EVELEIGH PLANNING COMMISSION AN IMPORTANT DECISION RE HER FUTURE

SUBMITTED BY Richard K Butcher Author, Publisher, Ex. Eveleigh Blacksmith, MECH.ENGR. DIP.T. FWTIA. Act. As Head Tour - Guide for A T P MIRVAC OWNERS. A role carried out from 1991, under her original ownership, attended years of meetings re Eveleigh role and future?

, Richard has prepared two (2) Special Historic Folders for examination, key factors within!

SUBMISSION Locomotive Workshops Australian Technology Park SSD 8517 & SSD 8449-D538-18

PUBLIC MEETING FOR 30th NOV. 2018

HELLO TO THE CHAIR, INTERESTED PEOPLE RE- SYDNEY'S ICONIC LOCOMOTIVE WORKSHOPS

HELLO TO ALL

MY NAME IS RICHARD K BUTCHER, A FORMER BLACKSMITH, AND IN THE 1950's ENCOURAGED BY THE RAILWAYS INSTITUTE, AND MANAGEMENT OF THESE HERITAGE SHOPS TO FURTHER MY CAREER, BECAUSE EVELEIGH WAS LIKE A FAMILY, THE BOSSES CARED. AFTER THE FIRST FOUR (4) YEARS SENT TO THE THEN NSW GR's, HEAD OFFICE at WYNYARD TO EXPERIENCE LOCOMOTIVE ENGINEERING DESIGN, A PERIOD OF 8 MONTHS. DURING MY 'HIGHER' TRADES SMITHING COURSE, I TOPPED THE STATE IN MY TRADE, FOR ALL THOSE YEARS, EVEN RECEIVED A COMBINED UNIONS AWARD FOR MY EFFORT IN YEAR FIVE (5) ORIGINALLY COMMENCED THE TRADE COURSE AT LOCOMOTIVE SHOPS 'CASINO'. ALL APPRENTICES FROM THE COUNTRY HAD TO ATTEND A CITY WORKSHOP. GREATER EXPERIENCE IN LEARNING. FROM WYNYARD H.O. COMPLETED THE HIGHER TRADES COURSE SERVING IN BAYS 1 AND 2, ALSO BAY 3, THEN A HEAT TREATMENT ROOM FOR ALLOYED STEELS; AT EVELEIGH WE VIRTUALLY COULD DO ANYTHING, WHICH IN WORLD WAR 2, PROOVED INVALUABLE.

PUT THE THINKING HAT ON RICHARD?

I ENROLLED AT SYDNEY T A F E COLLEGE, STUDIED ALL ADVANCED WELDING COURSES, HEAT TREATMENT METALLURGY, STUDIED FOUR (4) NIGHTS A WEEK AFTER WORK, 14 YEARS IN TOTAL.

INCLUDED THE MECHANICAL ENGINEERING COURSE AND ADDITIONAL - METALLURGY TOPICS. SERVED AT EVELEIGH BLACKSMITH'S SHOPS NUMBER 1 & 2, AND 3, ALL HIGHLY SKILLED WORK, A LOT OF FIRE WELDING NOW RARE, HOWEVER SO MUCH TO-DAY IS L O S T. SERVED AT DAVY PRESS, VERY HOT, THE 40 CWT, DOUBLE ARCH STEAM DROP HAMMER, THE FORGES IN BAY 1, STILL USED THE CURRENT LEASEE MATHEW USES THE FORGES,MY ERA HIGH PRECISION WORK CARRIED OUT WITH LOCOMOTIVE CONNECTING AND COUPLING RODS, WE USED OUR EYES, THE TOOL ROOM USED MICROMETERS, YET -TO THE NEAREST THOUSANDTH OF AN INCH BY THE SMITH'S EYESIGHT.

CAREER CHANGE

THE RAILWAYS - ADVERTISED FOR AN UNDER-STUDY TO THE CHIEF WELDING ENGINEER, AT THE WILSON STREET TESTING LABORATORIES, THE C.M.E. SIMPLY SAID. 'BUTCHER'- HAS GOT OFF HIS BACK SIDE – HE IS APPOINTED AND I DO NOT CARE ONE HOOT WHAT THE UNIONS SAY! SO A YOUNG BOY FROM THE BUSH, PUT ON A SUIT, DUST COAT AND LEARNT A WHOLE NEW HIGHLY INTERESTING NEW WORLD, SO DARN INTERESTING, ER WELDING UP THE MAC DONALDTOWN GAS-O METER, HAD TO BE HALF FULL OF EXPLOSIVE TOWN GAS,, WELL I'M HERE FOLKS.

I FIRST VISITED THE SHOPS IN 1952, THERE WERE WELL OVER FIVE THOUSAND BELT DRIVEN-

LATHES, MILLING MACHINES, FILING MACHINES, WHEEL LATHES BIG & SMALL. LEATHER BELTS DRIVING LINE SHAFTING THROUGHOUT BAYS 6,7,8,9,10,11,12, every where. IN MID 1956 OVER 4,900 MEN; WOMEN WORKED UNDER HER WROUGHT IRON ROOF. STEAM ISSUED FROM THE ROOF ESPECIALLY BAYS 1;2;4;4A THE BOILERMAKERS. YES NOISY, NO HEARING PROTECTION, NO GLOVES, YES -LEATHER BOOTS, NO HOT WATER TO WASH, WE BOILED OUR OWN WATER- IN GALVANISED BUCKETS, BECAUSE NO wash rooms, or Showers. AND RICHARD ATTENDED OPERA FOR DECADES, NO PROPER WASHING FACILITIES. EVEN HAVE PAVOROTTI SIGNATURE ON A PROGRAM.

THE WORKSHOPS OVERALL

EARLIER DAYS THERE WAS THE 'HUGE' FOUNDRY, THE MASSIVE PATTERNMAKING SHOP YES BULLDOZED. THE WELDING SHOP, THE HUGE STEEL RACKS WITH PRETTY PAINTED ENDS, TOLD YOU WHAT THE STEEL BAR (analysis) WAS, ALEXANDRIA GOODS YARDS, VERY ACTIVE, THUS MUCH REGRETABLY HAS DISSAPPEARED. THE WHEEL WRIGHTS SHOP, OLIVER HAMMER SHOP- GONE.AND THE FIRST AID ROOM ALSO KNOWN AS "RED SQUARE' THE PLACE WHERE AUSTRALIAS BIGGEST EVER STRIKE COMMENCED FROM THE 1917 GREAT STRIKE YES ITS BULLDOZED.

STEAM CRANES LIKE THE SMALL ONE ON DISPLAY IS WHERE THE 'SPRING SHOP' STOOD, The Cranes ABOUNDED. Like 1083, ALL AROUND THE WORKING YARDS AND FOUNDRY AREA.

LOCOMOTIVE BOILERS ENTERED THE BOILERMAKERS, MADE NEW AGAIN BY HIGHLY SKILLED MEN, COULD TELL YOU A REAL STORY FOR THIS ONE ?????? FAMOUS AUSSIE STEAM ICON?

