meet environmental and health and safety standards" a staggering 19% of those using non BCAS members rated them as either 0 or 1 out of 10 and a further 19% only rated them between 2 and 5.

In contrast of those using BCAS members, 49% scored their supplier either 9 or 10 out of 10 and a further 34% scored them between 6 to 8. Of the rest, no one scored a BCAS member lower than 4.

The same story is repeated across other factors such as maintaining equipment and fixing problems quickly, for expert advice and responsive personnel; **see pie charts.**

Vanda Jones continues: "It is also a mistake to think that using a non BCAS member may offer better value for money, with 15% expressing extreme dissatisfaction and further 27% not being happy.

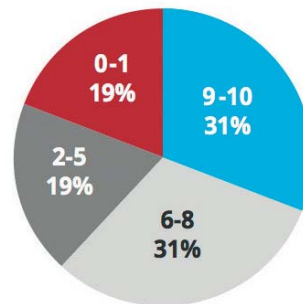
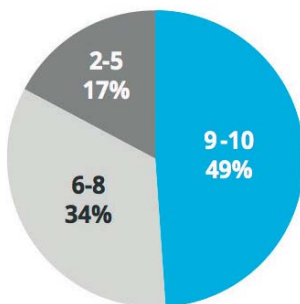
"This survey provides empirical evidence

BCAS Members

Non BCAS Members

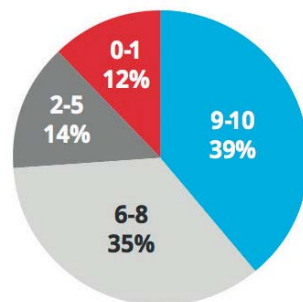
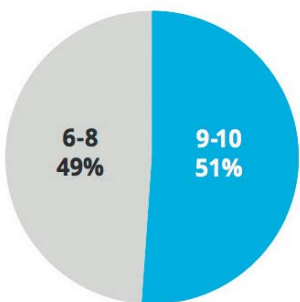
Legal Compliance

They help us meet environmental and Health and Safety standards.



Effective Support

They maintain equipment and fix problems quickly.



from users of compressed air that you are better off using a BCAS member for supply and maintenance. Most importantly do not gamble with legal compliance on environmental and health and safety standards, the evidence is clear - use a BCAS member."

Industry 4.0 attitudes

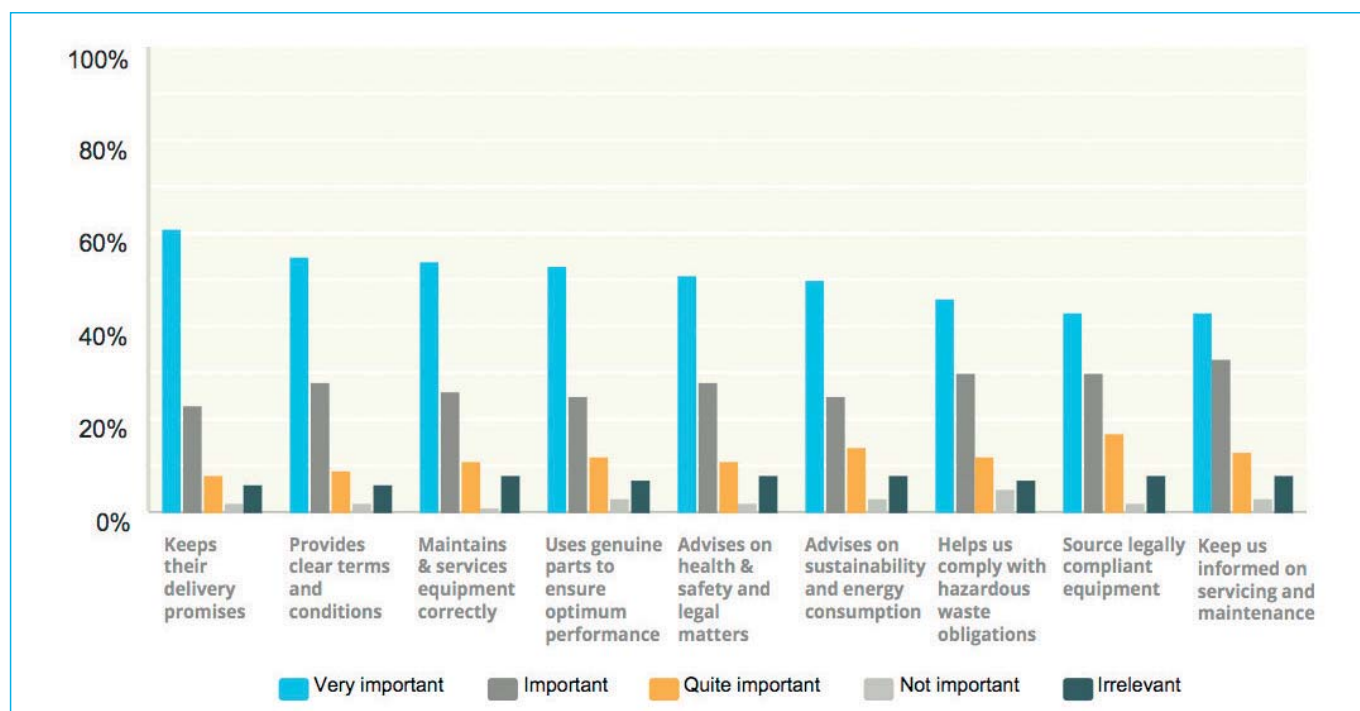
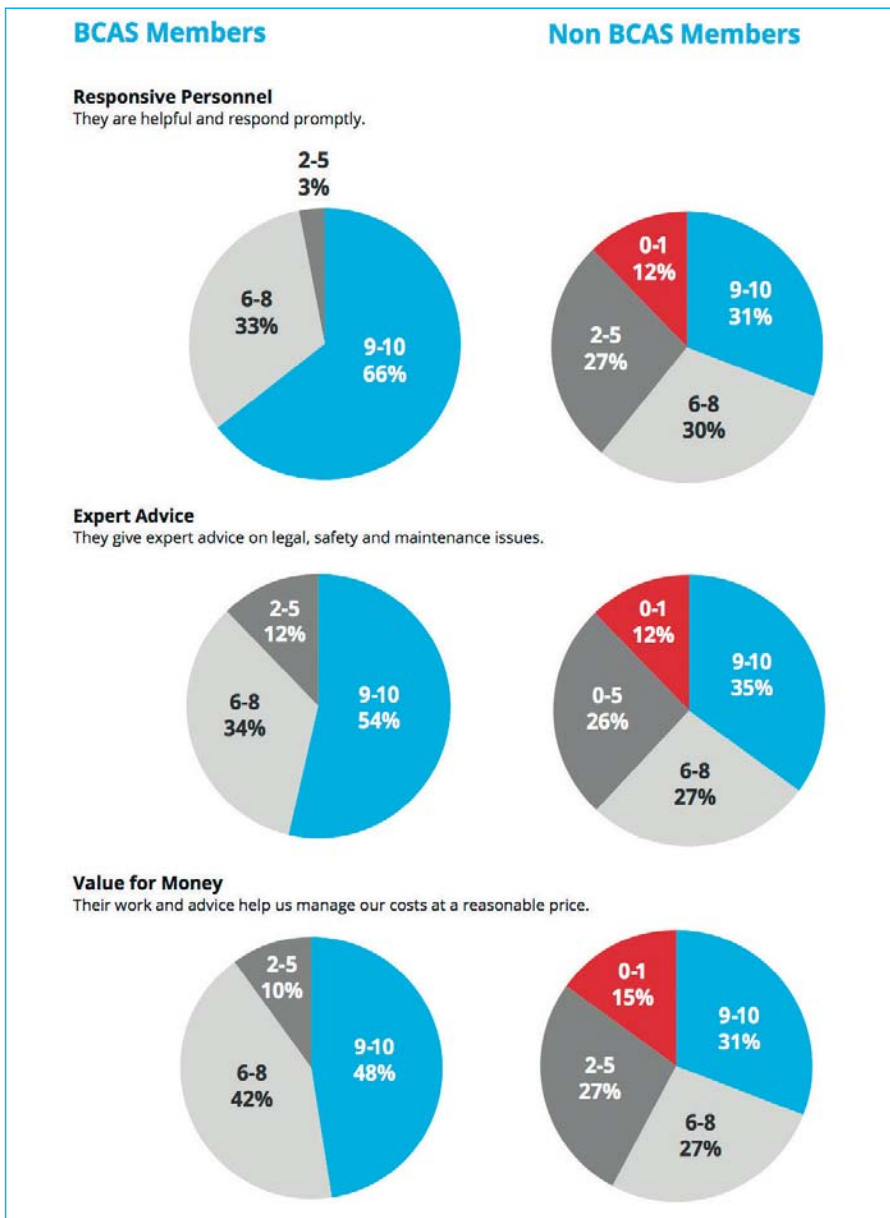
In addition to satisfaction levels, the survey also covered a number of other current developments in industry to gauge attitudes.

One surprising result is the apparent lack of urgency surrounding the whole area of Industry 4.0.

With just 23% of respondents rating it as very important, there is either still some work to do as far as communicating the role that digital industrial technology can play now, or respondents feel that there are other more immediate priorities to focus on. Most seem to agree, however, that it's importance will rise over the next 5 and 10 years.

In respect of the survey, Vanda Jones concludes: "BCAS members conform to a strict code of conduct and also have the latest technical and legislative information to hand via the society. We also offer ongoing training plus technical help and advice to our members. Clearly if you want a professional service that also represents value for money, then it pays to check that your supplier is a member of BCAS."

For a summary of the report's findings visit www.bcas.org.uk



Things to consider...

BCAS looks at what to consider when improving the compressed air distribution system.



A compressed air distribution system will be installed to deliver compressed air from the compressor house to the point or points of use. At the time of original design a number of factors will be taken into account including the total flow capacity of the system, operating pressures at points of use and exceptional flow demands. These factors will be used to determine the type of system, for example, a ring main, a combination of ring mains with sub headers or a simple single line system.

In the same way that air receivers are a source of stored energy, so is compressed air piping. Therefore it is essential that:

- The system is designed properly to be safe and energy efficient.
- The system is installed correctly.
- Proper procedures are followed during commissioning to ensure the integrity of all the connections within the system.

Correctly sizing the pipework at this stage is critical to ensuring the pressure drop

across the system from the discharge at the compressor house to the points of use is no more than 0.2 bar, generally accepted as best practice.

This is not a difficult process for an experienced compressed air engineer; however, as time goes by requirements often change driven by, new processes, updated equipment and variations to production patterns. As these factors are difficult to accommodate in the initial design their impact on the performance of the compressed air distribution system must be understood and monitored to ensure that compressed air continues to be generated and distributed.

Managing expectations

There are several key points when looking at pipework installation or modification it is key that both you and your contractor are working from the same understanding.

The following are minimum requirements before embarking on a project:

- Agree an acceptable leakage rate at the contract stage

- The concept of 'zero leakage' is unacceptable unless related to a time factor and the accuracy of the test method
- The pressure at which the integrity test is conducted and its duration should be agreed
- When agreeing the test conditions the test pressure chosen should be related to;
 - i. Design Pressure;
 - ii. Actual operating pressure or;
 - iii. 'PS' which is identified as the 'maximum allowable pressure'.
- Prior to any work a risk assessment method statement should be drawn up regarding safety of personnel.
- Set the criteria for the leakage test & the pressure (integrity) test both will be required
- Who will be responsible for the follow up check.
- Carry out a risk assessment procedure on the system to establish which areas would be dangerous to personnel should there be a major leak or system failure.

Joining techniques

In joining many new modular piping may be similar in appearance, but the joining procedure can be quite different. If not correctly carried out this presents a real risk of failure and consequent injury to personnel.

Joining must be carried out employing the process described by the manufacturer of the system or relevant British Standard. Your supplier should be able to advise you in accordance with your applications requirements and also set the testing appropriately at the quotation stage of your project. We have listed some detail for you below but for full detail please download the BCAS pressure and leak test guide from: www.bcas.org.uk

Push-fit Joints

This type of joint is made by mating a soft



seal in some form of housing against either the inner or outer surface of the piping system. Box section modular aluminium pipes are connected to each other and fittings employing a double 'O' ring seal and dovetail clamping and jointing system.

Screwed Joints

Where pressure-tight joints are made on the threads – the BCAS publication "Pipe Joint Guide" identifies the thread types used for this type of jointing technique and the practices to adopt to ensure a satisfactory air-tight joint.

Welded Joints

The integrity of this type of joint rests solely with the quality of the welded joint. Therefore, a qualified and certificated welder in accordance with BS EN ISO 9606 should perform the welding procedure

'Press-fit' Joints

This is a mechanical pressed joint using an O-ring to make it fluid tight. The joint can be made by either hand force crimping tools or powered hand tools. Where flexibility is required, other systems may be more suitable.

Hydraulic Friction Joints

These are popular for pressures above 20 bar and extend into regions of 450 bar. The use of these fittings to make a joint with a pipe should follow the joint manufacturers' instructions in every detail.

Flanged Joints

This type of joint relies upon a sealing

material being adequately clamped between faces whose surface is suitably prepared to prevent leakage. The flanges are secured to the pipes by threaded or welded joints and the flanges are bolted together with a sealing gasket between them.

Rigid Plastic Joints

The integrity of this type of joint, usually fusion bonded, also rests solely on the quality of the jointing procedure.

Air main location

This is another area that causes confusion and dispute. The air mains can be sited at any level from under-floor ducting to overhead. For ease of servicing and draining and for access when connecting to service points, the overhead main is often used. Some general guidance:

- Pipes must not be allowed to sag or hog, especially at threaded or flanged joints, since the bending stress could result in leakage and possibly to pipe fracture. Follow manufacturer's instructions for support spacing.
- The air main should be supported throughout its length so that the correct fall to the drain points is maintained and condensate cannot collect in the pipe itself.
- Allowance must be made for thermal expansion and contraction. This allowance will vary with the material used.
- Compressed air piping should not be attached to (i.e. hung from), other utilities such as gas mains.

Your contractor

Under Regulation 6, The Pressure Systems Safety Regulations 2000 Approved Code of Practice, the owner/user of the system must ensure that those doing the installation have the required training, skills and experience.

It is important that the user selects a supplier that can demonstrate competence through experience and evidenced training in pipe installation and jointing. The user should also check that the supplier:

- Is conversant with the safety issues surrounding compressed air
- Will carry out the work in a safe manner
- Holds the appropriate insurance
- The Pressure Systems Safety Regulations 2000 do not specify piping types or specific installation procedures. Like other health and safety legislation such detailed recommendations are beyond its scope.
- Therefore to demonstrate compliance with the law, users (and their contractors) should follow that "good industry practice" during the installation process. Examples of "good industry practice" are trade bodies' codes of practice, for example:
 - the BCAS installation Guide, and
 - BCAS Pressure & Leak Testing Best Practice Guide (BPG 103).

For full detail these two publications cover the selection of equipment, correct installation and commissioning prior to use and are available to download at: www.bcas.org.uk

Oil free choice

Is an oil free air compressor right for your application?

Compressed air is used in many applications where air quality is paramount for the end product and production process: including food and beverage processing, pharmaceutical manufacturing and packaging, chemical and petrochemical processing, semiconductor and electronics manufacturing, the medical sector, automotive paint spraying, textile manufacturing and many more. It's considered by some that air in its pure state has no moisture or contaminants. However, in reality, this isn't the case. In these critical applications, contamination by even the smallest quantities of contamination can result in costly production downtime and product spoilage.

Air Compressor Types

Over the past 25 years, both rotary screw and sliding vane air compressors have firmly established themselves for mainstream industrial use, due in part to their compact size, low noise and overall efficiency. Air compressors are typically supplied in one of two configurations, oil lubricated or oil-free. Approximately 75% or screw compressors sold are oil lubricated (higher if vane is included), however many companies are now opting for oil free variants. Before making the choice between oil lubricated or oil-free, a number of factors should always be considered.

