



FLOUR POWER

The Awful Force of Grain Dust Explosions

Grain dust explosions are rarities in Australia but - given the size of our wheat industry - they are an ever present threat. A grain dust explosion in a large handling facility can rival a cruise missile attack in its destructive effects. Take, for example, the blast at Westwood, Louisiana USA in December 1977. The explosion tore off the upper 100 feet of headspace in the storage area and killed 36 people. Another incident at Wichita, Kansas, on June 8 1998 severely damaged a kilometre long storage facility killing 7 people and injuring 10. More recently in November 2001, an entire port terminal was almost destroyed in Paranaguá, Brazil. Remarkably, because the explosion occurred at lunchtime, no was killed although 7 people were injured.

The first recorded grain dust explosion is believed to have occurred in an Italian baker's shop in Turin when flour dust was ignited by a lantern's naked flame and led to the realisation that dust is a highly explosive material.

For a grain dust explosion to occur, a number of factors need to come together. The dust particles must be less than 0.1 mm in diameter and be suspended in air in approximate concentrations of between 40 g and 4000 g per cubic metre. The risk of explosion increases as particle sizes get smaller and drier. Oxygen is required for ignition and there must be an ignition source. This could be from an overheated bearing, loose bolts striking elevator components, or even static build up. Other possible sources of ignition are sparks from fork tines or collision, electrical arcing and sparking from switches and contactors, electrical malfunction, hot surfaces produced from relay coils, transformers, hot joints or brakes.

The truly frightening aspect of a grain dust explosion is that it will frequently initiate a much bigger and more devastating secondary explosion. The blast wave triggered by the primary explosion will cause layers of dust in other areas to become suspended in the air and ignition of this dust can follow within microseconds of the primary explosion occurring. In the Brazilian incident, all structures in the terminal were flattened, rail cars servicing the facility were overturned and five-tonne chunks of concrete hurled 300 metres. All this was followed by a fire which burned for three weeks and all of it was caused by the secondary explosion. Cruise missiles could not have done a better job.

Given the potential for death, injury and massive material losses in a dust explosion, preventative measures are of paramount importance. By far the most important and most effective precaution is the removal, extraction or suppression of dust. Bearing in mind the risks and effects of a secondary explosion, dust elimination efforts should not be confined only to the immediate grain handling or processing areas but to any surrounding area where grain dust may settle and build up. Mobile materials handling equipment such as forklifts and scissor lifts need to be protected in accordance with AS/NZS 4745 and AS/NZS 61241 series of standards as does any ancillary equipment such as fans, lighting and sounders.

Other measures include the need for regular maintenance, safety inspections and audits and the removal of all actual and potential sources of ignition. Adherence to safety standards and procedures is as vital in grain handling and processing as it is in mining.

Something to think about over the morning slice of toast and Vegemite.

Information on flameproofing techniques can be found on our website at www.chessflameproof.com.au

Paranaguá - the aftermath



Images of a mobile vertical lift and a scissors lift recently modified for use in Zone 22 (dust) hazardous areas.

Autumn
2006

Chess
Engineering
Pty Ltd

Chess
Flameproof

101 Fairford Rd
Padstow
NSW 2211

Tel:
(02) 9772 2355
Fax:
(02) 9772 3189

info@
chessindustries.
com.au

www.
chessindustries.
com.au/

© 2006

WINNER
Bankstown City
INDUSTRY



& EXPORT
Awards

Employee
of the Year 2005

WINNER
Bankstown City
INDUSTRY



& EXPORT
Awards

Business
of the Year 2005

ASDA
Australian Stainless Steel
Development Association

BUSINESS AS USUAL Waiting for the WorkChoices Dust to Settle

Well, it's here. All 2,500 plus pages of legislation, regulations and explanatory notes of the WorkChoices law that is certainly not my bedtime reading of choice.

With a High Court challenge by the States already heard and a likely wait of many months before we know the result and the real nitty-gritty of the legislation yet to be understood by small business, it will be a while before we all have a clear understanding of what this legislation has hidden in the detail. In the meantime, the Federal Government has stimulated some sections of the economy by handing free kicks to the legal profession and to seminar organisers.

Relying as we do on traditional skills which - as the Government has acknowledged - are in short supply, Chess Engineering takes comfort in our recently signed Enterprise Bargaining Agreement and in the three-year transition period allowed under the new laws. These will allow us to see what happens with the High Court challenges and any appeals as well as to maintain the EBA status quo until beyond the next election. For the foreseeable future, it's business as usual for Chess Engineering.