EVELEIGH HELPED TO KEEP UP TO 1200 STEAM LOCOS OPERATIONAL, OLD AND NEW, SHE BUILT 185 BRAND NEW STEAM LOCOS, SHE MAINTAINED A FLEET OF OTHER LOCOS. THE DIVERSITY OF WORK ENORMOUS. EVELEIGH EMPLOYED - A RAT CATCHER, A CLOCK WINDER, WATCH REPAIRERS, IN BAYS 15, THE TOOL ROOM, MOST ACCURATE MEASURING GAUGES,INSTRUMENTS MORE HIGHLY PRECISION ENGINEERING, MADE ANYTHING.

BEARINGS WERE WHITE METALLED, I LEARNT THIS TRADE AT CASINO, SYDNEY POWER HOUSE MUSEUM USE ME TODAY. ALSO TO THE OLDER RTM, ONES SKILLS HELP 'KEEP' LACHLAN VALLEY RAILWAY, STEAM LOCOS OPERATIONAL- BIG PRESSURE WELDING TO THEIR STEAM LOCOS 5917 3237. STARPS. Steam trams Parra. ASSIST IN FACT A HUGE WELD REPAIR, HORNSBY MODEL ENGINEERS A BOLIER INSPECTOR MAKE ALL THEIR TRACK. GIVE ADVICE ALL OVER THE LAND, ITS NOT TAUGHT NOW, E'R PROGRESS.

RICHARD'S APPRECIATION BY OTHER GROUPS

I AM A LIFE MEMBER OF TRANSPORT HERITAGE NSW. AT THIRLMERE A MUSEUM I HELPED BUILD. Also life member TRANSPORT HERITAGES VALLEY HEIGHTS DEPOT. ASSIST SYDNEY P H M, have assisted. LAST WEEKEND (24-11-18) P.H.M – RE- LAUNCH OF 3265 STEAM LOCO. I REMETALLED EVERY BEARING FROM 2000 TO 2005, AN EX. MAIN LINE RTM RUNNING FITTER FOR A DECADE IN CHARGE OF THE MUSEUMS FIRST EVER OVER-HAUL OF A MAIN LINE LOCO 5910. IN THE P.H.M. CITY STANDS SMALL 1243 STEAM LOCO, WAS HER FITTER THE DAY SHE TURNED 100 YRS. IN 1982.

MEDIA INVOLVEMENT

ALONG WITH THE BLACKSMITH GUIDO GOUVENEOUR A PRIZE WINNING DOCUMENTARY OF EVELEIGH SHOT IN MID 1990'S, SBS tv. BEST DOCUMENTARY - "EVELEIGH" AT AWARDS NIGHT.

RADIO 576 -A B C PROGRAM ' THE NIGHT AIR'- EVELEIGH; Journalist Tony BARRELL plus another,

"REMEMBERING EVELEIGH" recorded Richard's story. ABC Harris St. Studios Nigel Helyer Interview.

A SERIES OF "EVELEIGH STORIES" VIA THE OLDER A.T.P. Booklets of history.

SERVE MIRVAC- AS HEAD TOUR GUIDE; RECENTLY A VERY GOOD OPEN DAY, TOLD THOUSANDS ATTENDED.

ANOTHER STORY OF VARIOUS WORKERS FROM EVELEIGH on - DVD by Dr. Peter RADCLIFFE

AUTHOR PUBLISHER

RICHARD BUTCHER'S "REMINISCENCES OF THE GREAT EVELEIGH RAILWAY WORKSHOPS" 2004

BY REQUEST PART TWO (2) AT TYPESETTING STAGE. NOV.'18. 'EVELEIGH STORY CONTINUES'

WRITER OF "STEAM DAYS ON THE NORTH COAST OF NSW" 1990

A WONDERFUL BOOK BY PHILANTHROPIST Caroline SIMPSON daughter of Sir Warwick FAIRFAX

PHOTOGRAPHY BY ACCLAIMED DAVID MOORE titled "RAILWAYS, RELICS and ROMANCE" 'EVELEIGH'. After a display at the Sydney Art Gallery, had to advise Caroline and David, all photo captions were WRONG, so Richard Technically Edited - a brilliant photographic book.

I have spoken at Sydney City Council meetings re the Importance of our Heritage ICON

Earlier years I was a member of the U S A Based SMITHSONIAN INSTITUTE whom made a comment:-

EVELEIGH RAIL WORKSHOPS IS ONE O F THE WORLDS LAST REMAINING VICTORIAN RAILWAY WORKSHOP, MANY PARTS INTACT SHOWING THE FABRIC OF THE AGE OF STEAM. HER TWIN CAST IRON COLUMNS (Sydney Globe Foundry 1880's) SUPPORTING HER WROUGHT IRON ROOF STRUCTURE (wrought iron is near PURE iron, or No C. ). The smith's "dirt floors", the overhead steam pipes, the Hydraulic pipes produced energy to drive hundreds of machines within the shops, my good friend John GIBSON serves as Tour GUIDE near the FOUR C 36 class BOILERS OUTSIDE BAYS 2 & 3. LOCOMOTIVE STREET.

BAY 5 APPRENTICE TRAINING SCHOOL AND CANTEEN

SERVED THE APPRENTICE TRAINING SCHOOL, EACH YEAR OVER 300 APPRENTICES SERVED AT EVELEIGH, NEARBY THE WOODEN STEPS LEAD TO THE CANTEEN ABOVEGROUND LEVEL OFF CENTE ROAD WAS A WIRE CAGED ZONE, AS FITTER AND MACHINIST CHIPPED AWAY AT CAST IRON BLOCKS. SAFETY FROM FLYING METAL PIECES BEING CHIPPED AWAY.

BAYS 6 ·7 · 8

NUMEROUS MACHINES WITH LEATHER BELTS SOME REALLY LONG BELTS PRODUCED A RYMTHIC WHINE, AND MACHINISTS STOOD ON WOODEN TIMBER STANDS, better to fight foot fatigue and cold floors. DURING WINTER WORKERS LIT FIRES IN 44 gallon drums; BURNT WOOD, TO THE OBJECTION OF THE OVER-HEAD CRANE DRIVERS AS SOOT, SMOKE, A STINK ROSE. I'VE BEEN WELDING IN SOME BAYS, AND NOT UNCOMMON TO GET A BUCKET OF WATER TOSSED OVER YOU, THE GLOW FROM THE ELECTRIC -ARC ANNOYED THE CRANE DRIVER.

BAYS 14 and 15

DIESEL LOCOMOTIVE-THE ENGINES (drive the train) FOR TRAINS LIKE THE COOMA MONARO TRAIN

NEAR THE LARGE ERECTING SHOP END circa 1899, UNITS WERE OVERHAULED, REPAIRED,

NAMES LIKE 'GENERAL MOTORS' AND 'ROLLS ROYCE', THEIR ENGINES MOUNTED UNDER THE BODY FRAMES, TO PROPEL AND DRIVE THE UNIT.

BAY 14 AND 15 ALSO NEAR THE CENTRE ROAD, WAS THE 'WESTINGHOUSE BRAKE' OVER-HAUL SECTION, PLUS A TOOL ROOM, LATER WAS AIR-CONDITIONED, A PLACE THEY MADE ANYTHING.