Compressed air contamination

There are 10 contaminants found in compressed air, originating from four different sources, the ambient air, the air compressor, the air receiver and the distribution piping. Whilst oil-free compressors reduce the amount of oil carried into the compressed air system, they do not provide contaminant free (or totally oil free air) due to the oil in the ambient air being compressed, concentrated, then cooled & condensed in the compressed air system.

So what are the main differences between an oil injected and oil free compressor?

In simplified terms, oil lubricated



compressors use oil to seal between the rotors of the air end (allowing compression), for cooling and for lubrication of vanes & bearings. Typically, an oil lubricated compressor utilises a single 'air end' to compress the air. Oil free variants however do not inject oil directly into the compressor stage, instead opting for faster rotation speeds, specialist air end coatings and tight machining tolerances to compress the air. As the oil in a lubricated compressor cools the air, temperatures in an oil-free machine are typically higher, therefore compression typically takes place in two stages with an inter-cooler placed between the stages for intermediate cooling. Almost all oil-free compressors still use oil for lubrication of bearings and the gearboxes connecting the two air ends.

Important note: Oil free compressors are often specified in industries requiring "technically oil free air" as there is a perceived risk with lubricated machines from bulk oil carryover should an air / oil separator fail, however it must be noted that with regular maintenance and use of

genuine parts, separator failures on modern lubricated compressors are very rare indeed.

Total Cost of Ownership

When selecting an air compressor, it should not be done based upon purchase cost or running cost alone. It is best practice to always consider the Total Cost of Ownership (TCO) over a reasonable period (e.g. 10 -12 years). TCO should be purchase cost, full maintenance costs plus operational costs.

Calculating TCO will require the compressor manufacturer include both regular maintenance items such as oil & oil filters as well as costlier wearing parts such as air ends or vanes and integrated HOC dryer components. Including all of these items will prevent any 'unforeseen' costs in the future (for example, the maintenance periods on a two stage compressor may be longer than found on a single stage machine, however the cost of replacing two air ends is higher than replacing one plus more frequent oil changes).

Class 0 compressed air

When selecting new air compressors for their installations, many users (especially in the food, beverage and pharmaceutical industries) are now requesting oil free air compressors with “ISO8573-1 Class 0” certification.

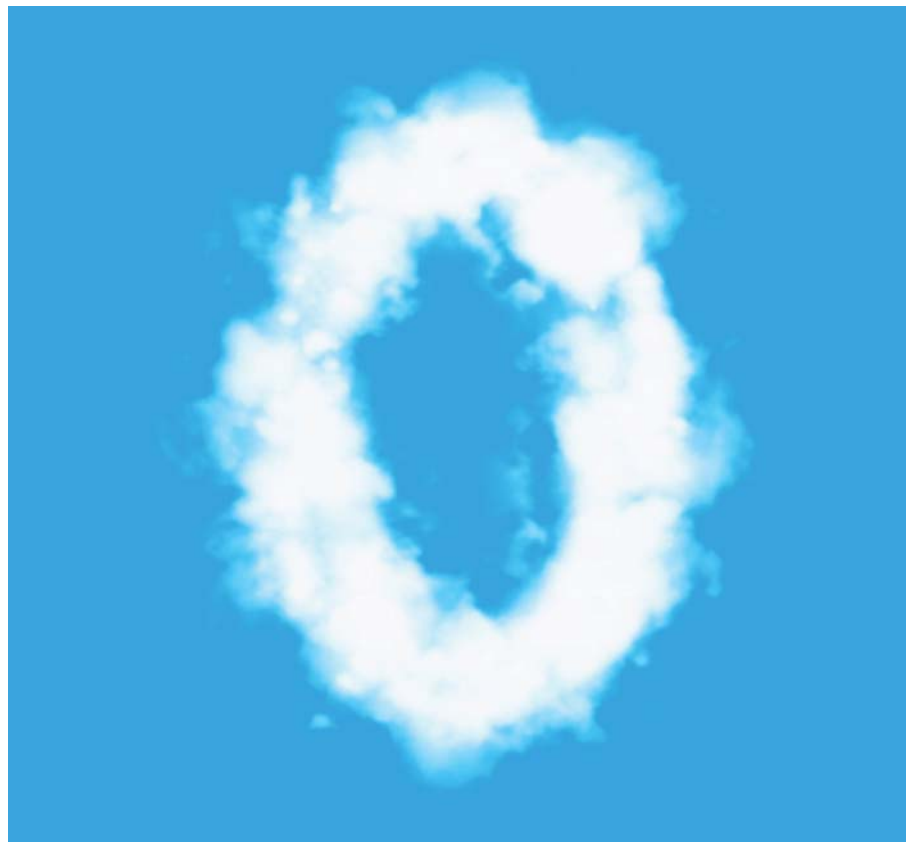
When using ISO8573-1, the international standard for compressed air purity, Class 0 is the highest purity classification available. Class 0 allows a user or manufacturer to specify an air purity which is cleaner than Classification 1 and which is still measurable using the methods and equipment of ISO8573 Parts 2 to 9. Many compressor manufacturers have taken to specifying their oil free air compressor models to Class 0, however this often leads to misunderstandings regarding the actual purity of compressed air at the point of use.

Some myths

- MYTH: A lubricated air compressor is the only source of contamination in a compressed air system.
- MYTH: An air compressor can clean the air it compresses, or provide oil free compressed air.
- MYTH: An oil free compressor removes the need for some, most or all of the air treatment technologies associated with a lubricated compressor.
- MYTH: Class 0 covers all contaminants found in a compressed air system or means 0 contamination.
- MYTH: Air that is Class 0 at the outlet of the compressor will still be Class 0 when it gets to the point of use / application.

Some facts

- FACT: In a typical compressed air ring main, there are 10 different contaminants present requiring treatment (regardless of whether an oil free or oil lubricated compressor is installed).
- FACT: These contaminants come from 4 different sources.
- FACT: The purification technologies required to clean compressed air from an



oil free compressor is identical to that required for an oil lubricated compressor.

- FACT: Many oil free compressor designs are not totally oil-less.
- FACT: Oil vapour in the ring main cools & condenses to form liquid oil and oil aerosols.
- FACT: Old contaminated piping in a ring main contains many contaminants (including oil).
- FACT: Compressed air must be treated both in the compressor room and at the point of use.

Oil free air

Most users request Class 0 as they have critical applications where the presence of

oil is unacceptable and by requesting Class 0, users are actually specifying the need for oil free air (not oil free equipment). There are filtration products on the market to provide the removal of all forms of oil from compressed air (liquid oil, oil aerosols & oil vapour). Some levels of filtration provide the final oil removal stage, which allows the air to be designated as “Technically Oil Free” and with an air purity (quality) classification of ISO8573-1 Class 0. Air can now be available no matter what type of air compressor is installed (even oil lubricated). Installation flexibility can mean oil free air is available just where it’s needed, at the critical points of use.

Donaldson

Low noise: Adsorption dryer in whisper mode

The new adsorption dryer Ultrapac® Smart from Donaldson is the first compressed air dryer of its kind that is operated with a sophisticated silencer, with noise emissions in the range of just 60 dB. “Our silencer technology reduces noise production to a level equivalent to a normal conversation,” explains Wolfgang Bongartz, Engineering Manager Industrial at Donaldson in Haan/Germany. “These merits make the Ultrapac Smart series ‘best in class,’ and allow the adsorption dryer to contribute to relief for employees in the workplace.”

Adsorption dryers are used whenever highly purified and dry compressed air is required in accordance to ISO 8573-1:2010. Areas of use are food processing, pharmaceutical, medical and industrial machinery as well as the plastic, filling and packaging industry. Part of the compressed air generated is used for the operation of the dryer itself. It extracts stored humidity from the desiccant and is then discharged to the environment via the new UltraSilencer.

In addition to the quiet operation, the current series also offers additional new features: For instance, the dryer can be configured, installed, or integrated into machines and systems in different ways thanks to its compact, space-saving design. A removable display also enables the comfortable monitoring of the adsorption dryer when space is limited. This allows to comfortably read e.g. the dew point, cycle times, and temperature. This and other data can also be exported via Bluetooth and app as well as interfaces (i.e. common bus systems, WLAN).

The adsorption dryer works with a desiccant with a high absorption capacity and outstanding regeneration capability. Thanks to a dew point transmitter built into the Superplus version, which measures directly in the compressed air flow, switching between the two cartridges takes place only when the desiccant is truly saturated. The pressure dew point is kept stable at a minimum of -40°C. This results in a high level of efficiency and operational safety. An additional plus is the spring-loaded desiccant bed in the corresponding cartridge, which prevents abrasion of the desiccant. The proven UltraPleat® energy saving filter is also used in the integrated pre- and after-filters.

With the Ultrapac Smart, the customer also benefits from service worldwide coverage and reliable spare parts supply that are standard at Donaldson.



ABOVE: The Ultrapac® Smart adsorption dryer, with built-in pre- and post-filters



The UltraSilencer allows to operate the dryer with noise emissions in the range of just 60 dB

“All-in-One“ Three-stage Filter offers high Operating Safety and reduces Installation Space

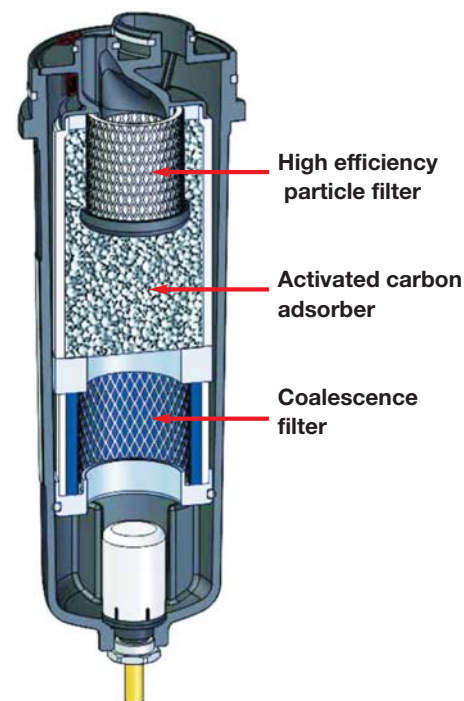
The compressed air three-stage filter DF-T(hree) combines three purification stages in one filter: As a coalescing filter it retains oil aerosols and particles, as an activated carbon adsorber it removes oil

vapours and other hydrocarbons. The DF-T is validated according to ISO 12500-1 and achieves an overall residual oil content of < 0.003 mg/m³. It is therefore still under the required limit value according to

ISO 8573-1:2010 to achieve the quality class 1.

The three-stage filter is based on the flow-optimized filter housings of the Donaldson Ultrafilter® brand and expands the proven

Donaldson



Ultra-Filter series. The compressed air filtration by Donaldson therefore with immediate effect has a "All-in-One" filter for removing oil aerosols, oil vapours and solid particles, which offers essential economic advantages at a high operating safety. The triple function of the filter significantly reduces the number of required filters and therefore needs 60 % less installation space. The integration of the three filtration stages in machines and equipment can be implemented considerably easier and more cost-effectively. When replacing a previously common combination of three filters by a three-stage filter DF-T, up to 60 % of installation space can be saved when compared to the triple combination. Of course, the installation and maintenance

costs for an individual filter are also reduced when compared to the filter combination. The use of the DF-T filters is as interesting for point of use filtration in sensitive applications, such as the food production, the pharmaceutical industry, in laser cutting machines, as well as environmental technology as in the central compressed air treatment for performances up to 110 m³/h. The filter can be used especially advantageously as a compact treatment unit for small compressors, in order to generate pure compressed air in a simple way, for example in paint applications. The three-stage filter thereby enables the optimum adjustment of the compressed air quality to the consumer profile as requested by the users.

FACT FILE



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Filtration selection – making the right choice

BCAS looks at filtration and why it is an important part of contamination removal.

In a typical compressed air system, there are 10 contaminants that require treatment for the system to operate safely, efficiently and cost effectively. This rises to 15 if using compressed air for breathing air applications. These contaminants come from 4 different sources and are not solely related to compressor design. Compressed air filters are required to treat 9 of the 10 main contaminants.

Selection of filtration is important and there are many factors to consider when selecting filters:

- Sizing: for example, can the filter handle the compressed air flow rate at the minimum system pressure and maximum system temperature.
- Grade of filtration: a single filter is unable to treat all contaminants; therefore, a combination of filtration grades and filtration methods are used.
- Cost: filters are often seen as a commodity and purchased on price. Although filters may look similar and claim similar performance, the cost to operate the filter and maintain it can vary significantly. When considering cost, always use total cost of ownership rather than initial purchase cost.

Filtration Types

Water separators

Although called water separators, they reduce the content of all liquids at the point of installation. Liquid in a compressed air system is usually a mixture of oil and water (even when using an oil free compressor).

Water separators are usually the first piece of purification equipment installed downstream of an aftercooler or air receiver and should be used to protect coalescing filters from liquid contamination. It is worth noting that they are not always necessary,

for example if coalescing filters are installed immediately after the air receiver and the air temperature is unchanged (no condensation occurs between the air receiver and the filters which means no liquid requires removal).

If variable speed compressors are used, ensure the water separator selected can work at the variable flow conditions (many are designed for optimum efficiency only at their maximum flow conditions and reducing air flow reduces the velocity of the air in the separator and therefore separation efficiency).

Coalescing filters

Coalescing filters treat multiple contaminants (atmospheric particulate, rust, pipscale, micro-organisms and aerosols of oil and water). But more importantly, protect refrigeration and adsorption (desiccant) air dryers from contamination.

They are usually installed close to where the compressor is located (either in the compressor room on larger installation or on the compressor itself for smaller fixed or portable compressors).

These will typically be installed in pairs, with one being a General Purpose filter, the other being a High Efficiency filter. This is the most cost effective method of installation as the general-purpose filter protects the high efficiency filter from heavy contamination, extending the life of both elements up to 12 months.

Dry particulate filters

Dry particulate filters are very similar in construction and operation to that of a coalescing filter, however as their name suggests, they are not suitable for the treatment of oil or water aerosols and are therefore found installed downstream of

the coalescing filters and dryer.

Adsorption dryers use granular desiccant materials and dry particulate filters are usually installed on the outlet of such dryers to prevent excessive particulates entering the distribution system.

They will also be found installed to protect point of use applications from particulate already in the distribution system such as rust and pipscale and micro-organisms

A general purpose dry particulate filter will typically provide particle reduction down to 1 µm with an efficiency rating around 99.9%.

Oil Vapour Removal Filters (Activated Carbon Filters)

The previously mentioned stages of filtration will treat liquid water, water aerosols, liquid oil, oil aerosols, and particulate. However, oil vapour will not be removed by these stages, which is often evident by the smell of oil from compressed air. Oil vapour can cool and condense in the downstream piping and once again form liquid oil and oil aerosols. Additionally, if the compressed air is to be used for breathing, mixing with food, beverage or pharmaceutical products or other such duties, oil vapour removal must be included.

A combination of general purpose and high efficiency coalescing filters plus an oil vapour removal filter would typically be classified as ISO 8573-1:2010 Class 1.-.1. Some manufacturers are also available to meet ISO 8573-1:2010 Class 0 (0.003mg/m³) for total oil.

Adsorption filters are available in a variety of designs, and can be split into the in-line type, carbon tower and modular system.

In-line oil vapour filters are typically



housed in a similar or identical housing to a coalescing filter. They are usually matched to the pipe size of the system and therefore have a small volume of adsorbent material inside. This requires frequent element changes to constantly achieve the desired air quality. This type of filter is best suited for small flow, point of use applications, not compressor rooms.