As was proved in the old Soviet Union, you can't legislate for productivity or for quality—remember the Lada jokes? An unhappy work force can drive a

business into decline but productivity and growth are built on customer satisfaction which in turn is founded on an able and willing workforce.

In the last two and a half years, Chess has enjoyed extraordinary growth reflecting both renewed focus on the customer and a stable and committed workforce. Our Enterprise Bargaining Agreement ensures that the rewards of this success are shared by way of graduated bonuses calculated on both personal performance and the corporate bottom line. Staff are assessed on a range of performance criteria including quality of work, efficiency, teamwork and OH & S.

The results dictate the bonus share and are published openly. With a significant amount of work undertaken during factory closures, everyone at Chess understands the need to be flexible over leave arrangements.

Behind our EBA is the philosophy that our staff is encouraged to be self-directed and self-regulating. Irrespective of what may develop on the legislative front, the principles of any future agreement will be very similar to what they are now - as long as they are within the law.

Steve Facer



With a 'wait and see' policy on WorkChoices, it's business as usual at Chess

A REAL AMBASSADOR FOR THE COMPANY...

Chess Tradesman is Bankstown's Employee of the Year



Bob Talimdzioski - Bankstown City's Employee of the Year

Chess Engineering's Slobodan Talimdzioski, a senior boilermaker, has been named 'Employee of the Year' in the 2005 Bankstown City Industry and Export Awards. At the same ceremony, Chess Engineering was awarded 'Business of the Year'.

Born in Prilep, Macedonia, in the former Yugoslavia, Slobodan came to Australia in 1979 and has now been with Chess for 11 years.

In congratulating 'Bob', as he is known to his

workmates, Chess CEO Steve Facer says "He was already an accomplished tradesman when he joined Chess Engineering and would now deserve a Master Tradesman's ticket if we had such things in Australia today."

"Bob works well with our customers and is a real; ambassador for the company when he goes out on site." Steve Facer continues, "He has a natural aptitude for working with metal and is extremely good with people."



Chess Engineering was named Bankstown City's Business of the Year



SPOTLIGHT ON STAINLESS STEEL

A quick flick through any one of the classier modern living magazines will bring it home. Stainless steel is the designer material of choice for this the early 21st century. Its smooth shiny finish now graces domestic kitchens, home appliances and fittings as well as architectural features in the trendier developments around our cities.

Stainless steel - with its exceptional corrosion resistance, durability and high-tech appearance - has long been a favourite with architects, industrial designers and engineers. The fact that it is completely recyclable has also influenced its world-wide use.

As a material, stainless steel is ubiquitous. The best hand tools are made from it as are surgical instruments and high quality cookware. But the same attributes of durability and corrosion resistance that make it attractive domestically also lend themselves to a wide range of industrial applications. The metal lasts longer by virtue of its anti-corrosive, low wear and tear and heat resistant properties which also make the material easier - and cheaper - to maintain over its lifetime.

'Stainless steel' is the generic name for those steel based alloys that contain a minimum of 10.5% chromium. Other additives may be present and may include - but are not limited to - titanium, molybdenum and nickel. The anti-corrosive properties derive from the addition of chromium to the alloy

which forms a protective, oxidising layer on the surface of the metal. This layer is self-healing and spontaneously reforms when the metal surface is scratched, machined, cut or damaged.

There are basically five types of stainless steel, each type having its own particular range of properties which lend the particular type to specific applications. In summary, they are:

Austenitic - the most widely used group.

Typically containing 18% chromium and nickel to improve fabrication qualities.

Depending on grade, the austenitic steels can be utilised - while retaining their intrinsic properties - at very high temperatures as furnace components and at very low or cryogenic temperatures. Ideally suited to cold forming and working, austenitic stainless steel is non-magnetic and commonly found in springs and structural elements.

Ferritic - magnetic and with a chromium content ranging from 10.5% to 18% and with no nickel content, ferritic stainless steels are less easy to weld or form. Being non-hardenable,



Conveyor for a major food manufacturer under construction at Chess Engineering

they are always used in the annealed state. Typically used for domestic appliances, decorative trims and some builders' hardware, as well as in materials handling, decking and dust or fume extraction applications.

Duplex - a blend of austenitic and ferritic stainless steels, the duplex grading contains between 18% to 28% chromium and nickel. The higher chromium content enhances corrosion resistance and the metal is easily welded or formed. Duplex grades can be found in such applications as materials handling, heat exchangers, mine dewatering and food preparation.