ONE HAS BEEN LUCKY ENOUGH TO VISIT OVERSEAS RAIL MUSEUMS, OUR EVELEIGH IS UNIQUE, THE ARRANGEMENT. STORIES ABOUND THROUGHOUT THE WHOLE PLACE, A PAINTED AUSSIE FLAG ON A WALL THINK BAY 4 OR 5, Nearest to Running roads. HER ARCHITECTURE BEAUTIFUL, ENGLISH BOND BRICK WORK HUGE ARCHED WINDOWS, CREAM BRICK ARCHES. Whilst UNDER FLOOR, BEAUTIFUL BRICK DRAINS, DIRECT RAIN WATER TO STORM PIPES, ROOF AREA ENORMOUS, UNDER THE DAVY PRESS THE DOUBLE ARCH AND ALL STEAM HAMMERS ARE 14" x 14" WOODEN BEAMS METRES BELOW, TO ABSORB SHOCK FROM THE POWER OF THE HAMMERS. CORNERS OF THE BUILDING HAVE WOOD PILES DRIVEN DOWN IN SPECIAL 5 X 3 PATTERN, ALSO ARCHED BRICK BEAMS ACT AS A SPRING TO THE FLOORS , GREAT ENGINEERING, VIRTUALLY NO CRACKS IN THE BUILDINGS WALLS.

★ HERITAGE LIES ALL AROUND

OVER 400 MISCL. PIECES OF MACHINERY, INCLUDING LOCATED THROUGHOUT THE WORKSHOPS, ARE SPRING BUCKLING MACHINES, HYDRAULIC COMPRESSORS, IN BAY 9

A TRAVERSOR, NUMEROUS LATHE'S;A WHEEL TURNING LATHE, VERTICAL BOREING MACHINES A WHOLE TREASURE TROVE, MANY UNITS WERE BUILT BY THE NSWGR, AND A DECENT ASSORTMENT OF OTHER MACHINES, LIKE IN BAY 8; BAY 14,15; AND THE FABULOUS BLACKSMITH'S SHOPS WITH RACKS OF TONGS, SWAGES, TO SHAPE AND FORM STEEL; THE SMALL MOVEABLE 180 DEGREES SWING ARM CRANES. THE COVAC OR AJAX UPSET MACHINES THREE, HAVE THE IMPORTANT DIES TO FORM, AND SHAPE ITEMS, I STATED ONE HAS TRAVELLED TO MANY OVERSEAS MUSEUMS, AND EVELEIGH ONE OF THE FINEST, MAYBE A SMITHSONIAN STATEMENT? THE PATINA OF THE PLACE, LOOK ABOVE ALL THAT STRUCTURAL STEEL FRAME WORK, THE ROWS OF TWIN CAST- IRON COLUMNS', and captured by the lens of David Moore, photographer. A TREASURE TO RICHARD.

✖ ANY WONDER WAY BACK IN 1991 RICHARD SENT A REPORT TO THE STATE AND FEDERAL GOVTS. SAVE THIS ICONIC PLACE.

★ AUSTRALIAN DESIGNED AND MADE

THIS WAS A PLACE WHERE WE AS AUSTRALIANS COULD PRODUCE ANYTHING, AND WE DESIGNED MANY ITEMS CARRIAGES, WAGONS, SPECIAL TAFE CARRIAGES, A ZOO TRAIN, A SILVER CITY COMET, A PULLMAN SLEEPING CAR, AT WAR SECRETLY DESIGNED AND BUILT 'ADVANCED RADAR', FOR DARWIN SAVING HUNDREDS OF LIVES FROM JAPANESE BOMBING ATTACKS.

THE GOVERNMENTS FOSTERED AND NUTURED OUR RAILWAY SYSTEM, TRUE AUSTRALIAN DESIGNED AND BUILT LOCOS, CARRIAGES, AND ASSISTED THE SYDNEY RANDWICK TRAMWAY WORKSHOPS. A HUGE EMPLOYER FOR many aboriginal, and boys from the bush, FANTASTIC APPRENTICE TRAINING GROUND. MY DAD COMMENCED HIS TRADE AT EVELEIGH IN OCTOBER 1925.

If those walls could only talk, what tales to tell. THINK TWICE; HER VALUE TO YOUNG CHILDREN, TO EDUCATORS, AN EXAMPLE- PREVIOUS BLACKY GUIDO & RICHARD YEARS AGO GAVE A "FIRE WELDING" DEMONSTRATION TO A VISITING AMERICAN UNIVERSITY PROFESSOR, HE WAS OVER THE MOON, AND 40 INTERESTED SYDNEY UNIVERSITY ENGINEERING STUDENTS stood in 'awe', sent me a letter Richard the MASTER SMITH thanks mate!

BAYS 1 & 2 the Heritage BLACKSMITH'S

THE OLDEST ON SITE OPENED IN 1887, DIRT FLOORS, ROOTES AIR BLOWERS, COAL FOR FIVE STEAM LOCO BOILERS SITUATED IN BAY 1, FOR THE DAVY 1'500 TON PRESS, AND THE DOUBLE ARCH STEAM DROP HAMMER. I SERVED A PERIOD AT EACH UNIT. HARD,FAST, HEAVY, TEAM WORK, BRILLIANT TO REFLECT AN ERA WHERE WE BUILT ALL OUR OWN STEAM LOCOMOTIVES, AND YES A FEW DIESEL UNITS ALSO. I HAVE A PAPER IN FACT A FOLDER OF MANY SPECIAL PAPERS, RE THIS HERITAGE WORKSHOP.

MANY STEAM HAMMERS ARE NOW GONE, A FLASH-BUTT WELDING MACHINE ALSO, FLOOR GRINDERS SURVIVE MANY 'EVELEIGH BUILT', A CIRCULAR CUT OFF SAW, WOW THE HOT PARTICLES LEFT YOUR ARMS BLOODIED, SAME FOR A FRAZING WHEEL, LIKE A MILLING CUTTER. ROWS OF TOOLS, MANY FROM RICHARD'S 53 YEARS AGO, AND MANY FROM ANOTHER "PREVIOUS 60 YEARS". LOVE TO SEE FIBRE GLASS MODELS OF SMITHIES THEIR STRIKERS, HELPERS BESIDE THE FORGES. MANY SWING ARM CRANES SURVIVE, ALSO THE 5 TON OVER-HEAD CRANE FOR THE DAVY PRESS.WITHIN BAY 2; THREE COVAC AR AJAX UPSET FORGING MACHINE EXIST, AND 'BIG' RACKS OF DIES, THE FURNACES ALSO, WITH THEIR WATER COOLED SPECIAL DOORS, SIMPLY COLD WATER CIRCULATED THROUGH THE CORE OF THE DOOR, VERY HOT TO STAND IN FRONT OF! AND OUR VARIOUS SLEDGE HAMMERS SURVIVE, SOME AT 28 KG. YES WE SWUNG THEM, I SAID 'HOT' HEAVY.