Sterile air filters

Micro-organisms in compressed air can be a serious problem. Not normally visible to the naked eye (some can be as small as 0.04 μm), they are drawn into the compressor intake in huge quantities and multiply rapidly in the compressed air system under the right conditions.

The passage of even a few viable organisms into a clean area, process or system causes contamination. This can result in reduced product quality, complete rejection or serious infection.

Some applications, typically in the food, beverage or pharmaceutical industries require a degree of control over micro-organisms or even sterile compressed air.

For this a combination of dry air (-40°C pressure dewpoint to inhibit the control of micro-organisms) and point of use sterile air filters are used.

The growth of micro-organisms can be controlled and low compressed air dewpoint's are known to inhibit the growth of micro-organisms. For example, the BCAS Food and Beverage Grade Compressed Air Best Practice Guideline 102 recommends a pressure dewpoint of -40°C for direct

contact applications or in-direct applications where micro-organisms may still present a risk.

By controlling the multiplication or growth of micro-organisms within the compressed air system, high efficiency dry particulate filters can be used to remove almost all as a particulate.

For critical applications needing 100% particulate removal and applications needing sterile compressed air, sterile air filters can also be used. The benefit of dedicated sterile air filters is that they not only provide sterile compressed air, they are designed such that they can be sterilised in place with steam.

Energy consumption associated with filtration

In a compressed air filter, pressure losses are a combination of fixed pressure loss and incremental pressure loss. Fixed pressure losses are designed into the filter from the beginning and come from the filter housing and element endcap designs. Many manufacturers offer filters with flow management built into the design and whilst costing a little more to purchase, they offer significant savings when in operation. Whilst the initial performance of the two filters may look similar or identical in literature (both quoted 200mbar wet dp), one filter has an element with a higher dirt holding capacity than the other and would therefore have lower operational costs.

Point of use filters & pressure loss

Point of use filters are necessary for

almost all compressed air systems. They deal with the contamination that is already in the distribution piping (rust, pipescale, particulates, oil vapour and micro-organisms), especially in ageing systems. When it comes to high pressure losses in existing systems, it can often be traced back to point of use filtration.

As facilities change or expand (this applies to point of use equipment and applications also), demand for air increases and system pressure subsequently drops.

Compressed air filters must be sized for the minimum system operating pressure (remember lower pressure = more air volume = larger filter). If they are not, they will have too great an air flow which significantly increases pressure losses (dp), increases costs significantly and results in contamination carryover to the application.

When sizing point of use equipment, always check how pressure changes when equipment is operating. It is not uncommon for pneumatically operated processes to drop the system pressure significantly when using compressed air. Never size the equipment based upon the compressor discharge pressure.

Correctly sizing a point of use filter can save significantly on pressure losses and energy consumption.

The information provided above will enable the designer to arrive at the correct purification equipment specification for the facility. Please remember to ask a specialist to review your filtration requirements.

Considering a portable compressor?

Portable air compressors are defined as the workhorse of building and construction sites because they supply compressed air to power all kinds of heavy tools.

Therefore, it is essential to choose the right compressor for the needs of your construction site to ensure that it is productive and runs as smoothly as possible.

Here are eight key features that you should focus on when you choose to buy or rent a small compressor for your construction site:

1. Design & cost

A portable compressor should be designed to overcome the challenges that construction workers face daily while offering a low cost of ownership. Therefore, you should look for a portable compressor whose design combines higher utilisation, lower service and fuel costs along with a guaranteed buy back to ensure the value of your asset.

2. Canopy

You should choose a compressor that is engineered with a tough canopy. Manufacturers traditionally favoured metal canopies because of their perceived toughness. However, these have been gradually phased out by the introduction of plastic canopies which offer proven toughness and long-term resilience, along with resistance to corrosion and cracks, reduced weight and an improved environmental impact. Initially untrusted by many in the construction industry, the use of polyethylene is now widely accepted as the best material for compressor canopies. It is resistant to low and high temperatures thanks to UV stability and long-term antioxidants within the plastic. To minimise environmental impact, buyers should also look for canopies that are made from approved recyclable material.

3. Weight

The weight of the portable compressor will make a big difference when you need to transport it from site to site or move it within the working location where you are. Therefore, if you choose a unit that is below

750kg you will ensure that your compressor arrives on site when you arrive and you will not need any special driving license to tow the machine. This means that you simply rent or buy it and drive away. There are now compressors that, thanks to the latest advances in air element design and smart engineering, are below 750kg yet still offer multiple options, including a built-in generator which can be up to 150kg lighter than comparable models.

4. Options for everyone and everything

When you are selecting a portable compressor, you should focus on the solutions it will offer you. This way you can ensure that you are not paying for features you do not want or “extras” which should be standard. You should choose your unit from a manufacturer that build its products to include all the innovative features you expect and it offers you an extensive range of options. Useful options to look for include tow bars, aftercooler, tool box, air treatment, filtration, hose reels and non-return valve.

5. Quick service

It is important that you look for a compressor with maximum uptime. If your compressor is being repaired, then it is not being productive. Therefore, you should choose a unit with a minimal service time, simple service procedures that can be undertaken without custom tools or training, and extended service intervals. A compressor that can be serviced in a short amount of time with longer intervals will help ensure that uptime is optimized. Also, you should look for a compressor that has easy access to all parts and filtration. Moreover, it is recommended that you choose a compressor from a manufacturer that can fully guarantee low service costs.

6. Improve fuel efficiency

If you choose the wrong compressor, fuel cost can be the highest cost over the lifetime of your compressor. Therefore, you should choose a compressor with improved fuel efficiency. Over the lifetime of the compressor the savings are significant. Another point to consider when choosing your compressor should be the question of whether you will be able to tow it behind a normal passenger car. If you can, you will not be adding extra transportation costs and this contributes to reduced CO₂ emissions.

7. Solving common problems users experience

A portable compressor should be intuitive and come with the features you desire as standard. For example, look for features that guarantee starting, no matter the conditions. To achieve this, you should choose a compressor with features that protect the engine and maximize its lifetime. Also, it is advisable to select a compressor that guarantees simple connection for the hoses. You also should look for a compressor that guarantees the quality of your environment by ensuring that no spillages can contaminate the ground. This is also key in maximizing your compressor's utilisation.

8. Total cost of ownership

No matter whether you are renting for a few days or buying a compressor for your own use or to rent out, the key figure is the total cost of ownership. For a compressor that helps you to achieve sustainable productivity, choose a unit that provides you with improved return-on-asset value. This means that if you have higher utilization, coupled with low service and fuel costs you can increase your revenue.

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Don't underestimate vane technology!

Although screw air compressors account for a large share of the market, vane technology should not be underestimated when it comes to reliability and its ability to deliver in harsh environments. BCAS looks at how the design of vane air compressors improves energy efficiency without compromising on performance.

In today's market, there are two main types of industrial rotary compressor – vane and screw. Although both are designed to produce the same output, it is important to know how they work, as these differences affect the maintenance costs, energy efficiency and levels of reliability associated with each technology.

Efficient by design

A rotary-vane compressor comprises a rotor, with slots along its sides which house individual sliding vanes. This assembly is offset within a cylinder, or 'stator', and rotates on white-metal bushes. As the rotor turns on its axis, the vanes are pushed against the stator wall by centrifugal force and the air is compressed.

Oil is injected into the stator to seal clearances between the rotor, stator and end covers. The oil also serves to lubricate the moving parts and cool the air during compression. Lubrication also keeps the

freely moving vanes in constant contact with the stator's internal surface, so the air seal is near perfect.

The design of rotary vane compressors eliminates 'blowholes' where air under high pressure can be driven to areas of low pressure, which is inherent in screw compressors. This means that vane compressors don't need to run at high speeds to compensate for air leakage. They can operate at low speeds, from a direct drive coupling, which in turn leads to lower power consumption.

Wear and maintenance

The lubricating oil forms a film on which the vanes slide. With no direct metal-to-metal contact between the vanes and the internal stator wall there's no negative wear. In fact, rather than experiencing damaging wear, the blades of a rotary vane compressor undergo a polishing process during use, which results in less friction, and

consequently, better operation and reduced energy requirement.

The absence of roller bearings in a vane compressor means lower maintenance costs and a reduced risk of component failure. In fact, some vane compressors have been known to run for over 200,000 hours without the need to replace the white-metal bushes used in this type of compressor. This poses a serious contrast with roller bearings, which are typically required to be changed out at every 30,000-40,000 hours. Due to the integrated nature of the airend most vane compressors have fewer hydraulic hoses, further minimising the risk of leakage and breakdowns. All of this means vane compressors offer greater reliability and guaranteed lifetime performance.

Long-lasting performance

The polishing effect within a vane compressor's airend means that its efficiency actually improves for the first thousand hours or so and then stays constant throughout the rest of its operating life, whereas typically a screw compressor's efficiency falls away over time as its bearings wear. If a rotary vane compressor is looked after in accordance with manufacturer's instructions (which often only require compliance to a standard and a less than onerous servicing regime) the operating life of its airend can easily extend to over 100,000 hours without wear, even in dusty operating conditions.

Energy efficiency is a serious priority for the industry, and air compressors play a major role in reducing consumption. With its energy efficient design, vane air compression technology can help businesses minimise their energy use whilst lowering the cost of ownership throughout a unit's lifespan.



Is it time to rethink mobile power

For many fleet operators, having access to mobile power is essential for business operations. Mobile power is required for many tasks carried out on the road, including the operation of road drills, hand tools, submersible pumps and electrofusion equipment, and for supplying site lighting. BCAS reports.



For businesses that rely on mobile power, this has often meant towing a separate generator and/or compressor, carrying them in the back of a vehicle or arranging for these items to be delivered to site.

There is an alternative: on-vehicle power. This involves a vehicle being converted so that the power of the engine is used to drive auxiliary equipment. On-vehicle power systems can provide compressed air, electric, hydraulic or high pressure water jetting. And, compared to the traditional approach of using separate plant to provide power, they offer differing benefits. On-vehicle power systems are available on light commercial vehicles to deliver compressed air at up to 120cfm at 12 bar and electric power up to 10kVA. Other outputs are available for larger vehicles.

Employees essentially drive a mobile work station and can benefit from a

changed working environment with potentially lower noise & exhaust emissions.

When choosing portable power, it is important to compare life cycle costs (including vehicle fuel consumption) and the service offering. But there are some important legal requirements to be aware of too. On-vehicle power systems should be installed and certified in line with manufacturer guidelines and, where applicable, to EUWVTA UK National Small Series Type Approval (NSSTA). Type Approval means the vehicle installation conforms to current legislation, meets legal requirements.

It's also important to consider the impact a conversion will have on payload. There has been growing pressure for equipment installed within a vehicle to be as light as possible, most notably because of the introduction of Euro 6, now a mandatory

requirement for all new factory-build light commercial vehicles. The extra technology that is being fitted to meet the new emission regulations results in the base vehicle becoming heavier, potentially eating into payload capacity and increasing the risk of a vehicle being overweight.

Therefore the user should ensure they understand the fully installed weight of any on-vehicle power system rather than simply the weight of the component parts. Reducing weight must have been achieved without compromising the integrity of the system.

In addition to drive line underfloor systems, compact engine mounted compressor system are also available for both front and rear wheel drive vehicles, where the on-vehicle power system is installed within the engine compartment to reduce the overall vehicle weight and increase payload.

Reciprocating compressors – NOT the dinosaurs you thought!

Think of small piston compressors and so often the image of a tired noisy relic clattering away in a high-street tyre bay used to come to mind. Nothing could be further away from this reality than the contribution today's modern reciprocating compressor technology is making to industrial productivity. BCAS reports.

The latest advanced piston technology is designed to meet exact application requirements; whether it is within a large industrial plant, a small workshop, or the controlled environment of a clean technology lab. That versatility includes customised piston solutions for industries with specific OEM demands as diverse as transport air suspension, marine propulsion and snow making equipment.

The small-to-medium piston compressors range from 0.55 to 15 kW and are available as either oil-lubricated or oil-free machines. They can be supplied on a standard base or as trolley or receiver mounted units. If required, they can also be provided as part of a complete compressed air station including a refrigerant air dryer plus pre-wired starting and regulation equipment.

Oil-lubricated piston compressors

Compact, single-stage, oil-lubricated, reciprocating compressors in the 10-bar 1.5 to 15kW range are best suited for applications with limited space requirements. In these designs a lightweight compressor block, directly coupled to the motor, provides excellent cooling characteristics and smooth integration in small spaces. Filtered air enters both cylinders through the inlet valve. The piston is driven forward through



the connecting rod attached to a balanced crankshaft. Air compressed in the cylinders leaves through the outlet valve when the pressure reaches 10 bar.

Higher pressure, two-stage units allow filtered air to enter only one cylinder. This low-pressure cylinder feeds a second, high-pressure cylinder that can operate at a maximum pressure of 15, 20 or 30 bar and provide corresponding capacities ranging from 2.1 to 18l/s.

The specific needs of the artisan workshop, garage operator or commercial vehicle service bay are catered for with 8, 10 and 12 bar receiver-mounted, simple-to-use, low weight, easy-to-move machines that offer capacities ranging from 1.7 to

12.9 l/s. At the heavyweight end of the scale, there are two-stage cast iron piston compressors with high volumetric efficiency for demanding industrial, automotive, and commercial applications requiring working pressures of between 8 to 12 bar.

Oil-free piston compressors

Oil-injected compression, even filtered, cannot guarantee that all oil vapours, aerosols, and other contaminants are removed from the air. The oil-free air technology employing sealed for life bearings and PTFE or carbon piston rings that remove any risk of contamination and meets the certified ISO 8573-1 Class 0 standard in air quality.

Oil free, 10 bar piston compressors fall into three principal categories: Single-stage, one-cylinder units for applications between 1.0 and 2.5l/s; single and two-stage compressors designed for continuous duty, delivering quality air between 3 and 17l/s; as well as electronically controlled single-stage, fully silenced models. At the heavy end of the range are 25 to 40 bar, 37 to 275 kW, 3 and 4-stage high pressure oil-free compressors, which are the preferred choice for critical processes such as PET bottle blowing, aeronautic industry test benches and food and beverage production.

BCAS Training



Training is a key feature needed for the enhancement of staff in any company. Compressed air is utilised in a wide variety of applications. Knowledge of compressed air is important to those who not only supply compressed air but also to those who use the compressed air. BCAS has a range of courses to suit various needs, either to improve knowledge or as part of legislative compliance including:

- distance learning
- e-learning
- face-to-face
- bespoke workshops

All the distance and e-learning courses are continual enrolment and can start at any time convenient to the student.

All the compressed air training and education courses below are accredited by BCAS.

Please email Training@Bcas.org.uk for full member and non member options.

Further information on all BCAS training can be obtained by either contacting our Technical Development Officer on 020 3856 1754 or by visiting www.bcas.org.uk

Condensate drains in focus

Some of the greatest wastages, often up to 10% of the mean demand, are found at the condensate collection points at the inter-cooler, after-cooler, air receiver, coalescing filters and distribution system. BCAS reports.



Compressing Air creates moisture and contaminants which can combine and form emulsion.

Often drain traps are unsuited to the duty, or incorrectly installed, and after a short while they fail, causing the contamination to pass on to the usage points. To avoid this problem many traps are found by-passed or valves left cracked open, causing the wastage. Traps without some lubrication can have internal parts rust, causing them to fail.

Special oil: water separation systems are needed to comply with the Environmental Protection Act 1990. This act and its implications for the disposal of condensate from compressed air systems are described in the booklet 'Condensate Disposal', available from the British Compressed Air Society (BCAS).

Condensate drain types

Zero air loss drains

Zero air loss drains are any condensate drain (also known as a drain trap) that discharges condensate from a compressed air system without discharging (wasting)

compressed air. These can be internal float drains as found in water separators and coalescing filters, external float drains or electronic level sensing drains. Properly maintained, any of these types of drains will significantly reduce air loss and improve energy efficiency.