Martensitic - the original stainless steel. Developed for the industrial production of cutlery, these steels are utilised where hardness and sharpness are required as in - for example - surgical scalpels. With a relatively high carbon content and the chromium percentage varying between 12% and 18%, martensitic steels have limited weldability properties but can achieve high levels of strength and hardness after heat treatment. Other applications include springs, impellers, nozzles, shafts spindles and fasteners.

Precipitation Hardening - a heat treatment which increases strength by inducing changes at the micro-particle level. When applied to austenitic and martensitic stainless steels, the process facilitates the production of long, straight, high strength components and high strength wire.

It can be concluded from the above that there is a lot of stainless steel to choose from. While the generic term 'stainless' implies no rust at all, corrosion can and does occur. Because stainless steel needs free access to oxygen to maintain the self-healing chromium oxide layer, areas where surfaces adjoin can attract and hold moisture which blocks off the oxygen supply preventing regeneration of the oxidising layer. Generally known as 'crevice corrosion' this factor is the prime cause of corrosion in stainless steel. Crevices are defined typically as where two surfaces are

bolted together, the underside of adhesive labels, intermittent welds, underneath bolt heads, washers and gaskets - in fact any tight space. The likelihood of corrosion increases according to the environment - there are more problems in beachside locations for example than occur further inland. Other causes of corrosion include the build-up of sediment and scale and presence of microbiological films caused by bacteria all of which can inhibit access to oxygen.

It follows then, that selecting the right type and grade of stainless steel is of paramount importance as is the application of proper design principles. Wherever possible crevices should be eliminated at the design stage. If this is not possible, a grade of steel with greater corrosion resistance should be chosen and appropriate sealing treatments applied - again, choosing the right sealant is essential as some types may shrink and form their own crevices. In some applications, it may be possible to increase the size of the crevice to allow both elimination of moisture and exposure to oxygen.

Fabrication standards are equally important. Welding needs to be of the highest standard without cracks or undercuts and with a smooth bead.

Given the capital cost of some stainless equipment, ongoing maintenance is vital. In addition to the normal tasks involved in mechanical maintenance, it is necessary to avoid the build up of debris, reduce surface contamination and at all times maintain the free flow of air around the equipment.



High grade austenitic stainless steel is used to manufacture exhaust scrubber tanks fitted to diesel forklifts used in hazardous areas. The interaction of the exhaust fumes and water produces a corrosive solution requiring the water to be changed daily. Each tank is fitted with a sacrificial anode to prolong the tank's life.

Chess Engineering has been designing, fabricating, manufacturing and maintaining stainless steel equipment and components for four decades. Our expertise covers a wide range of industries including food, marine, defence and manufacturing. As members of the Australian Stainless Steel Development Association we are in touch with developments in stainless steel technology as well as offering high level design and fabrication skills. Our dedicated sheet metal shop can be inspected at any time. To arrange a visit or receive further information, email us on: info@chessindustries.com.au

KEEP THEM BOGIES ROLLIN'

Wheels that don't turn don't earn is the simple precept that underlies Bob Patterson's approach to increasing customer satisfaction in Chess Engineering's newly expanded Rail Division. Bob - who was recently appointed as General Manager of the new arm - puts it this way: "Out of service rolling stock is both a drain on resources and capacity. Literally getting it back on the rails safely and cost effectively is what we are about."



Leading Chess Engineering's new rail endeavour - Bob Patterson is on the left

Chess Engineering has a long history of servicing the rail transport sector in freight, passenger and maintenance sectors. "We have a solid base of skills and experience," continues Bob, "and our apprentice training scheme will ensure that we have them in the future."

Bob Patterson brings over three decades of rail industry expertise and experience to his new position. A former general manager and founder of Pacific Rail Engineering, Bob worked his way up from tradesman to Workshop Manager at the then NSW State Rail Authority's Chullora Manufacturing Centre. You might say he knows a bit about rail.

With the expansion of the national rail freight network, the kilometre long freight train is becoming a familiar sight on some parts of the Sydney network. "Rail is a large scale user of traditional technology," says Bob Patterson, "Which is an area where Chess Engineering has excelled for almost forty years. We have the skills and the facilities and the tools to keep the wheels both turning and earning."

FOOD FOR THOUGHT?

In one of those NASA PR hook-ups with orbiting astronauts, one of the crew was asked by a reporter: "How do you feel?" "How would you feel," the astronaut replied, "if you were sitting on top of a couple of million parts each and every one of which was supplied by the lowest bidder?"