WHAT A GEM WE HAVE, RESPECT OUR PIONEERING SPIRIT

THE WHOLE WORKSHOPS ARE OF STATE SIGNIFICANT HERITAGE VALUE, HOW LUCKY WE ALL ARE, PLEASE RESPECT AND REALISE, NSW IS A LUCKY STATE, THANKS TO GREAT MEN LIKE JOHN WHITTON, AND THE PIONEERS FROM THE ERA OF STEAM, PAST GOVERNMENTS, AFTER ALL A FEW GREAT PARLIAMENT MEN SERVED UNDER THE OLD ROOF!

THANK YOU MEMBERS OF THE PLANNING COMMISSION, AND THOSE THAT CARE RE- OUR HERITAGE.

RICHARD K BUTCHER

Richard K Butcher

# A WORKING DAY

AS EACH DAY COMMENCED AT HISTORIC EVELEIGH, WHILST RICHARD BUTCHER WORKED THEIR- 1950'S, SMITH'S SHOP THE LARGE PORT HOLES HIGH IN THE POLYCHROME BRICK - WORK AT THE BUILDINGS ENDS, ACTED LIKE A STAGE SPOT LIGHT. THE SUN SHONE THROUGH, CASTING SHADOWS AND A WHITE BEAM OF LIGHT UPON THE FLOORS.

WITHIN THE SUN'S RAYS WERE MINUTE PARTICLES OF COAL, COKE, SWIRLING AND DANCING ABOUT. SHIMMERING AND GLITTERING AS SMOKE ROSE ALL AROUND.

ANOTHER DAY IN THE LIFE OF EVELEIGH, THE STAGE WAS SET;

THE ACTORS IN POSITION, LET THE FORGES GLOW BRIGHT,

THE FURNACES GLOW WHITE; THE STEAM HAMMERS

ENERGY 'EXPLODE', THE ANVILS RING, ANOTHER DAY HAS BEGUN!

SUCH A DAY IN EVELEIGH'S LIFE!

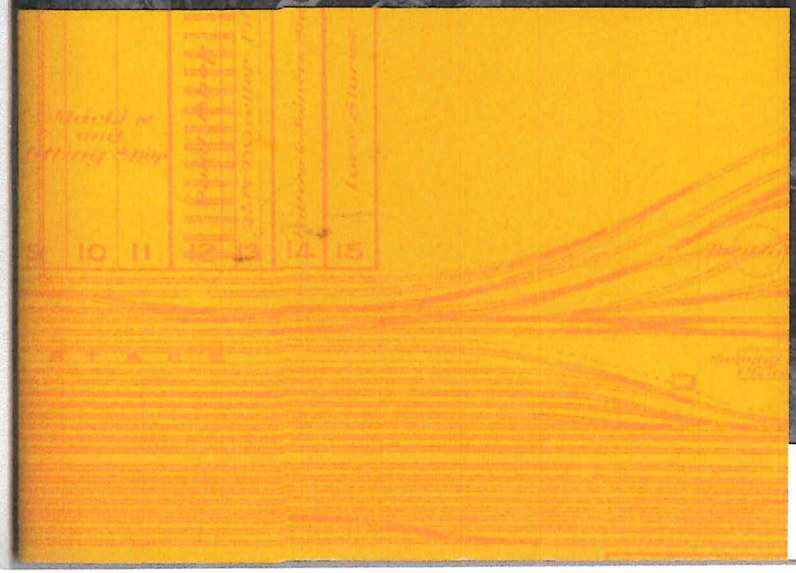
Richard. L. Butcher

Verse by ex. Blacksmith,Engineer

AUSTRALIAN TECHNOLOGY PARK TOUR GUIDE

FWTIA. Mech.Engr. Dip.T.

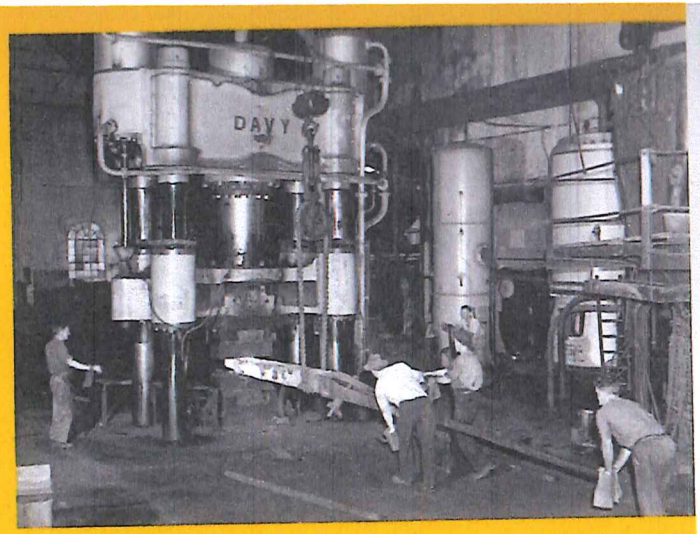
LIFE member Transport Heritage NSW



# EVELEIGH STORIES

**DISCOVER MORE STORIES AT**
eveleighstories.com.au

R. TOGNETTI R K Butcher




# DAVY PRESS

**Installed in 1922, the Davy bore the brunt of heavy forging work at Eveleigh. At least six men were needed to operate the Davy Press and its equipment.**

The head forger was the general – commanding his troops with absolute authority. The furnace man heated the immense iron billets for hours until the precise forging temperature was reached. The crane operator hauled the billets to and from the furnace and press. The press operator was responsible for lifting and lowering the Davy's powerful ram. While a gang of assistants gathered the tools for the job, fixed billets into the long-handled holders with huge spanners, fastened loads to the crane sling and positioned work pieces in the press.

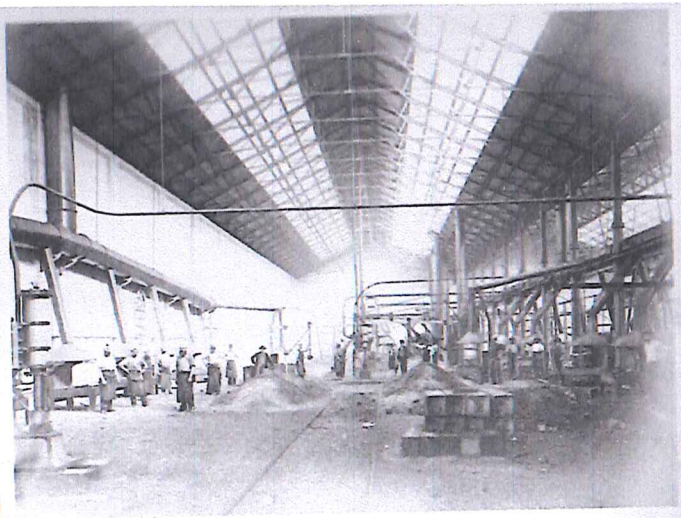
Richard Butcher an Eveleigh blacksmith recalls:

*"It was hard going. The work there was very hot. When the 5 ton ingot of steel came out of the furnace, the core was glowing red and white heat.*

*In that era, you were sooks if you wore any protective clothing, so your clothing would be actually on fire and there'd be hot pieces of steel lying around your feet."*

1
VISIT BAYS 1 & 2

**Left:** Forging metal on the Davy Press, undated
**Right:** Blacksmiths' Shop, Eveleigh Railway Workshops, circa 1890s



# BLACKSMITHING

***"I came in as a shop boy at an early age and I first worked in the blacksmith's shop here, and I was scared of them steam hammers. They kicked back and I didn't like it."***

BOB WRIGHT, EVELEIGH EMPLOYEE

Bay 2 blacksmiths stood amid the flickering flames of some 20 forges that were once ablaze in the north.