Timed solenoid drains

Timed solenoid drains use an electronic timer to open and close a solenoid valve and discharge condensate. They will typically lose compressed air during discharge and hence are wasteful of energy. Correctly set up (short duration between discharges and short opening times), the air loss can be minimised however they will need re-setting to match seasonal conditions.

Thermodynamic disc traps

Thermodynamic Disc Traps are modified steam traps and were once very common due to their low cost. By design they constantly discharge compressed air as well as emulsifying condensate as it is discharged to a point where standard

gravity oil / water separators will not work, requiring more costly disposal methods. It is recommended to replace thermodynamic disc traps with more energy efficient solutions.

Failure of a condensate drain will result in carryover of liquid resulting in overload of filtration and drying equipment and or contamination of downstream distribution piping and applications.

Best Practice for your condensate drains

- Daily checks of condensate drain function are recommended.
- Almost all condensate drains are susceptible to particulate contamination and where necessary, should be protected by strainers.
- Except for timed solenoid drains, condensate discharged from float drains and level sensing drains will be under gravity, not system pressure – do not try to “lift” condensate above the point of drainage or “push” condensate over long distances.
- For condensate discharge piping, use large internal diameter piping and keep pipe lengths short to prevent back pressure.
- Never combine or tee condensate drain lines, always run individual drain lines to a common, open ended or vented condensate manifold prior to feeding into storage vessels or on-site treatment devices.
- Condensate drains require regular maintenance (or replacement in the case of internal float drains). Always follow manufacturers recommended maintenance instructions.

Nitrogen on-site production

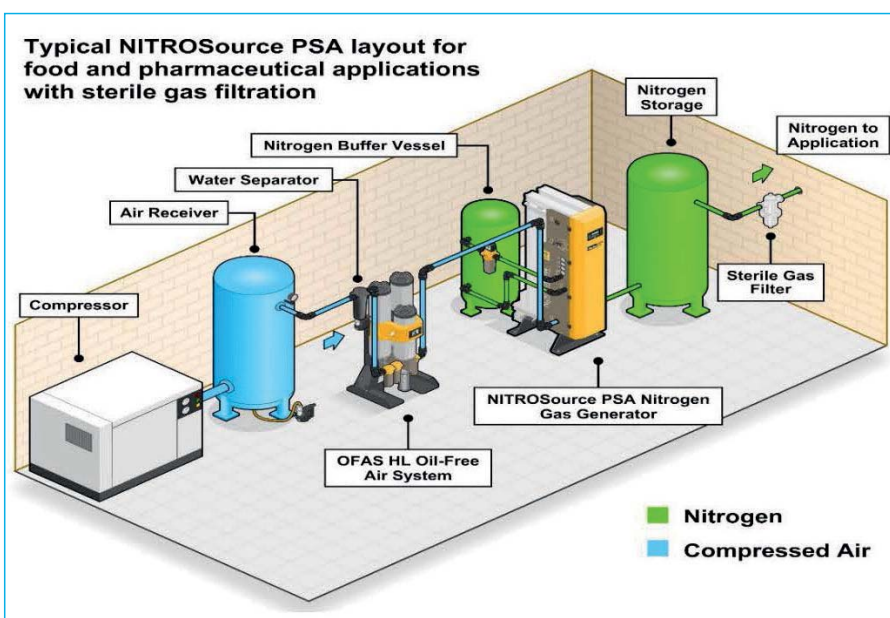
Nitrogen has widespread applications in various manufacturing sectors due its inert nature compared to normal air. It is used in food and drink manufacture (modified atmosphere packaging), pharmaceutical manufacturing, for purging equipment, tanks, and pipelines of flammable vapours and gases. It provides an inert atmosphere for laser cutting, soldering and heat treatment. BCAS reports.

An alternative to traditionally sourcing nitrogen in bottles or liquid, delivered to site, is to produce nitrogen on site from a compressed air system. Nitrogen forms approximately 78% of the earth's atmosphere, and therefore it is the main constituent of the air drawn into a typical compressor intake. Standard factory type oil-injected screw or rotary vane compressors are suitable sources of the required compressed air input.

Two main technologies are used to separate the nitrogen gas from ambient air; Pressure Swing Adsorption (PSA) and membrane technology. The PSA method uses a carbon molecular sieve (CMS) to remove oxygen. The membrane technology works on the principle that the relative speed of gases, their molecular size and ability to pass through a semi permeable cellular structure; preferentially separates the faster gases such as oxygen, carbon dioxide and water vapour from the slower nitrogen gas.

Nitrogen safety

Nitrogen should be considered in exactly the same manner as compressed air with regards to pressure systems legislation, equipment, and compressed gas safety. Compressed nitrogen represents the added hazard in that the oxygen has been removed and it cannot support life. All equipment, pipework, vessels, processes and machines should be clearly labelled to warn that they contain nitrogen and that it is a potential asphyxiant. Nitrogen has no properties to warn people of its presence, thus it can act as an asphyxiant by displacing the oxygen in air to levels below those needed for the brain to remain active. Inhalation of excessive amounts of nitrogen



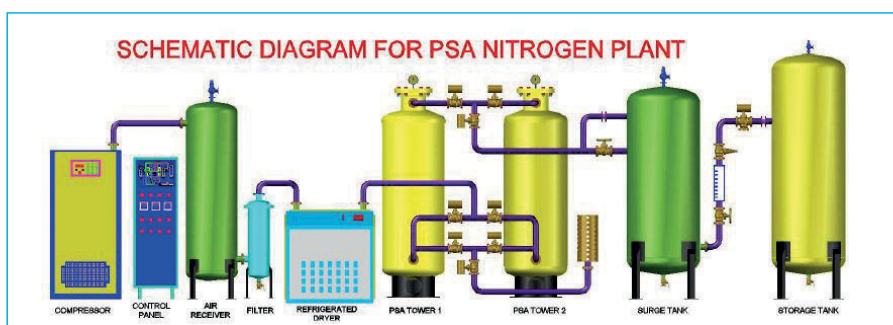
can cause dizziness, vomiting, loss of consciousness, and death.

Advantages of on-site nitrogen generation

- The unit gas cost to produce nitrogen is typically up to 90% less than traditional supplies.
- No large stored volumes of potentially asphyxiant gas.

- Ambient temperature gas removes the risk of cold burns associated with liquid nitrogen.
- Low pressure gas @ 5-10 barg. Far fewer safety issues than with 300 barg high pressure cylinders and associated manual handling of heavy cylinders.

For further help and information please contact the BCAS Technical Office



Dryer types – where to start with selection

Whether designing new systems, or reviewing existing systems, the first step should be to define exactly what are the compressed air purity requirements. Ensuring you have the correct advice is key and the dryer is only part of the process.

There is a very wide range of requirements for air quality, all of which can be met with the right equipment. However, unnecessary levels of treatment can significantly increase the associated energy costs.

There are many types of dryer available, with drying technologies often associated with the dewpoint they can deliver. Once the required pressure dewpoint (air quality) has been selected it is then a case of selecting the best technology to provide that dewpoint. All compressed air dryers have their own advantages and disadvantages and there is not currently one single technology that is suitable for every system and application.

Refrigerated Air Dryer Technologies

Refrigerated Air Dryers (+3°C / +7°C / +10 °C Pressure Dewpoints)

Refrigeration dryers cool the compressed air causing condensation of the water vapour into liquid water and then use a built-in water separator to remove the liquid. The dewpoint of a refrigeration dryer is dictated by its ability to cool the air to the desired dewpoint temperature and then the efficiency of the liquid removal separator. If the dewpoint temperature cannot always be achieved and / or the liquid separation is not always 100% efficient (for example in varying flow conditions) then the dewpoint cannot always be guaranteed.

Refrigeration Dryer Types

Refrigeration dryers consume energy through pressure drop, electrical energy for the refrigeration compressor and condenser fans or chillers and pumps on water cooled variants. Below is an overview of the 3 most common types of refrigeration dryers sold.

Direct Expansion Refrigeration Dryers

Direct expansion dryers are the most common type of refrigeration dryer. The refrigerant compressor is constantly running and of the 3 main types of refrigeration dryer, can be the costliest to run. Direct expansion dryer dewpoints are often more stable than for example those delivered by a thermal mass dryer.

Thermal Mass Refrigeration Dryers

Unlike direct expansion dryers that have a direct heat exchange between the air circuit and the refrigerant circuit, as their name suggests, thermal mass dryers have as large mass (typically a glycol/water tank or sand) which is cooled down by the refrigeration circuit. The heat exchange with the compressed air then takes place between the air circuit and the thermal mass.

The benefits of this is that once the thermal mass has been cooled down, the refrigeration compressor can be turned off to save energy.

Variable Speed Refrigeration Compressor

This type of refrigeration dryer uses inverter technology to vary the speed of the refrigeration compressor to try and match the cooling requirements of the dryer to the water vapour loading of the incoming compressed air. Whilst they can be more energy efficient than an equivalent direct expansion dryer, the cost of the inverter technology and complexity means they are often only available for larger compressed air flows and dewpoint.

Membrane Dryers

This type of dryer use hollow-fibre membranes which diffuse the moisture from the compressed air to atmosphere. To remove the permeated moisture from the membrane they require a constant flow of

compressed air called “sweep air”. To provide a constant pressure dewpoint in line with ISO8573-1 classifications can require the sweep air to be as much as 50% of the dryers rated capacity and are therefore not very efficient.

Adsorbent (Desiccant) Dryers

When lower dewpoints are needed than those which can be achieved from refrigerated air dryers, adsorbent (desiccant dryers) are used. The basic principle of an adsorbent dryer is to pass compressed air saturated with water vapour (not liquid or aerosols) over a bed of adsorbent desiccant material. The longer the air is in contact with the desiccant, the drier the air becomes. The desiccant material can only adsorb so much moisture before becoming saturated and therefore it must be regenerated if a constant dewpoint is to be supplied.

Adsorption (Desiccant) Dryer Types

Adsorption dryers consume energy through pressure drop, and the methods used for regeneration of the desiccant material. The regeneration methods can consume energy in the form of purge air (taken from the process air), cooling air (again taken from the process air or from ambient air) and direct electrical requirements for heaters, blowers or vacuum pumps. There are different types of adsorption dryers sold.

This guide is designed to give a brief introduction to technology types and cannot replace the advice of a BCAS member to ensure the correct system is specified. Find a list of suppliers on the BCAS website. Further & more detailed information will be available from the Air treatment guide produced by BCAS. Ask your supplier to review the information with you.

Pressure on

The British Compressed Air Society outlines answers to its most commonly asked questions. Two questions came instantly to mind; the first regards compliance with the Pressure System Safety Regulations (PSSR) and the second deals with the responsibilities of a competent examiner if he or she discovers a situation that could give rise to imminent danger.

So first let's deal with a question which is very much at the top of the list from both BCAS members and non-members alike:

Q. What do I need to do to comply with the Pressure System Safety Regulations (PSSR)?

Anyone asking this question is obviously aware of the PSSR and recognises the need to be compliant, albeit they need some guidance.

Of more concern are the reports we receive regarding compressed air systems being operated without consideration to the PSSR. To put it quite simply, and forcibly, this is illegal. If pressure equipment fails in use, it can seriously injure or kill people and cause serious damage to property.

Each year in Great Britain, there are about 150 dangerous occurrences of which around six result in a fatal or serious injury. The regulations have the status of a statutory instrument (SI 128) and therefore are the law; non-compliance is a criminal (not civil) offence.

It means that BCAS continues to beat the PSSR drum and endeavours to explain the PSSR, how it affects you as the owner/user and what you have to do to comply.

But let's start at the beginning; the PSSR came into force as a UK Statutory Instrument on 21st February 2001 and applies to any compressed air system operating at a pressure of greater than 0.5 bar. If the pressure/volume relationship is less than 250 bar/litres, then the following regulations will apply:

- Regulation 7 - Safe operating limits
- Regulation 11 - Operation
- Regulation 12 - Maintenance
- Regulation 15 - Precautions to prevent pressurisation of certain vessels (user only)

If the pressure/volume relationship is



greater than 250 bar/litres, then the following additional regulations will also apply:

- Regulation 8 - Written scheme of examination (WSE)
- Regulation 9 - Examination in accordance with the written scheme
- Regulation 10 - Action in case of imminent danger
- Regulation 11 - Operation
- Regulation 12 - Maintenance
- Regulation 14 - Keeping of records etc.

It is Regulation 8 about the Written Scheme of Examination (WSE) that generates the most interest and unfortunately confusion, so it is worth exploring it in greater depth.

Competent person

The PSSR stipulates that a 'competent person' must certify the WSE, albeit any suitably competent and experienced engineer can draw up the content.

In this respect the guidance for a

competent person is that they should be qualified to at least Chartered or Incorporated Engineer, with practical and theoretical knowledge and actual experience of the relevant systems. They must also have access to specialist services, effective support and professional expertise within their organisation and proper standards of professional probity.

It should be noted that these qualification criteria are for guidance only; if an appropriately experienced engineer meets the requirements then there is nothing in the legislation to prevent this person from carrying out the duties of a competent person. You must be aware however that enforcement agencies and/or the courts could test this suitability if any legal action is taken.

A competent person must also carry out the WSE (Regulation 9). They should have sufficient practical and theoretical knowledge and actual experience of the type of system under examination to identify defects or weaknesses and assess their significance in terms of the

equipment's integrity and safety.

User's/owner's responsibility

Another aspect of the PSSR that is often misunderstood is that it remains the user's/owner's responsibility to ensure compliance with the PSSR as detailed below:

- The user of an installed system and owner of a mobile system shall not operate the system or allow it to be operated unless he has a written scheme for the periodic examination, by a competent person, of the following parts of the system:

- all protective devices;
- every pressure vessel and every pipeline in which (in either case) a defect may give rise to danger; and
- those parts of the pipework in which a defect may give rise to danger, and such parts of the system shall be identified in the scheme.

- The said user or owner shall:

- ensure that the scheme has been drawn up, or certified as being suitable, by a competent person;
- the content of the scheme is reviewed at appropriate intervals by a competent person for the purpose of determining whether it is suitable in current conditions of use of the system; and the content of the scheme is modified in accordance with any recommendations made by that competent person arising out of that review.

So to summarise who is responsible for what:

The user/owner ensures that the scope of the scheme is appropriate i.e. which parts of the system are covered (with advice, if necessary, from a suitably experienced adviser); and the competent person specifies the nature and frequency of examinations and any special measures needed to prepare the system for safe examination.

Safe operating limits

The owner/user also has responsibilities for Regulation 7 of the PSSR about its 'safe operating limits.'

Specifically, the user of an installed system and owner of a mobile system shall not operate the system or allow it to be operated unless they have established the safe operating limits of that system. The

owner of a mobile system shall, if they are not also the user of it, supply the user with a written statement specifying the safe operating limits of that system or ensure that the system is legibly and durably marked with such safe operating limits and that the mark is clearly visible.

This regulation complements regulation 5, which makes the designer, manufacturer and supplier responsible for providing adequate information about the system or its component parts. It prohibits the user/owner from operating the system, or allowing its operation, before establishing its safe operating limits.

BCAS' second most frequently asked question is related to the first:

Q. What do I do as the competent examiner if I find that there is a situation that may give rise to imminent danger?

In answer to this, the PSSR regulations state

that the examiner must make a written report identifying the system and specifying the repairs, modifications or changes concerned and give it to the user or owner.

The competent person must also send a written report containing the same particulars to the local enforcing authority for the premises where the pressure system is situated, within 14 days of completing the examination.

It is then up to the owner/user to ensure that the system (or if the report only affects a discrete part of the system, that part) is not operated until the repairs, modifications or changes have been made.