The principle machines and tools of the blacksmith's trade remain here. A forge fire and nearby coke bin, a water-cooling quenching tank, an anvil and a swage block, were all essential blacksmithing equipment.

Located nearby was a tool box, as well as hammers and tongs of every size and shape. Around the workshops, rack upon rack of improvised tools remain. The smiths thumped, clattered and clanged producing a maelstrom of smoke, sparks and racket.

1
VISIT BAYS 1 & 2

Right: This was the cab of a Comeng diesel locomotive, 7485. It shows a drivers chair, handbrake wheel and handrail.

# STOR
# FROM
# THE P
# SHOP

6
VISIT THE PAINT SHOP

# HE VOLUTION F VELEIGH ONTINUES

years of lobbying and , the vision of Dr Tom ame a reality. In 1996 Technology Park opened technology based nferences and events.

worked tirelessly to ace where technology nd development could ite product, providing jobs for our children. this vision it had been to develop a critical gh the linking of the f Sydney, the f New South Wales and ity of Technology Sydney.

With the adaptive reuse of Carriageworks into a contemporary creative hub, and the Australian Technology Park as an incubator of invention and technology, Eveleigh Workshops continue to be a place of innovation and evolution.

**Left**: ATP's successful Conference Centre brings new life into the Exhibition Hall, formerly Eveleigh's Machine Shop.
**Right**: NSW Government Railways nameplate for Engineers, 1915.

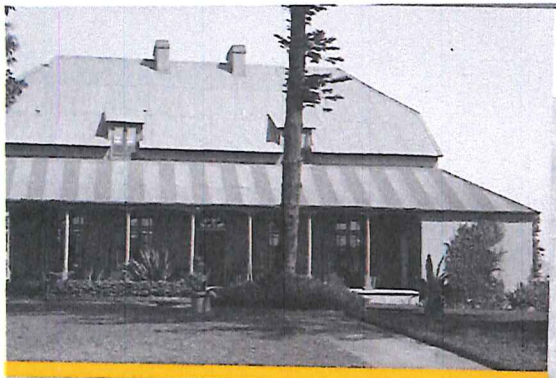

**Designed and Built at Eveleigh 2015**

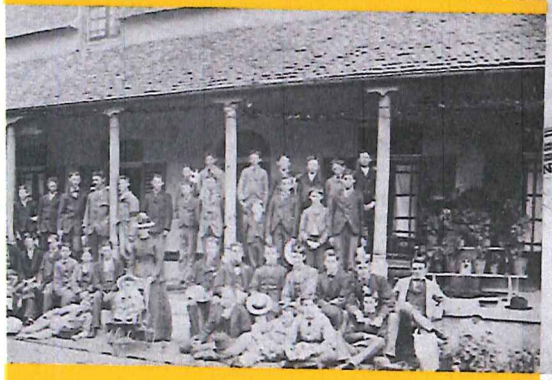
Eveleigh Stories 2015 was curated and edited by Juliet Suich. Two Trees & Co. from content produced by ATP Heritage Volunteers, community contributors, 3D Projects, AHMS and NGH Environmental, in collaboration with Art of Multimedia.

Eveleigh Stories is hosted and managed by the UrbanGrowth NSW Development Corporation.

Images Courtesy of AHMS, Australian Railway Historical Society, National Library of Australia, NSW State Library, NSW State Records Richard Butcher, Ron Tognetti, Rishi Boojharut and Sydney City Archives.

For complete image and quotation source details see **eveleighstories.com.au**



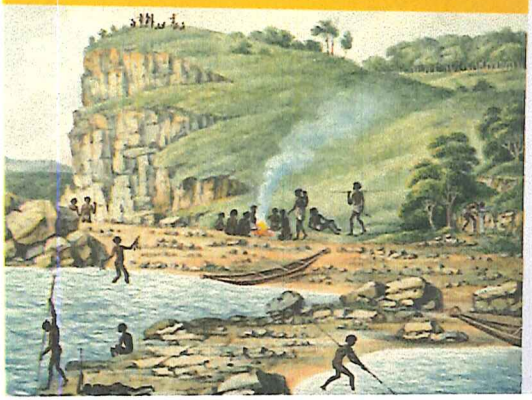


Mechanical
on Wilson Street,

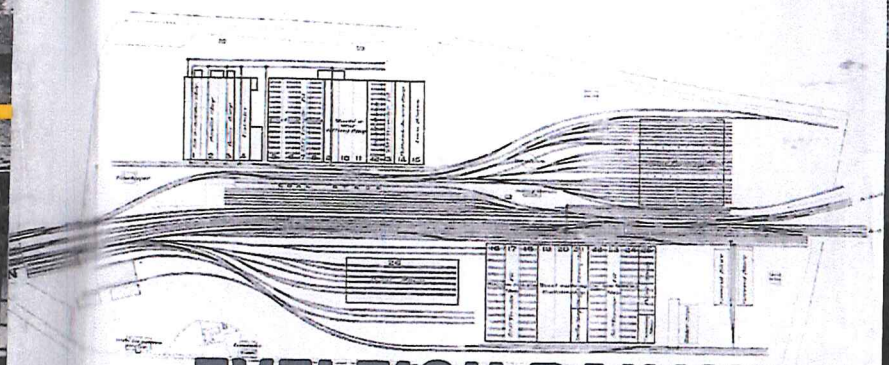
Rose Holden
use (after his
name) on
gh Street
Company land.
eigh House,
vided through
giving its name

In 1855 Sydney's first railway line ran between Sydney Terminus and Parramatta Junction. At that time, J.F. Castles took a lease over the Estate and opened a private school for boys.

Chisholm Estate was resumed in 1880 to establish the Workshops, and Calder House became the residence of Eveleigh's General Works Manager, until it was demolished in 1924.



N.S.W.R.
DIAGRAM OF WORKSHOPS
EVELEIGH



# EVELEIGH RAILWAY WORKSHOPS

**Designed by the NSW Government Railways Chief Engineer, George Cowdery, the principal workshops were developed between 1882 and 1887.**

The Locomotive Workshops, Running Sheds and Manager's Office were sited to the south of the main railway line.

The Carriage Works, Paint Shop, Stores and Chief Mechanical Engineer's Office were located to the north of the tracks.