The PSSR is a complex piece of legislation and clearly cannot be dealt with in one article. Its main aim however is clear – to prevent serious injury as a result of the failure of a pressure system or one of its component parts. By complying you ensure that your compressed air system is safe and fit for purpose.

Further advice can be found on the HSE website at: <http://www.hse.gov.uk/pubns/priced/l122.pdf>

The full text of the PSSR can be found at: http://www.legislation.gov.uk/ukxi/2000/128/pdfs/ukxi_20000128_en.pdf

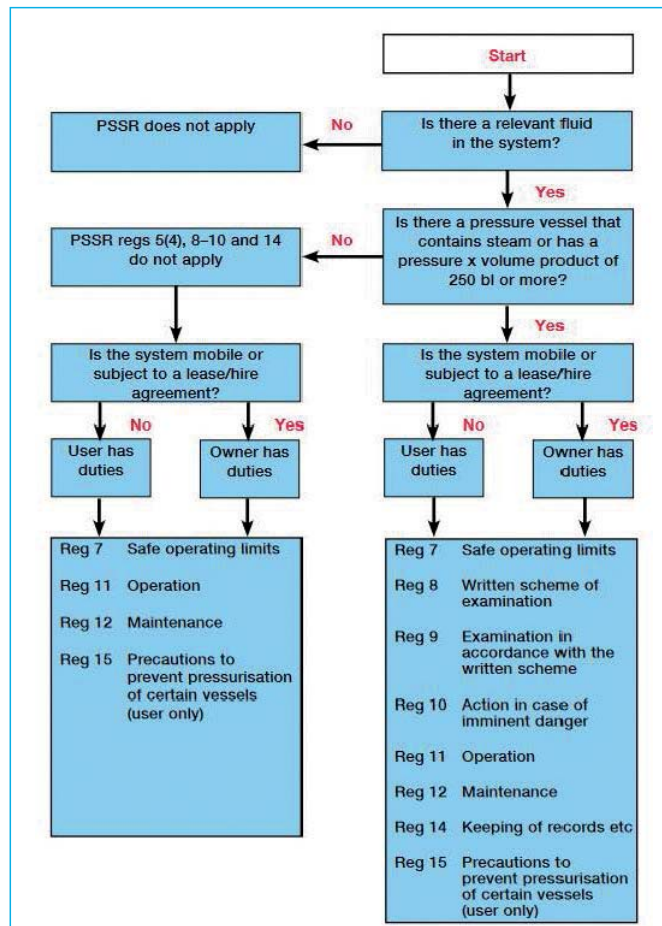


Fig 1. Decision tree showing how Pressure System Safety Regulations apply to equipment. (Reproduced from the HSE website)



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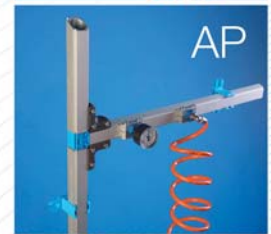
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Are you competent?

There is frequent confusion over what constitutes a 'Competent Person' in the context of the Pressure Systems Safety Regulations 2000. It is important to understand this term correctly in order to comply with the law states. BCAS reports.

The Approved Code of Practice 2014 (ACOP), Clause 98, identifies pressure systems in three categories - minor, intermediate and major. The vast majority of compressed air systems fall into the minor category. The information given here relates to this categorisation. The ACOP, Clause 32, describes in general terms the requirements for a 'Competent Person' acting across all pressure systems' categories.

The term 'Competent Person' is defined in Regulation 2 as a legal meaning. Guidance for Clause 10 clarifies that the employer of the 'Competent Person' has the responsibility for the activity unless the person is self-employed. The ACOP, Clause 28, states that the term 'Competent Person' is used in connection with two distinct functions:

- a. Drawing up and certifying a written scheme (Regulation 8).
- b. Carrying out examinations under the scheme (Regulation 9).

These two distinct functions can be fulfilled by one person, although the qualifications and responsibilities for both have different but complementary knowledge and skills.

The ACOP, Clause 30, indicates that, "In some cases, the necessary expertise will lie within the user's/owner's own organisation (but see paragraph 33 for guidance on independence)." However, most companies will not have the staff or expertise to be able to perform this function successfully. As stated, paragraph 33 should be read for full understanding.

Drawing up and certifying written schemes

There are two aspects to producing a written scheme:

- a. Drawing up / revising the written scheme – these can be done by anyone having sufficient understanding of compressed air systems.
- b. Certifying the written scheme – the Guidance, Clause 94 states "Where the written scheme of examination is written by someone other than a competent person, it must be certified as suitable by a competent person." Guidance, Clause 99 (a)(i) identifies that someone of Incorporated Engineer level is a suitable qualification for a minor system.

Examination under the written scheme

The 'Competent Person' performing examinations may be different to that person certifying the written scheme and does not need to have the same level of qualification, i.e. Incorporated Engineer. The ACOP, Clause 124, indicates the knowledge and skills level required, "The competent person should have sufficient practical and theoretical knowledge and actual experience of the type of system under examination to enable defects or weaknesses to be identified and an assessment made of their significance in terms of the integrity and safety of the equipment."

Skills and training

No single training course will make someone competent. Each relevant course can contribute to competence. For example, the BCAS Competent Examiner course does provide instruction and training to support examination activities, but does not provide for the role of Competent Person to certify written schemes.

You should remember that only the courts can give an authoritative interpretation of law as to whether any person or organisation is actually a "Competent Person." In the event of an accident, the competence of the relevant individual(s) will ultimately be determined in a court of law.

The Approved Code of Practice and guidance for Pressure Systems Safety Regulations 2000 can be downloaded free from the HSE Website and should be read to gain full understanding of this topic. For more detail on becoming an Incorporated or Chartered Engineer visit the Engineering Council website.



Don't compromise on safety

For manufacturers across the UK, compressed air is just as important as gas and electricity – and yet this utility doesn't receive the same amount of focus. BCAS explains why end-users could be compromising safety.

Compressed air is regarded as industry's fourth utility, but, despite it being a vital part of the manufacturing process, when it comes to safety on the shop floor it largely remains unconsidered, or even forgotten.

While the risks that gas and electricity pose are widely publicised, understood and prepared for, anecdotal evidence suggests that the same cannot be said of compressed air. For example, we still hear of employees using it to dust off machinery, work-benches and their clothes – even though if it penetrated the skin and entered the bloodstream a fatal air bubble could reach the heart or lungs. And, as compressed air travels at a phenomenal speed, if it hits an eye or an ear it may lead to blindness or loss of hearing respectively.

And just like other pieces of industrial equipment, the compressor itself needs to be installed and maintained correctly to ensure it operates safely. If a compressed air system isn't properly and regularly maintained it could end up posing a danger (and of course won't perform correctly or efficiently either). In very extreme cases a poorly maintained compressor might even catch fire or explode.

This is why every compressed air system, virtually without exception, should have a Written Scheme of Examination in place, which the system should be regularly inspected in accordance with.

Written Schemes of Examination are a legal requirement under the Pressure Systems Safety Regulations 2000. The document contains a wide range of information, including the parts of the system that need to be examined, the nature of the examination required, the preparatory work needed and the maximum interval allowed between examinations.

The worry is that many businesses



running compressed air systems either ignore this or are simply not aware of it, even though it's been in place for over 14 years. There is a potential fine of up to £20,000 for not having a Written Scheme of Examination – but no one seems to really police it.

Noise levels from a compressor are also worth checking to ensure employees aren't adversely affected. All compressor manufacturers have to state the noise levels of their machines in accordance to international standards, with the current one being EN ISO 2151:2008.

There is continuing concern that despite the risks, there are currently no formal accreditation schemes for engineers designing, installing and maintaining compressed air systems – so some end users could well be receiving poor advice, and safety could be being compromised.

BCAS offers four courses – Safe Working with Compressed Air, a Certificate in Compressed Air System Technology, the Diploma in Compressed Air Management and a Competent Examiner course for those involved in carrying out examinations in accordance with Written Schemes of

Examination. However, these are voluntary.

BCAS would like to see the introduction of a recognised training programme and an official accreditation scheme for service engineers working on compressed air systems, and for those involved in design and installation. We would even go so far as to suggest that we need something similar to the Gas Safe Register that is in place for installers working with gas appliances, so that only people with proven competence can install and maintain compressed air systems.

In the absence of formal accreditation there are some voluntary schemes that end users can look out for when assessing compressed air companies, which can help them to choose a professional supplier or maintenance contractor.

For example, companies working in the compressed air industry can demonstrate their professionalism and competence as well as their commitment to health and safety and best practice by joining BCAS. Memberships is by peer review and members have to adhere to its codes of conduct, and can choose to proactively participate in the BCAS AirSAFE register, which promotes the credibility and professionalism of BCAS members as identified via customer feedback.

Compressors and the air they generate can pose health and safety hazards, just as other machinery and gas and electricity can, and the potential risks must be taken seriously. Compressed air must always be used with care – and only for legitimate purposes – and it is advisable for end-users to check that they have a Written Scheme of Examination in place and that the companies they use to design, supply, install and maintain their compressed air systems can prove they are reputable and professional, and that they have the necessary competencies.

Inspiring a new generation

Aaron Blutstein spoke to Susan Scurlock, CEO of Primary Engineer, about the organisation she created to encourage young people to consider careers in STEM related professions.

Meeting Susan was an inspiring experience. Her story is one we can all perhaps identify with – that of trying to help inspire the next generation. Most involved in UK manufacturing and engineering are only too readily aware of this need.

As a child, Susan wanted to become an engineer, but she explains she couldn't because of stereotypical gender pressures from her father. Eventually she became a secondary school teacher (the other option being a nurse), and also worked as a graphic designer for a long period. Nothing out of the ordinary at the moment, but her story becomes inspiring because despite not pursuing her childhood dream of becoming an engineer, the dream never left her, and it's what comes next that gets interesting.

The brainchild of Susan began in 2005, when Primary Engineers was established. It came about when she had the opportunity for DTI funding for people who had ideas about how to encourage more engineers. Susan explained: "I made an application, it was successful and we received three years worth of funding. Which meant I had to actually bite my lip, put my money where my mouth was and stop teaching, give up my career and start Primary Engineer (PE)."

Her eventual creation of what is now Primary Engineer and Secondary Engineer was born out of a belief that if children knew the structures and support mechanisms from organisations such as the IMechE, BCAS, BFPA, and EEF were in place when they left school, they would surely want to be part of it. She believes these organisations really do want to help and support, adding that once you're on the radar, it's quite straight forward. Therefore she came up with the idea of the Institution of Primary Engineers, and the Institution of Secondary Engineers. She created two

professional engineering institutions for children so that they could look at the skills they were accumulating from all these different sources, recognise them and build on them in the same way you would do if you were going for Chartership or going to be an Eng Tech or an Incorporated Engineer. She built two structures in a similar way.

Ultimately the PE and SE are designed to encourage both girls and boys to aspire to become designers and makers from a very early age. The engineers of the future. The very career that Susan would have loved to have had the opportunity to pursue.

PE's main supporter for the last five years has been the IMechE – which Susan says "has been extraordinarily supportive and generous with us. They've given us a foundation to be able to do all we do".

In the beginning...

The task of creating PE, has been a long and difficult one, explains Susan. She believes that many engineers have a tendency to look at things and think there's something wrong so we can mend it. They don't necessarily look at the options that are out there.

She explains: "There are a lot of people and organisations that exist that think they have the solution, so you have to have one that is unique to survive within this type of field."

When PE started, the idea was looking at teachers not children. Because, as Susan explains, if you actually look at the biggest influencer – it's the teacher: "If they don't teach maths or science, if they don't talk about engineering, if they don't have that conversation with the child then that child will never get to know that that opportunity exists."

So right from the beginning PE took a different approach and concentrated on the teachers rather than the children, knowing

that's where it would end up - with the children. The original plan was always to train teachers to deliver practical maths and science to technology.

Susan explains that PE design the projects, the resource, the teacher training, and then delivers it out to schools: "We normally have around about 15- 20 schools on anyone course and we try and link each of the schools up with an engineer so the engineer comes on the course with the teachers and does the same activities and then we'll go back into the schools at some later date and work alongside the kids but not as the teacher – but as the expert in the room.

She adds: "We also recognise that engineers have a limited amount of time so the idea of engineers designing something to take into a school that they don't know is going to work or be relevant or being pitched right is potentially a bigger waste of their time than actually fronting up to a programme that is established within the curriculum that they know they can support, so the time is given to the kids rather than thinking about what you could do with them."

Susan also emphasises that PE doesn't have a problem with socio-economic backgrounds. She explains: "I think if I'm honest, the PE programme is a leveller. Because schools where there are issues with pupils, be it behavioural or attainment, quite often those children will engage infinitely more with practical based activities, and because it suits, because there are the engineer contexts, because there are all these different elements to it we are seeing a major impact in these types of schools and they share their knowledge. We are not an activity that works with the usual suspects. It's wholly inclusive of everybody in the school, and whichever school wants to be involved is



involved. Occasionally we find councils will suggest a particular area because they never get these types of opportunities.”

Honing young skills

Susan highlights the importance the PE programme places on honing the kids’ skills year in and year out and building on them. She explains: “With the English curriculum there is a vehicles project in primary schools so we have children that in years one and two (five and six year olds) design box modelled vehicles that have to run in straight lines for as long as a distance as possible. Then in years 5 and 6, the children would then use gearing systems, build electric circuits and then control them to do other activities.

“In between that you have other activities – we have a 3D printing project, we also have a scratch programme in lifting and lowering devices, paper engineering, so there is a whole range of things they can do.”

Each time, she says, the kids are building on their new skills.

However Susan warns: “One of the biggest challenges to children thinking can they can become an engineer is that they have to engage in engineering regularly – it has to be a part of the curriculum. We don’t teach engineering as such in primary schools. But we do teach maths and science. We do teach technology and there is no greater way of learning than applying theory to a practical task, so that you’re actually thinking about that application. And that’s what we try to do with engineering, is to bring together those vital parts of the curriculum in a practical way. In addition, if you also have an engineer enthusing about what it is to be an engineer then it really is magical to watch it in a classroom.”

BCAS

The growing involvement of the British Compressed Air Society (BCAS) with PE/SE,

has made Susan aware that BCAS perceives its area of expertise as an unrecognised field. She commented: “I think in Rogers Knights’ memorial programme at his funeral service it said: ‘An inspirational man in a hidden world’. What this highlights is that compressed air is not known or understood to many outside of the industry. It is this scenario that PE can help by trying to raise the profile of the engineering diversity that children can get involved in, while fitting it to what they already do in the curriculum.”

BCAS is now involved with Primary Engineer on different levels, growing both in terms of projects and industry support. Most recently there was a desire by BCAS to celebrate an important figure within the Compressed Air industry – Rogers Knight, who died at 99. BCAS felt it was befitting for the industry to have an award in his memory – The Rogers Knight Inspiration Award. Susan explains she was invited to London late last year, and was presented with the Award. She commented: “We thought this was fabulous. We took it back to the office and put it in the middle of the table and said what are we going to do with it then? We had a few ideas and put them to BCAS. After some discussions, we came back excited. BCAS gave us its approval to ask children: ‘So you’ve had an engineer visit, is he or she worth nominating for an award for being an inspirational character?’ “We’ll have a nomination form that the teacher will fill in with a few quotes from the children and nominate their engineer for the Rogers Knight Inspiration Award. That means we would get quotes from children as to the value of the engineers they’ve spoken to. Each engineer that has been nominated would get a certificate showing that they’ve been nominated, and then Award it to the best engineer.”

Susan believes this is both a befitting memorial for Rogers Knight and a great

opportunity for the Compressed Air industry to engage with children.

Convincing industry

Ten years on from having launched Primary Engineer, Susan believes industry is more and more completely convinced that the aims of the Institution are what they should be doing.