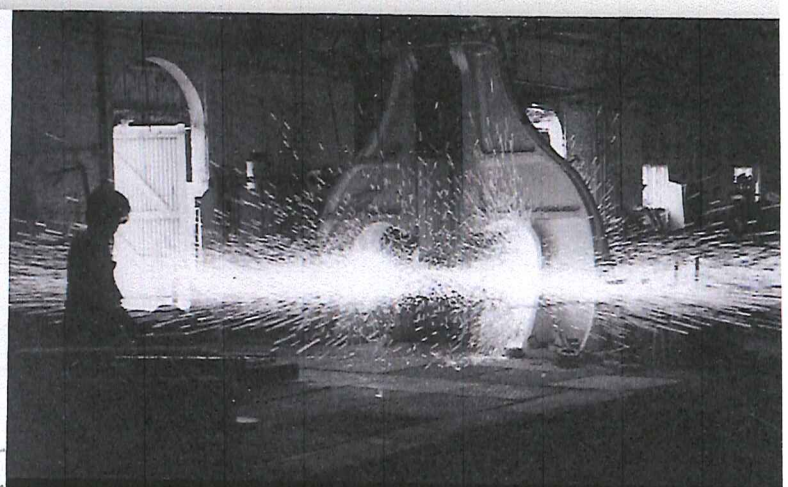
The Large Erecting Shop, opened in 1899, provided a dedicated workshop for locomotive overhaul and assembly, freeing up space for specialist trades in the Locomotive Workshops.

Eveleigh commenced manufacturing its own steam locomotives, with the commissioning of the New Locomotive Workshop (now the National Innovation Centre) in 1907.

During the periods 1908–25 and 1945–52, some 181 new locomotives rolled off the production line and into active service.

The Eveleigh Railway Workshops of the late nineteenth and early twentieth centuries were comprehensive and advanced, employing some of the most sophisticated machinery and power systems available for the manufacture and overhaul of steam locomotives.

RKB



# ALCHEMY

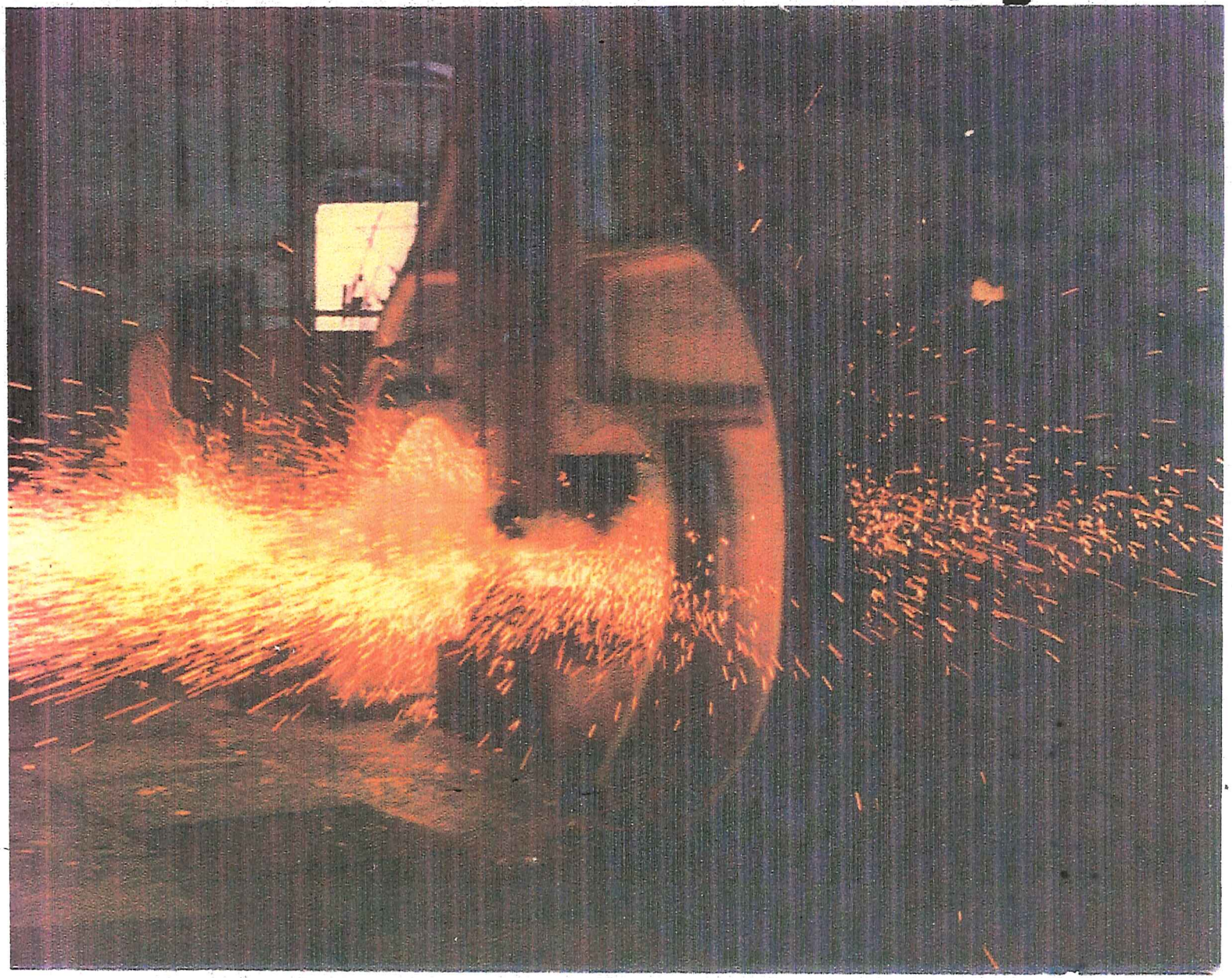
**In 1887 when the Workshops commenced operations, Bays 1 and 2 housed Eveleigh's brigade of skilled blacksmiths. Here they toiled amongst a labyrinth of anvils, presses, hearths and hammers that remain virtually unchanged.**

Bay 1 was the domain of heavy-metal forging, with the Davy Press and its attendant equipment dominating the northern end. In the south, glaring back at the Davy is the other workshop heavyweight – the mighty double-arch steam drop hammer. Used for fire-welding and metal forging, the drop hammer put on spectacular fireworks shows in the course of its daily duties. With its deafening bangs and lightning-quick blows to scorching billets, it showered the workshop with fantastical streams of iron embers, terrifying apprentices, singeing eyebrows and igniting the fashionable newspaper hats donned by nearby blacksmiths.

**Left:** NSW Railways diagram of Eveleigh Workshops, 1887
**Right:** The double arch drop hammer was where the sparks flew and often spewed to the furthest doors 30 metres away. At times oil sprayed from the top and the bottom die blocks, and as the tup (hammer) rose a cloud similar to an atomic bomb rose skywards.

1
VISIT BAYS 1 & 2

# No 1. SMITH'S SHOP.



EVELEIGH LOCO

FORGING

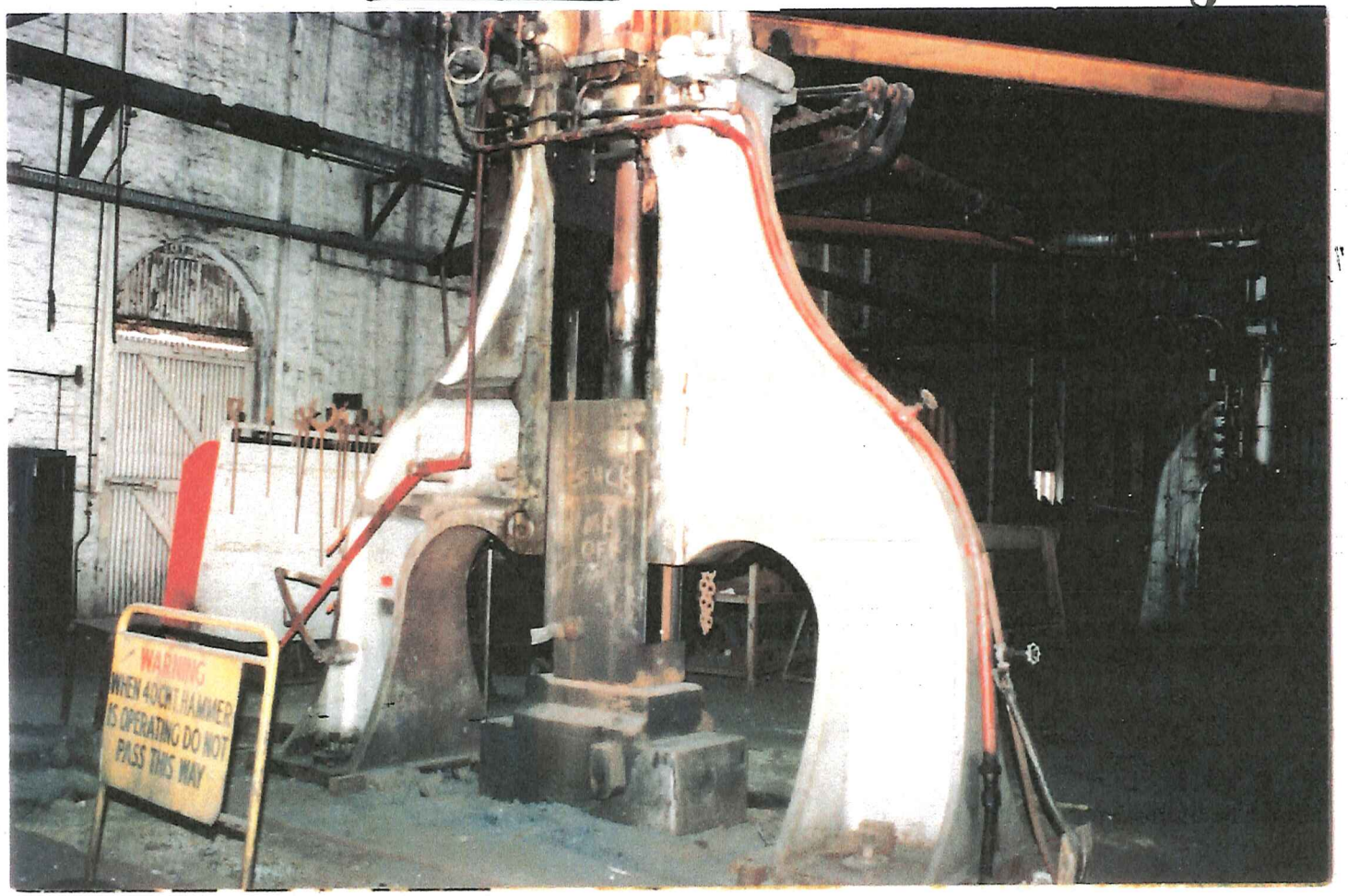
R. Butcher

40 C.wt. DROP HAMMER (2 Tons.)

Eveleigh Double Arch Hammer
40 Cwt. or 40 x 112 lb. wt. I served
6 Weeks on Heritage Hammer. 1957 RKB

& was petrifying, why there was Oil, Sparks, heat, noise — Eveleigh RKB

☆ Richard Butcher ☆



# SYDNEY,S INDUSTRIAL HERITAGE 'EVELEIGH'

THE HERITAGE VICTORIAN RAILWAY WORKSHOPS HERE AT EVELEIGH WERE PLANNED BY JOHN WHITTON THE FATHER OF THE NSW RAILWAYS FROM 1880. OPENED IN 1887 much of the early Fabric has been preserved. The workshops closed in 1988, in her hey days over 4,890 men and women served the Rail system both sides of the main lines that seperate Locomotive Workshops from Carriage Works. The NSW Government has preserved much of the early pioneering days from the age of STEAM.

The Sydney Metropolitan Development Authority, and the Australian Technology Park are entrussed to preserve Sydney's Iconic Rail Shops, so Future generations enjoy the technology from an era now passed, thus Educationists and school children enjoy a walk in the past.

In the Bays number 1 and 2, are heavy duty forging machines, Smith's forges, boilers for raising steam, blowers to generate fresh air to the fires et.