A common problem she is often faced with though, is usually to do with engineers being busy - so trying to get them out is sometimes an issue. Other than this, she continues, PE/SE are finding companies very keen: “They realise that if you are going to influence somebody’s decision making about whether to become an engineer or whether to work in STEM, or to engage in maths, it happens in primary school. So the more engineering in primary education the better.”

She adds: “If dialogue is created between professionals and schools in a meaningful manner it will change. Because children will start to ask questions about what it is to do different things. I think industry has to be increasingly open to the idea that every now and then they’re going to have to have an open day and let parents and children walk around their factory. It makes a major difference if there’s a community spirit.

“Where we work in Burnley is an extraordinary place – the council is so proactive and supportive. The amount of engineering that is going on there – the amount of enthusiasm for the schools to do well and to support our programme and for the community as a whole to recognise the potential for their children – I’ve never seen anything like it. These are ripples that if they come about can make a dramatic change.”

Susan concludes by stating concisely what she would like to change: “Ultimately I’d like to see engineering embedded within the curriculums of primary schools. I think that will change everything.”

Although Susan never achieved her childhood dream of becoming an engineer, her drive to help inspire a new generation of young engineers by giving them the opportunity to explore the designer and maker in them, is quite simply profound for UK manufacturing and engineering. A lot still has to be done, but the roadmap she has created is one we can all identify with, and one we can build on.

For further information, please visit:
www.primaryengineer.com

Air-Tech powers up for 2018

The biennial Air-Tech Exhibition, co-located alongside; Smart Industry Expo, Fluid Power & Systems, Drives & Controls, and Plant and Asset Management, is once again set to return to Birmingham's NEC from 10-12th April 2018, alongside MACH 2018. Collectively the exhibitions will be the largest manufacturing and engineering events of 2018.

Air-Tech 2018 is set to highlight current key themes related to the very latest in air compressor and related technology from companies from around the globe.

The event is supported by the British Compressed Air Society (BCAS), and is the UK's only dedicated event for the compressed air and generators market. Some of the range of products and services on show at Air-Tech 2018 from leading names in the industry, will include:

- Accumulators, actuators, air delivery systems and air motors.
- Compressors, cooler tools and cylinders.
- Vacuum and generators.
- Displays & meters.
- Filters, fittings, heat exchangers and hoses.
- Instruments, lubricators, manifolds and mobile compressors.
- Pumps, regulators, sensors, software and valves.

* Smart compressed air technology

Ideal opportunity

Vanda Jones, Executive Director of BCAS, said: "As the UK's only dedicated exhibition for the compressed air, generators and vacuum market, Air-Tech is an ideal chance for visitors to keep up to date with all the latest developments in our industry. For BCAS it is an ideal opportunity to engage with manufacturers, distributors and end users alike and for us to provide impartial advice about legislation, standards and technical issues.

"Events like Air-Tech are more vital than ever over the next two years because it brings our industry together to understand issues that affect us all such as Brexit. Our stand is an impartial space where people can come together and have their say. This



is important because BCAS represents every level in the compressed air supply chain and provides a powerful lobbying voice alongside other trade associations. It is vital that we understand what your needs are and put our case to those who will help shape our future if we are to minimise any consequences and make the most of the opportunities."

The Knowledge Hub – located in the heart of the 2018 co-location of events and sponsored by Gardner Denver - will take the highly respected free seminar and conference programme to a different level. The independent structure of the Knowledge Hub programme will provide visitors with a unique learning experience with one of the most comprehensive and respected speaker programmes of 2018. The theme of this year's conference programme is 'Smart Factory – from concept to reality, the journey to a smart future'.

The Knowledge Hub will bring together a range of leading experts on 4IR to understand the journey to a smart factory, from concept through to implementation.

Seminars will focus on smart technology, strategy, solutions and entrepreneurship, as well as skills, regulations, the environment, and safety.

Global initiatives and the technological paradigm shift associated with the Industrial Internet of Things, shows that there is a growing opportunity for industry to take advantage of the creativity and entrepreneurial nature of UK companies. The Knowledge Hub fully reflects this and will provide a fascinating insight into the potential plants of the future.



Co-located exhibitions

Air-Tech will be co-located with Smart Industry Expo, Fluid Power & Systems, Drives and Controls, Plant & Asset Management, and MACH. Collectively, the exhibitions attract over 40,000 visitors to the NEC over the duration.

For free registration and further information on exhibiting companies and full seminar details, please visit:
www.airtech-expo.com

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 <p>A & B Air Systems Ltd Unit 21- 27 Abenbury Way, Wrexham Industrial Estate, Wrexham, LL13 9UZ, UK Tel: 01978 661999 E: kevin@aandbairsystems.co.uk W: www.aandbairsystems.co.uk</p>	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
 <p>A C L Engineering Ltd Anglia House, Sandown Road, Watford, Hertfordshire, WD24 7UA, UK Tel: 01923 249444 Fax: 01923 424368 E: aclinfo@aclengineering.co.uk W: www.aclengineering.co.uk</p>	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<p>A E Industrial & Air Equipment Ltd Hardwick House (Head Office), 191 Chatsworth Road, Chesterfield, Derbyshire, S40 2BD, UK Tel: 01246 274358 Fax: 01246 233810 E: info@air-equipment.co.uk W: www.aeindustrial.co.uk</p>	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
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BRE Ltd

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Cambs Compressors

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W: www.cattaniesam.co.uk

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Ceccato

Unit 5 Westway 21, Chesford Grange,
Warrington, Cheshire, WA1 4SZ, UK
Tel: 01925 817803 Fax: 01925 850186
E: contact.uk@airwco.com
W: www.ceccato-compressors.com

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Central Compressor Services Ltd

38 Burrowfield, Welwyn Garden City,
Hertfordshire, AL7 4SR, UK
Tel: 01707 390888 Fax: 01707 390548
E: enquiries@ccslimited.com
W: www.ccslimited.com

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Chelmer Pneumatics & Compressors Ltd

Chelmer House, Bellcroft, Eastways Ind. Estate,
Witham, Essex, CM8 3YU, UK
Tel: 01376 500595 Fax: 01376 501589
E: info@chelmerpneumatics.com
W: http://www.chelmerpneumatics.com/



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Chelmer Pneumatics & Compressors Ltd is the premier compressed air distributor in East Anglia, the South East and London areas, with Service Engineers operating from modern offices and workshops in Witham and Welwyn Garden City.

Established in 1988, Chelmer Pneumatics & Compressors (CPC) is a successful family business that has grown from a supplier of pneumatic control equipment and systems into a major provider, designer and installer of complete compressed air systems.

Operating from prestigious premises' CPC has worked hard to earn and maintain a reputation for quality and reliability whilst providing compressed air equipment and services to an established customer base across a diverse range of applications.

Ensuring the best possible products and solutions for customers is of paramount importance to CPC. With an integrated approach based on value and service, our partnership with our industry leading manufacturers provides access to the most efficient and reliable compressed air systems available, and a technical and after sales support infrastructure that is unrivalled.

CPC's Sales and Service Support structure ensure we provide a service that is second to none, allowing our customers to focus on the efficiency and profitability of their own businesses.

CPC provide complete design, supply, installation and service packages for compressed air and Nitrogen generation, ranging from 2.2kW to 450kW, Fixed-speed, Variable-speed, Oil lubricated and Oil-Free.

- **Site Surveys & Energy Audits**
- **Skid Mounted & Containerised Packages available**
- **Pipework Division - Installations in Modular Aluminium, Steel, Plastic, Stainless Steel & Copper etc**
- **Compressor Hire Division - Long & Short Term Hire - Tailored Packages**
- **Compressed Air Leak Detection Surveys**
- **Service Division - Service & Maintenance programmes for all makes of compressed air equipment**
- **Extensive Stocks of New & Used Equipment**
- **Wide Range of Air Treatment Equipment**

CPC provide solutions for compressed air, nitrogen and vacuum generation.



Head office: Witham, Essex.



Office: Welwyn Garden City, Hertfordshire.



Air Compressors



Installation & Service



Air Treatment



Pipework



Pneumatics




Air Tools & Accessories

Head office:
Chelmer House
Bellcroft, Eastways Industrial Estate
Witham, Essex CM8 3YU
T: 01376 500595 • F: 01376 501589

Hertfordshire office:
16 Woodfield Road
Welwyn Garden City
Hertfordshire AL7 1JQ
T: 01707 376699 • F: 01707 324949







BCAS MEMBERS

	Air Treatment / Filters	Blowers	Condensate Systems	Cooling & Heat Technology	Dryers	Education and Training	Generators	Hose & Fittings	Industrial Compressors	Lubricants	Maintenance, Repair and Services	Mobile Compressors	Pipework & Ducting	Pneumatic Control & Air Treatment	Pressure Equipment	Process Compressors	Sensors & Switches	Systems	Tools	Vacuum Technology	Manufacturer	Distributor
 <p>Compressor Services (East Midlands) Ltd Unit 16 Ecclesbourne Park, Clover Nook Road, Alfreton, Derbyshire, DE55 4RF, UK Tel: 0845 8390714 Fax: 01733 546646 E: info@compressor-services.co.uk W: www.compressor-services.co.uk</p>	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<p>CPA Engineered Solutions Ltd Calderhead Road, Shotts, Lanarkshire, ML7 4EQ, UK Tel: 01501 825024 Fax: 01501 825029 E: cpa@cpa-group.co W: www.cpa-group.com</p>	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<p>D & F Techniek B.V. 1 Evergembaan 1 5121 DRIRijen, Netherlands Tel: +31 (0)161 453098 E: rb@dftechniek.nl W: https://www.dftechniek.co.uk/</p>				•									•	•		•	•			•	•	
<p>DBG (UK) Ltd Norfolk House, Bostock Road, Winsford, Cheshire, CW7 3BD, UK W: http://www.thedbg.co.uk</p>																						•
<p>DentalAir Services UK Ltd 15 Sovereign Enterprise Park, Salford Quays, Manchester, M50 3UP, UK Tel: 0800 975 7530 E: info@dentalair.com W: www.dentalair.com</p>	•				•						•	•	•	•	•	•	•					•
<p>Desoutter Unit 4 Zodiac, Boundary Way, Hemel Hempstead, Hertfordshire, HP2 7SJ, UK Tel: 01442 838999 Fax: 01442 838989 E: des.ukinfo@desouttertools.com W: www.desouttertools.com</p>																			•		•	
<p>Direct Air & Pipework Ltd Unit 38 Heral Way, Binley Industrial Estate, Coventry, Warwickshire, CV3 2RQ, UK Tel: 024 7668 8890 Fax: 024 7668 8977 E: info@directair.co.uk W: www.directair.co.uk</p>	•		•		•				•				•	•					•			•
<p>Donaldson Filtration (GB) Ltd Humberstone Lane, Thurmaston, Leicestershire, LE4 8HP, UK Tel: 0116 2564660 Fax: 0116 2696454 E: capuk@donaldson.com W: www.donaldson.com</p>	•		•		•	•					•								•			•






BCAS MEMBERS

	Air Treatment / Filters	Blowers	Condensate Systems	Cooling & Heat Technology	Dryers	Education and Training	Generators	Hose & Fittings	Industrial Compressors	Lubricants	Maintenance, Repair and Services	Mobile Compressors	Pipework & Ducting	Pneumatic Control & Air Treatment	Pressure Equipment	Process Compressors	Sensors & Switches	Systems	Tools	Vacuum Technology	Manufacturer	Distributor
																						
Doosan Trading Ltd Unit 20 Meadowcroft Way, Commerce Park, Leigh, Lancashire, WN7 3XZ, UK Tel: 01942 266900 Fax: 01942 266881 E: leslie.williams@doosan.com W: www.doosanportablepower.com							•		•			•						•		•		•
Dürr Technik (UK) Ltd Unit 13 The Industrial Quarter, Bath Business Park, Foxcote Avenue, Peasedown St John, Bath, Avon, BA2 8SF, UK Tel: 01761 422944 Fax: 01761 420895 E: office@durrtechnik.co.uk W: www.durrtechnik.co.uk									•		•	•				•				•		•
Edwards Ltd Innovation Drive, Burgess Hill, West Sussex, RH15 9TW, UK Tel: 01293 603451 Fax: 01293 534149 E: Uksales@edwardsvacuum.com W: www.edwardsvacuum.com																					•	•
ENGIE FM Europa Link, Sheffield Business Park, Sheffield, South Yorkshire, S9 1XU, UK Tel: 0114 280 0009 Fax: 0114 280 0082 E: stuart.wilcox@cofely-gdfsuez.com W: www.cofely.co.uk				•							•											•
Epiroc Ltd Swallowdale Lane, Hemel Hempstead, Hertfordshire, HP2 7EA, UK Tel: 01442 222394 E: ac.cmtuk@uk.atlascopco.com W: www.atlascopco.co.uk							•					•								•		•
Factair Ltd 49 Boss Hall Road, Ipswich, Suffolk, IP1 5BN, UK Tel: 01473 746400 Fax: 01473 747123 E: enquiries@factair.co.uk W: www.factair.co.uk	•							•	•		•	•	•	•	•	•	•	•	•			•
																						
Filter Integrity Ltd NETpark Incubator, Thomas Wright Way, Sedgefield, Co.Durham, TS21 3FD, UK Tel: 01740 625509 Fax: 01293 534149 E: info@filterintegrity.com W: www.filterintegrity.com							•						•									•
																						
Flowtechnology UK Ltd Pimbo Road, Skelmersdale, WN8 9RB, UK Tel: 01695 52780 Fax: 0800 2987230 E: sales@flowtechnologyuk.com W: www.flowtechnologyuk.com	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
																						

BCAS MEMBERS

	Air Treatment / Filters	Blowers	Condensate Systems	Cooling & Heat Technology	Dryers	Education and Training	Generators	Hose & Fittings	Industrial Compressors	Lubricants	Maintenance, Repair and Services	Mobile Compressors	Pipework & Ducting	Pneumatic Control & Air Treatment	Pressure Equipment	Process Compressors	Sensors & Switches	Systems	Tools	Vacuum Technology	Manufacturer	Distributor	
Gardner Denver FPS Air Compressors Ltd Unit 5, Tower Estate, Warpsgrove Lane, Chalgrove ,Oxfordshire, OX44 7XZ, UK Tel: 01865 892620 Fax: 01844 390955 E: sales@fps-compressors.co.uk W: www.fps-compressors.co.uk 																							
FS-Elliott LCC 3.02 Network House, Basing View, Basingstoke, Hampshire, RG21 4HG, UK Tel: 01256 341 890 Fax: 01256 358 259 E: wcollett@fs-elliott.com W: http://www.fs-elliott.com																							
Gardner Denver Ltd PO Box 178, Claybrook Drive, Washford Industrial Estate, Redditch, West Midlands, B98 0DS, UK Tel: 01527 838494 Fax: 01527 527229 E: sales.gddrum@gardnerdenver.com W: www.gardnerdenver.com 																							
Gast Group Ltd Unit 11, The IO Centre, Nash Road, Redditch, Worcestershire, B98 7AS, UK Tel: 01527 504040 Fax: 01527 525262 E: gastgroup.uk@idexcorp.com W: www.gastmfg.com																							
GDM Cooler Manufacturing Ltd Boston Industrial Estate, Power Station Road, Rugeley, Staffordshire, WS15 2HS, UK Tel: 01889 574880 Fax: 01889 575074 E: sales@gdmcoolers.co.uk W: http://www.gdmcoolers.co.uk																							
Gemco Services Ltd Brearley Works, Burnley Road, Luddendenfoot Halifax, West Yorkshire, HX2 6JB, UK Tel: 01422 888100 Fax: 01422 884071 E: service@gemco.co.uk W: www.gemco.co.uk																							
Glaston Compressor Services Ltd Greenhey Place, East Gillibrands, Skelmersdale, Lancashire, WN8 9SA, UK Tel: 01695 51010 Fax: 01695 50055 E: info@glaston.com W: www.glaston.com																							
Grant Services (Worc's) Ltd Unit 3, Silver Birches Business Park, Aston Road, Bromsgrove, Worcestershire, WR98US, UK Tel: 01527 882266 Fax: 01527 882277 E: sales@grantswl.co.uk W: www.grantswl.co.uk																							

BCAS MEMBERS

	Air Treatment / Filters	Blowers	Condensate Systems	Cooling & Heat Technology	Dryers	Education and Training	Generators	Hose & Fittings	Industrial Compressors	Lubricants	Maintenance, Repair and Services	Mobile Compressors	Pipework & Ducting	Pneumatic Control & Air Treatment	Pressure Equipment	Process Compressors	Sensors & Switches	Systems	Tools	Vacuum Technology	Manufacturer	Distributor	
 <p>Griffin Air Ltd 12 North Avenue, Clydebank Business Park, Glasgow, G81 2QP, UK Tel: 0141 951 4424 Fax: 0141 951 4425 E: info@gas4air.co.uk W: www.gas4air.co.uk</p>	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
 <p>H & M Compressors & Pumps Ltd Unit B Enterprise Centre, Paycocke Road, Basildon, Basildon, Essex, SS14 3DY, UK Tel: 01268 531288 Fax: 01268 532013 E: sales@hmcompressors.co.uk W: www.hmcompressors.co.uk</p>	•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•				•	
<p>Hague Dental Supplies 1 Graylands Gateway, Langhurstwood Road, Horsham, West Sussex, RH12 4QD, UK Tel: 0800 2985003 Fax: 01306 710480 E: lee@haguedental.com W: www.haguedental.com</p>	•					•		•		•	•	•		•				•	•			•	
 <p>Hertz Kompressoren Ltd Unit 13, Peel Mills Industrial Estate, Chamberhall Street, Bury, Lancashire, BL9 0LU, UK Tel: 0161 764 4160 Fax: 0161 764 2890 E: info@hertz-kompressoren.co.uk W: www.hertz-kompressoren.co.uk</p>	•					•	•	•	•		•	•	•									•	
<p>Hi-Line Industries Ltd 5 Crown Industrial Estate, Oxford Street, Burton Upon Trent, Staffordshire, DE14 3PG, UK Tel: 01283 533377 Fax: 01283 533367 E: enquiries@hilineindustries.com W: www.hilineindustries.com</p>	•	•	•	•	•	•	•	•			•	•	•	•				•				•	•
<p>HPC PLC Victoria Gardens, Burgess Hill, West Sussex, RH15 9RQ, UK Tel: 01444 241671 Fax: 01444 246310 E: info@hpcplc.co.uk W: www.hpccompressors.co.uk</p>	•	•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<p>Indequip Ltd Pimbo Road, Skelmersdale, Lancashire, WN8 9RB, UK Tel: 01744 755177 Fax: 01744 738628 E: sales@indequip.co.uk W: www.indequip.co.uk</p>	•	•	•		•			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<p>Industrial Air Power Ltd Brackla Industrial Estate, Coegnant Close, Bridgend, Mid Glamorgan, CF31 2AW, UK Tel: 01656 658961 Fax: 01656 766832 E: sales@airpower.co.uk W: www.airpower.co.uk</p>	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Hertz Kompressoren/Smart Compressors



Overview

Hertz/Smart is based in Bury, Manchester, offering a wide range of quality air compressors and ancillary equipment – including rotary screw and reciprocating/piston air compressors, refrigerant dryers and in-line filters. A full member of the British Compressed Air Society (BCAS), Hertz/Smart serves customers throughout the whole of the UK and Ireland, covering industrial, marine and mobile markets. All products, together with genuine spare parts, are delivered to the customer either by Hertz/Smart directly, or by a member of its highly experienced networker resellers and distributors within a very short timeline – often within 24 hours of first receiving a sales order. Hertz/Smart and its partners also offer a first-class sales and aftercare service.

Products

- Industrial Air Compressors
- Variable/Inverter Speed Compressors
- Direct Drive Screw
- Marine Compressors
- Low Pressure Compressors
- High Pressure Compressors
- Boosters
- Piston Compressors
- Mobile/Diesel Compressors

Five Year Warranty

Hertz/Smart offers a five-year warranty on major parts on the company's screw compressor range and refrigerant dryers, and a standard 12-month warranty on all

other equipment. For a more comprehensive listing of Hertz/Smart products and all services – including: rotary screw compressors, variable speed screw compressors, VSD direct-driven screw compressors, mobile screw compressors/reciprocating/piston compressors, HC oil-free systems, refrigerant dryers, in-line filters and spare parts – visit the company website at:

www.hertz-kompressoren.co.uk

www.smartcompressors.co.uk

Maintenance, service and support

All Hertz/Smart models are built for a broad range of applications, are easy to maintain and service, and are designed to offer long maintenance intervals and low operating costs. The company ensures that only genuine spare parts and oil are supplied to the customer and, wherever possible, looks to deliver most spare parts to the customer within 24 hours of receiving a sales order. Hertz/Smart also provides reliable support from an expert and friendly team, with the experience and skills to provide excellent technical, sales and after sales support.

Summary

Hertz/Smart offer a full range of air compressors and related products developed by highly trained and experienced designers and engineers. All products are manufactured to the latest ISO and TUV standards and are backed up with reliable support from an expert and friendly team. All compressors and ancillary equipment are

competitively priced, easy to maintain and install, and are designed to be as energy efficient as possible. Hertz/Smart offers full nationwide delivery and support, either directly or via one of its dedicated reseller distributors. You need look nowhere else for your air compressor, dryer and ancillary equipment needs. Contact Hertz/Smart now to discuss your requirements in more detail.

FACT FILE

hertz[®]
KOMPRESSOREN

smart
COMPRESSORS

Hertz Kompressoren UK & Ireland

Unit 13 Peel Mills Industrial Estate
Chamberhall Street, Bury, Manchester
BL9 0LU

Phone: +44 161 764 41 60
Fax: +44 161 764 28 90




E-Mail: info@hertz-kompressoren.co.uk
Website: www.hertz-kompressoren.co.uk

E-Mail: info@smartcompressors.co.uk
Website: www.smartcompressors.co.uk

BCAS MEMBERS

	Air Treatment / Filters	Blowers	Condensate Systems	Cooling & Heat Technology	Dryers	Education and Training	Generators	Hose & Fittings	Industrial Compressors	Lubricants	Maintenance, Repair and Services	Mobile Compressors	Pipework & Ducting	Pneumatic Control & Air Treatment	Pressure Equipment	Process Compressors	Sensors & Switches	Systems	Tools	Vacuum Technology	Manufacturer	Distributor
<p>KERR Compressor Engineers Compressors • Vacuum Pumps • Blowers www.kerrcompressors.co.uk</p>																						
<p>Ingersoll Rand Air Solutions Hibon, Sefton House, Northgate Close, Middlebrook Business Park, Bolton, Lancashire, BL6 6PQ, UK Tel: 01204 479 500 Fax: 01204 479 669 E: ian_pemberton@irco.com W: www.ingersollrandproducts.com </p>		•									•				•						•	•
<p>Ingersoll Rand International Ltd Sefton House, Northgate Close, Middlebrook Business Park, Bolton, Lancashire, BL6 6PQ, UK Tel: 01204 479500 Fax: 01204 479 669 E: hilary_dawes@irco.com W: www.ingersollrandproducts.com </p>	•	•	•		•				•	•	•			•	•	•	•	•	•	•	•	•
<p>J L L Leach & Co Ltd Etruscan Street, Etruria, Stoke on Trent, Staffordshire, ST1 5SE, UK Tel: 01782 202001 Fax: 01782 286868 E: sales@jlleach.com W: www.jlleach.com</p>	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•		•
<p>Kerr Compressor Engineers (E.K.) Ltd 37 Fairfield Place, College Milton, East Kilbride, Glasgow, Lanarkshire, G74 5LP, UK Tel: 01355 248222 Fax: 01355 249274 E: cameron@kerrcompressors.co.uk W: www.kerrcompressors.co.uk </p>	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<p>Kingsdown Compressed Air Ltd Unit 8 Invicta Business Park, London Road, Wrotham, Kent, TN15 7RJ, UK Tel: 01732 884954 Fax: 01732 886135 E: info@kcair.co.uk W: www.kcair.co.uk</p>	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•	•	•		•
<p>LL Fluid Power Unit 31, Enterprise Trading Estate, Pedmore Road, Brierley Hill, West Midlands, DY5 1TX, UK Tel: 01384 880850 Fax: 01384 263 383 E: brierleyhill@thorite.co.uk W: www.thorite.co.uk</p>	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•		•
<p>LMF (Leobersdorfer Maschinenfabrik) UK Ltd Celynnen House, Farm Lane, Tetchill, Shropshire, SY12 9AT, UK Tel: 07930333904 E: euan.mcculloch@lmf.at W: www.lmf.at</p>	•		•	•	•				•	•	•	•	•	•	•		•			•	•	
<p>Lontra Ltd Unit 7, Folly Lane, Napton, Warwickshire, CV47 8NZ, UK Tel: 01926 811102 E: info@lontra.co.uk W: www.lontra.co.uk</p>																						•

BCAS MEMBERS

	Air Treatment / Filters	Blowers	Condensate Systems	Cooling & Heat Technology	Dryers	Education and Training	Generators	Hose & Fittings	Industrial Compressors	Lubricants	Maintenance, Repair and Services	Mobile Compressors	Pipework & Ducting	Pneumatic Control & Air Treatment	Pressure Equipment	Process Compressors	Sensors & Switches	Systems	Tools	Vacuum Technology	Manufacturer	Distributor	
 <p>Mark Compressors UK Unit 5 Westway 21, Chesford Grange, Warrington, Cheshire, WA1 4SZ, UK Tel: 01925 817276 Fax: 01925 850186 E: contact.uk@airwco.com W: http://www.mark-compressors.com</p> 	•		•		•				•	•	•				•	•						•	
<p>Marshall Brewson Ltd Unit 6 Westside Business Park, Estate Road No. 2, Grimsby, DN31 2TG, UK Tel: 01472 359001 Fax: 01472 359954 E: steve@marshallbrewson.co.uk W: www.marshallbrewson.co.uk</p> 	•	•	•		•			•	•		•	•	•	•	•	•	•	•					•
<p>Mattei Compressors Ltd Admington Lane, Admington, Shipston-on-Stour Warwickshire, CV36 4JJ, UK Tel: 01789 450577 Fax: 01789 450698 E: info@mattei.co.uk W: www.mattei.co.uk</p> 	•		•		•	•	•		•	•	•		•					•					•
<p>Maziak Compressor Services Ltd Unit 1 Stanton Close, Finedon Road Ind. Estate, Wellingborough, Northamptonshire, NN8 4HN, UK Tel: 01933 222000 Fax: 01933 222200 E: enquiries@maziak.co.uk W: www.maziak.co.uk</p>	•	•	•		•			•	•		•	•	•	•	•	•	•	•					•
<p>MB Air Systems Ltd 149 Glasgow Road, Wishaw, Lanarkshire, ML2 7QJ, UK Tel: 01698 355711 Fax: 01698 359299 E: wishaw@mbairsystems.co.uk W: www.mbairsystems.co.uk</p>	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<p>MH Pneumatics Manby Hall Business Park, Hall Park Road, Immingham, North East Lincolnshire, Lincolnshire, DN40 2LT, UK Tel: 01469 577678 Fax: 01469 577670 E: sales@mhpneumatics.co.uk W: www.mhpneumatics.co.uk</p> 	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<p>Michell Instruments Ltd 48 Lancaster Way Business Park, Ely, Cambridgeshire, CB6 3NW, UK Tel: 01353 658000 Fax: 01353 658199 E: uk.info@michell.com W: www.michell.com</p>					•				•								•					•	
<p>Mid-Tech (Compressed Air) Ltd Unit B13 Holly Farm Business Park, Honiley, Kenilworth, Warwickshire, CV8 1NP, UK Tel: 0121 275 2787 Fax: 0121 275 2786 E: roy.ke@midtechcompressedair.co.uk W: www.midtechairproducts.co.uk</p>	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Diploma in Compressed Air Management

Flexible Learning

The distance learning paper-based course is completed at the candidates own pace over a period of up to six months.

This entails approximately 50 hours of self-study. Assistance is available via the telephone or email during office hours.

The exam is three hours in duration and can be taken either at your location or at the BCAS London office

Underpinning knowledge of compressed air principles:

This qualification aims to provide a comprehensive technical grounding in the principles of operation, design and maintenance of compressed air systems.

It will also be of value to sales engineers.

The course is relevant to manufacturers, distributors, managers, maintainers and installers of compressed air equipment and systems.

Candidates should either have:

- Minimum HNC Level 3
- Or two years' practical experience at a responsible level

The DipCAM Qualification is accredited by BCAS

Successful candidates will receive a DipCAM Certificate and will be able to add the letters DipCAM after their name.

Fees

BCAS Member Rate
£550 + VAT

Exam Fee
£35 + VAT

Non-member Rate
£1,045 + VAT

Exam Fee
£35 + VAT

Discount Rates
5 to 9 candidates 5%

10 plus candidates
10%

Application form available from the BCAS office **020 7935 2464** or info@bcas.org.uk

Course Content and Structure

1. Overview of Compressed Air Systems

System components; compression principles; discrete and centralised facilities.

2. Storage of Compressed Air

Theory of air storage and auxiliary storage; absolute, atmospheric and gauge pressure definitions; construction, selection and testing of pressure vessels.

3. Compressed Air System Management

'Whole system' approach; system pressure drop; compressors and distribution piping; air treatment and condensate management.

4. Compressor Types

Principle of operation; selection, installation and maintenance of various compressor types.

5. Air Treatment

Commissioning and maintenance of aftercoolers and dryers; operation and selection of filters; selection of lubrication and COSHH compliance.

6. Pressure Regulation and Control

Pressure control devices, including valves, pneumatic actuators and pressure valves; pressure gauges' construction and design

7. Energy Efficient Control

Theory of air storage and auxiliary storage; absolute, atmospheric and gauge pressure definitions; construction, selection and testing of pressure vessels.

8. Pneumatic Control Systems

Flow control devices; safety circuits; ISO 1219 drawing symbols.

9. Safety and Legislation

Safe working practices and safety issues; UK legislation and EU directives; checking compliance; Pressure Systems Safety Regulations.

10. Specific Legislation

The Machines Directive, PUWER; environmental legislation and environmental records - basic principles and compliance.

COMPRESSED AIR AND GAS TREATMENT TECHNOLOGY FOR EVERY FLOW, DEWPOINT, PURITY AND PRESSURE

At Parker, we have created a global engineering company, by engineering value for our customers. We apply our expertise in motion and control technologies within specific fields of excellence, to create market leading solutions.

Parker bring unparalleled expertise in compressed air and gas treatment, as well as vast technical know-how, gained at the sharp end of global manufacturing. We combine technologies, develop systems and collaborate with our customers and distributors to create a positive impact in their industry.



Parker | domnick hunter

Parker | Zander

Parker | Hiross

Across our three brands we offer everything our customers need for effective compressed air and gas treatment, for applications in the industrial plant and equipment, food and beverage and natural resources markets.

By concentrating our expertise around specific technologies, we are able to manufacture award-winning products to the highest quality, in order to deliver the ultimate in performance at every stage in the compressed air and gas treatment process.

Our products are engineered at our European centres of excellence. We're close to the people who use our products. We understand the industries they work in and the issues they face. We have a crystal clear focus on giving our customers what they need to succeed – straightforward product choice, innovative energy-efficient technology, reduced lifetime costs, and enhanced productivity and profitability. All backed by Parker's expert service and support.

PRODUCTIVITY & PROFITABILITY

ENERGY EFFICIENCY

LOWEST TOTAL COST OF OWNERSHIP

To find out more about our solutions in compressed air and gas treatment please contact the Parker UK sales office:

Parker Hannifin

Tachbrook Park Drive,
Warwick CV34 6TU

0800 2727 5374

email: parker.uk@parker.com

www.parker.com





THIS IS PARKER

The Challenge

Helping our partners
maintain their bread and butter

Parker enables its partners to maximise uptime with proven industry leading technology in the field of filtration, separation and purification of compressed air and gas.

These contributions reflect Parker's commitment to the profitability of our customers and to helping solve the world's greatest engineering challenges.

www.parker.com



ENGINEERING YOUR SUCCESS.

BCAS MEMBERS



Air Treatment / Filters	Blowers	Condensate Systems	Cooling & Heat Technology	Dryers	Education and Training	Generators	Hose & Fittings	Industrial Compressors	Lubricants	Maintenance, Repair and Services	Mobile Compressors	Pipework & Ducting	Pneumatic Control & Air Treatment	Pressure Equipment	Process Compressors	Sensors & Switches	Systems	Tools	Vacuum Technology	Manufacturer	Distributor
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Mid-Tech (Air Products) Ltd

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Motivair Compressors Ltd

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Multiquip Doncaster

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Nationwide Air Compressors Ltd

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Next Generation R-Series oil-flooded rotary screw air compressors work to keep you ahead of the competition by providing exceptional reliability and world-class performance. Now available from 200-250 kW, these Next Generation compressors feature advanced single or two-stage airends, delivering up to 10% improved efficiency and 16% greater airflow capacity. Our smart and sophisticated controllers, enhanced package design and long-life consumables extend compressor life and maximize system uptime. Capture the strategic advantage your business demands with Next Generation R-Series oil-flooded rotary screw air compressors. **The intelligence you need — to win.**

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Pennine Pneumatic Services 5-7 Mount Pellon Works, Pellon New Road, Halifax, West Yorkshire, HX1 4UB, UK Tel: 01422 321772 Fax: 01422 342430 E: sales@pennine-pneumatic.co.uk W: www.pennine-pneumatic.co.uk	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•		•
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Two global family-owned companies have been brought together – the Swiss company HAUG Sauer Kompressoren AG, the leading manufacturer of oil-free and gas-tight piston compressors is the latest member of the Sauer Compressors Group. HAUG special compressors complement the Sauer product range perfectly.

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 <p>Quality Assured Industrial Services Ltd Riverside Works, Chambers Street, Hertford, Hertfordshire, SG14 1PL, UK Tel: 01992 553363 Fax: 01992 553035 E: shirley@qaisl.co.uk W: www.qaisl.co.uk</p> 	•		•		•			•	•	•	•		•		•		•					•	
<p>REP Air Services Ltd Unit 23, Monarch Way, Belton Road Trading Estate, Loughborough, Leicestershire, LE11 5XG, UK Tel: 01509 213452 Fax: 01509 212102 E: info@rep-air.com W: www.rep-air.com</p>	•		•		•			•	•	•	•	•	•	•	•	•	•	•	•				•
<p>Rodwell-Bayne Ltd Bentalls, Pipp's Hill Ind. Estate, Basildon, Essex, SS14 3SD, UK Tel: 01268 242000 Fax: 01268 242001 E: sales@rodwell-bayne.com W: www.rodwell-bayne.com</p>	•		•		•			•	•		•	•	•				•						•
<p>Roton Compressor Services Ltd Roton House, Ellen Street, Oldham, Lancashire, OL9 6QR, UK Tel: 0161 6205 107 Fax: 0161 627 1351 E: sales@rotonair.com W: www.rotonair.com</p>	•	•	•		•			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<p>Sauer Compressors UK Unit D Martells Barns, Slough Lane, Ardleigh, Colchester, Essex, CO7 7RU, UK Tel: 01206 233335 Fax: 01206 2333370 E: tim.wix@sauercompressors.co.uk W: http://www.sauercompressors.com/en/</p> 									•		•			•	•								•
<p>Scot Industrial Air 398 Townmill Road, Glasgow, G31 3AR, UK Tel: 0141 556 7301 Fax: 0141 554 4658 E: jim.foley@scot-industrial-air.co.uk W: www.scot-industrial-air.co.uk</p>	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<p>Silicair Dryers Ltd Unit 13, St. George's Industrial Estate, Wilton Road, Camberley, GU15 2QW, UK Tel: 01784 424920 Fax: 01784 229676 E: sales@silicair.co.uk W: www.silicair.co.uk</p> 					•			•					•	•		•						•	
<p>Speck Analytical Ltd Alva Industrial Estate, Alva, Clackmannanshire, FK12 5DQ, UK Tel: 01259 222600 Fax: 01259 222618 E: support@speckanalytical.co.uk W: www.speckanalytical.co.uk</p>								•				•					•						•

Desiccant air dryer packages and engineered solutions

Silicair Dryers Limited now has over 50 years been providing the compressed air industry with air treatment solutions for the removal of contaminants and the provision of a very high quality dry air or inert gas supply.

In more recent years, the focus on customer requirements and more stringent requests for the use of specific equipment has led the Company towards also providing total engineered solutions for numerous industrial process applications, as well as highly complex dryer / filtration / controls instrument air skid packages for the oil / gas and other critical industries. Individual dryers and skid packages manufactured by Silicair Dryers are in use across the World and even after many years of operation, a comprehensive aftermarket technical support and spare parts service is available to provide the equipment operator with assistance throughout the design life of the equipment.

Process Air Dryer Packages for Industry

Silicair Dryers offer product designs from the supply of small flow point of use dryers through to Heatless or Heat Reactivated models catering for larger flow requirements. Silicair Dryers also offer dryers for medium (20-50 barg) and high pressure applications up to 400 bar g. Each dryer is designed and selected based on the individual pressure and flow rate parameters and with a scope of supply to meet the client criteria.

Dryer and filtration solutions are provided to support industries where a high quality supply of dry air is critical to process requirements as in the power generation, pharmaceutical, food and drink or paint spraying applications to name a few. The supply of dryer and filtration packages to the medical and dental industry is a significant area of product supply.

Silicair Dryers is a dedicated design, manufacturing, assembly and supply organisation with a highly experienced team who understand the requirements of the critical industries where these packages are installed and operated.



Instrument Air Dryer Packages and Engineered Solutions

Silicair Dryers has for many years been a leading high quality provider of bespoke engineered Instrument Air drying packages primarily for use within the process or oil and gas sectors for both Offshore and Onshore installations. Each package is individually designed to meet specific client needs with reference to pressure vessel codes, pipework and valve materials plus the specified level of on-board instrumentation to allow for constant monitoring of operation and performance. Package control panels can be provided locally or with interfaces provided to work alongside the client's own control philosophy. As the levels of technical specification and complexity continue to increase, design and selection of the most suitable equipment ensures that client and industry requirements are continually met.

You will note the extremely high level of scope of supply that can be included within these designs and when combined with the supporting project documentation, clients are provided with a thoroughly comprehensive package solution.

For help, assistance and advice on any aspect regarding your compressed air drying activities, whether for an individual dryer requirement or a full dryer / filtration / control skid package, please contact Silicair Dryers for further information.

NEW ADDRESS

SILICAIR DRYERS LTD
UNIT 13, ST. GEORGE'S INDUSTRIAL ESTATE, WILTON ROAD
CAMBERLEY, SURREY TW15 1BF.
Tel: 01784 424920



Company name
Silicair Dryers Ltd

Contact details
 Tel: 01784 424920
 Email: sales@silicair.co.uk
 Web: www.silicair.co.uk

Other products

- In line dryers
- Breathing air packages
- Tank vent dryers
- Medical Air Packages to HTM 02-01
- Engineered dryer / filtration / Control packages

Literature

Information available on all products

Standards
ISO9001: 2008



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SPX Flow Technology Konrad Zuse Strasse 25, Moers, D47745 Dusseldorf, Germany Tel: 07710 125850 Fax: 49284187112 E: steve.martin@spxflow.com W: http://www.spxflow.com 	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
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TESEO®

SINCE 1988

Is your compressed air pipework system leaking money?

Is your compressed air pipework system leaking money?

Teseo UK's goal is to save customers' money by providing a 100% leak-free high flow compressed air delivery system. Robust, safe and versatile enough for the modern marketplace. Too many businesses are reliant on outdated, inefficient pipes and fittings which force compressors to work harder to meet the task. More and more customers are finding that Teseo's hollow bar system (HBS) and aluminium profile (AP) are the answer.

Efficiency Savings

HBS and AP are industry leaders that satisfy efficiency and regulatory requirements. The smooth profiled aluminium tube generates increased energy efficiency thanks to high flow rates that are typically 30% higher than steel products. This equates to a lower pressure drop and overall energy and cost savings compared to traditional galvanised systems from day one. Typically, for every 1 bar reduction in air pressure, 7.5% of compressor power (Kw) can be saved. When combined with correctly sized receivers and an effective pressure control, significant energy savings are easily achievable.

Teseo Innovation

Teseo's robust aluminium extruded piping has an external rectangular section with tee slots making it an attractive and practical solution. A wide selection of angled and straight joints & clamping brackets make this system totally flexible in layout and quick to install.

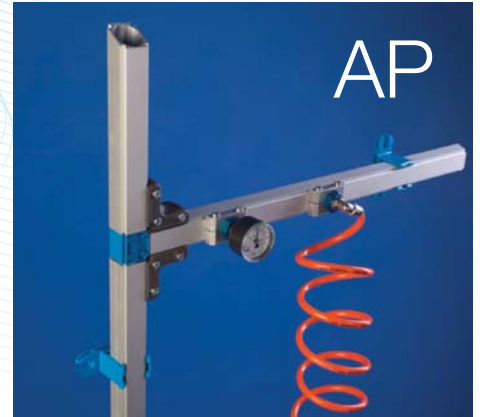
Hot Tapping

Teseo's unique hot tapping system, which allows for live system drilling, means connections to production equipment can be added simply and safely with no system down time or loss of production.

Strong, Safe and Easy to Install

Lighter than traditional steel airlines to install thus reducing stress on buildings and fittings, HBS and AP systems are not lightweight in performance; the internal connection system's configuration makes it the most robust aluminium system available and, unlike other systems, Teseo uses no plastic connectors which are points of weakness in case of fire and makes electrical earthing easy.

Providing an ergonomic workplace solution with health and safety at the forefront, Teseo's ATS air track supply system has been designed to complement the HBS and AP compressed air supply lines.



"Our 20-year warranty is more than twice as long as our competitors and clear evidence of the quality and reliability of our systems and we are the only manufacturer who can prove this as our initial installations date back to the early nineties."

Gianfranco Guzzoni, Teseo founder

To find out more about how Teseo can save your company money contact us now on **0870 167 2150**

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Mattei Compressors



Welcome to Mattei

For those looking for a rotary compressor manufacturer that is steeped in history and knows the industry inside out, Mattei offers just that. Founded more than 95 years ago in 1919 by Enea Mattei in Italy, the compressor manufacturer has remained a family business passed down through the generations. Mattei's heritage and innovation has led to the company being the number one compressor manufacturer in Italy, and the largest rotary vane manufacturer in the world.

The UK operation opened in 1987 and has been successfully selling high quality and reliable rotary vane compressors ever since. From the centrally located head office in Warwickshire, Mattei also provides installations and system design, as well as air compressor maintenance and servicing.

Research and development

Mattei is committed to continual research and development in vane technology and its investment in state-of-the-art facilities has enabled the company to make significant advancements to its products, evolving its compressors to meet the market's changing requirements. This has been more important than ever in recent years with industry's drive to reduce its energy consumption.

Through this research and development, Mattei has made a number of key changes to its rotary vane compressors, such as:

- By making advancements in internal lubrication, Mattei has been able to reduce off-load operating pressures, which significantly improves energy efficiency
- Mattei has developed its rotor stator unit, decreasing the on-load power consumption of its compressors, making it among the lowest that can be found in any modern screw or vane machine

1.5kW - 250kW (2hp - 335hp) - a range of choice



Rotary vane technology - energy efficiency at its best

The company offers an extensive product portfolio and prides itself on working closely with customers to ensure the right machine is specified for the needs of the individual application. In addition, Mattei is a firm believer in only selling compressors where there is a real need and will always provide feedback to customers on what they could do without replacing a machine that is working perfectly well.

Mattei's technologies include:

- The Maxima range which operates at just 1,000rpm and has a high mechanical efficiency, using as little as an unrivalled 5.2kW of electricity to produce a cubic metre of air per minute
- The Optima variable speed range provides significant energy savings of typically 30 per cent or more when compared to a fixed speed compressor trying to serve a variable air demand

Where a company has a varying air requirement on top of a constant base load, using Mattei's Maxima and Optima machines together provides the ultimate solution for energy efficiency.

Added benefits

In addition to its extensive range of energy efficient compressors, Mattei offers the following energy saving solutions for compressed air systems:

- Leakage detection & repair services
- Heat recovery systems
- Datalogging
- Energy efficiency audits
- Compressor Servicing

These services are all designed to help companies reduce energy wastage from their compressed air system and improve profits.



Please get in touch

For more information on Mattei's compressors and range of services, visit www.mattei.co.uk or call 01789 450577.

FACT FILE




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BCAS MEMBERS

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Pressure Systems Safety Regulations: Competent Examiners Course



Pressure Systems Safety Regulations (PSSR)

As the owner or user of a compressed air system operating in excess of 0.5 bar and containing an air receiver you must comply with 15 regulations, one of which is the requirement under the Pressure Systems Safety Regulations to have a written scheme and to have examinations of the equipment carried out at intervals specified within that scheme.

The Course

BCAS developed this course to provide the basic knowledge and skills necessary to be able to offer examination services in accordance with the Pressure Systems Safety Regulations.

This qualification assures your customer that you have reached an approved standard to carry out the function of a Competent Examiner. In the event of an accident, such a certificate would demonstrate to the Health and Safety Executive that you have met your duty of care obligations.

Candidates successfully completing all the course assessments will be awarded the BCAS Competent Examiner Certificate. This provides the underpinning knowledge and skills required to contribute towards becoming a competent person.

Who Should Take This Course?

Users of compressed air to conduct in-house examination of their own systems
Distributors of compressed air equipment or services in order to offer a service to their customers with the added reassurance of their staff having achieved certification
Maintenance service companies
Field inspectors who offer the service as part of insurance cover

Fees

BCAS Member Rate

£1,498+ VAT

Non-member Rate

£2,995 + VAT

Application form available from BCAS office
020 7935 2464 or info@bcas.org.uk

British Compressed Air Society Ltd Company
Registration No. 3589631

Course content

Introduction to Pressure Systems Safety Regulations with a focus on Regulation 9

Physics and Calculations

Introduction to relevant physics and pressure drop calculations. Symbols and circuit diagrams ISO 1219.

Non-destructive Testing (NDT)

Non-destructive testing (NDT) techniques. Practical exercises in the application of these techniques, including testing of pressure vessel and calibration of pressure gauges and pressure relief (safety) valves.

Written Schemes

Review and evaluation of written schemes of examination using actual case studies of real documents

Revision and Exam

Revision interactive question sessions followed by the final exam.



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BCAS Training



Training is a key feature needed for the enhancement of staff in any company. Compressed air is utilised in a wide variety of applications. Knowledge of compressed air is important to those who not only supply compressed air but also to those who use the compressed air. BCAS has a range of courses to suit various needs, either to improve knowledge or as part of legislative compliance including:

- distance learning
- e-learning
- face-to-face
- bespoke workshops

All the distance and e-learning courses are continual enrolment and can start at any time convenient to the student.

All the compressed air training and education courses below are accredited by BCAS.

Please email Training@Bcas.org.uk for full member and non member options.

Further information on all BCAS training can be obtained by either contacting our Technical Development Officer on 020 3856 1754 or by visiting www.bcas.org.uk