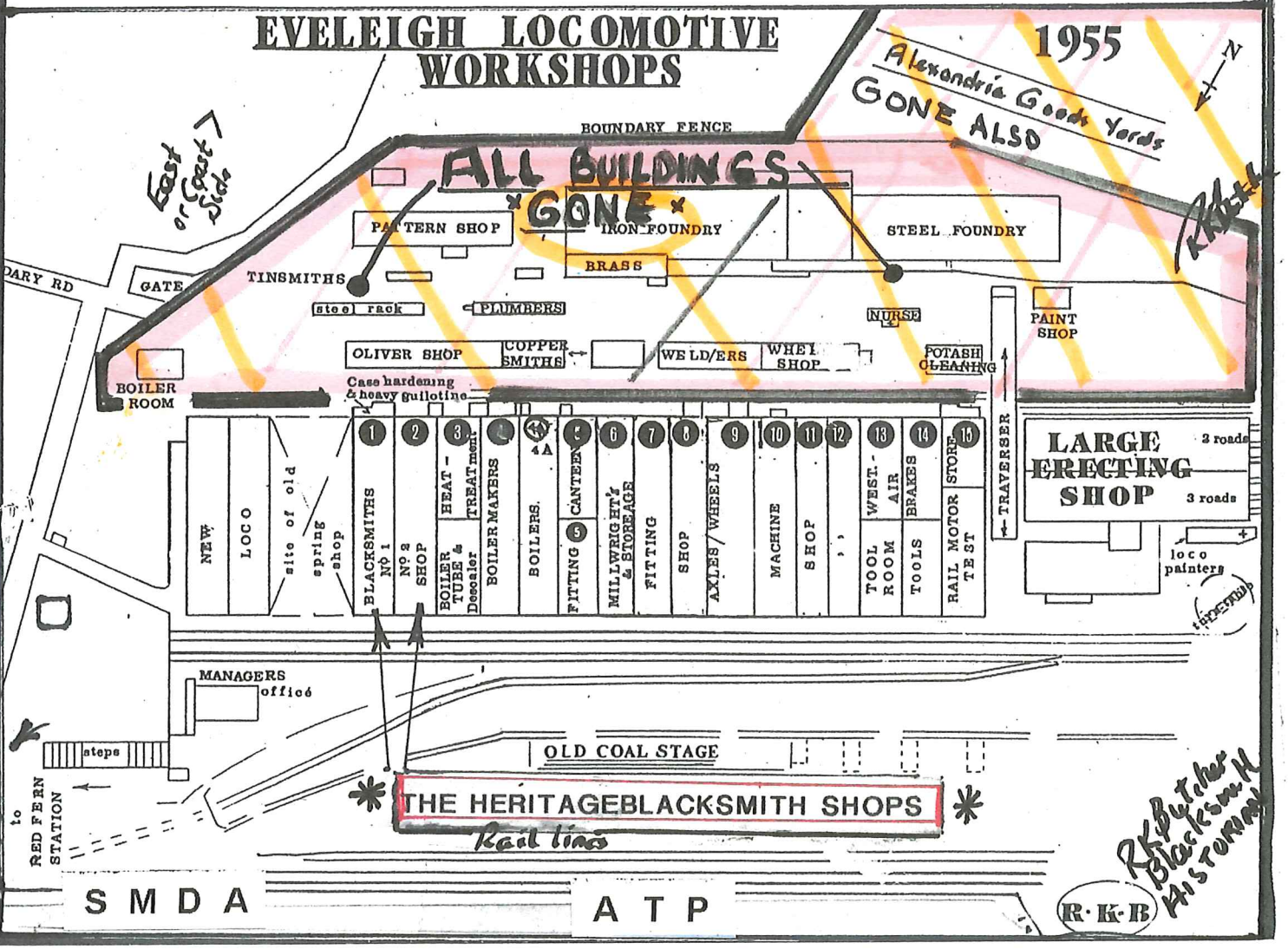
AUSTRALIAN TECHNOLOGY PARK

## NSW HERITAGE RAILWAY WORKSHOPS HEY DAYS

AUSTRALIAN TECHNOLOGY PARK

23·4 hctre ONCE!

A.T.P. 2 Locomotive Street, EVELEIGH NSW 2015 tel. 02 [redacted]



# Thank you!

Australian Technology Park Sydney Ltd would like to acknowledge the significant contribution of

## *Richard Butcher*

for promoting and celebrating the rich heritage of ATP.

We value your time, passion and dedication as a volunteer.

Australian
Technology Park
Sydney

Innovation | Sustainability | Community

# Certificate of Honorary Membership

The LACHLAN VALLEY RAILWAY hereby awards

HONORARY MEMBERSHIP

to:

## Richard Butcher

in recognition of his dedicated service to the society

Signed

22-11-2017

Date

WTIA

Welding Technology Institute of Australia

*This is to certifiy that*

# Richard K Butcher

*was registered as a*

**Fellow**

**Member**

*on the* 19th *day of* October *1989*

*Member Number* 2752

*President* _____

*Executive Director* _____

International Year of Volunteers 2001

# Certificate of Recognition

Awarded to

Richard Butcher

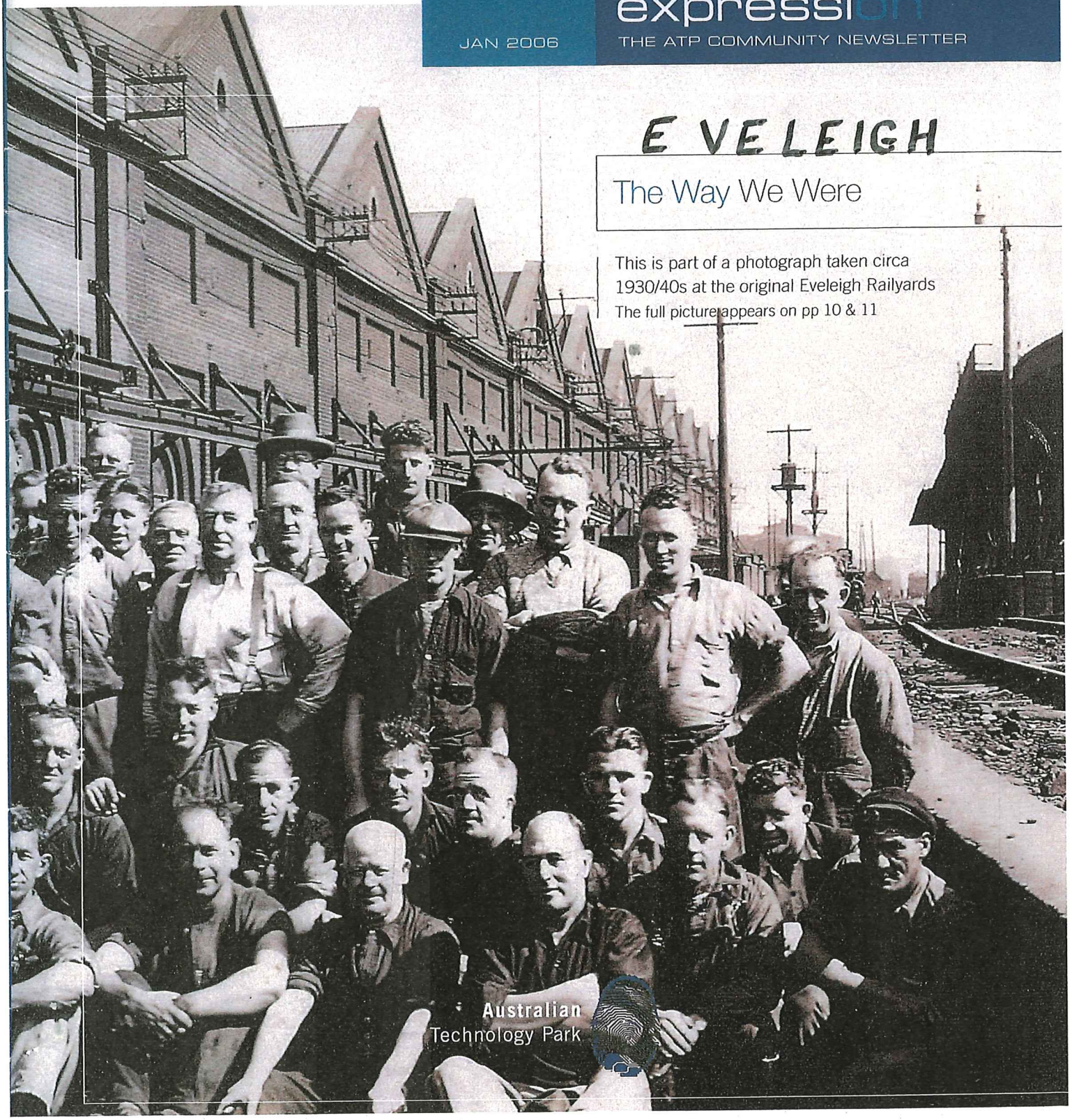
in recognition of your extraordinary contribution
to your community and Australia.

2001
International Year
of Volunteers

*The Hon John Howard MP*
Prime Minister of Australia

JAN 2006

expression
THE ATP COMMUNITY NEWSLETTER




# The Way We Were

This is part of a photograph taken circa 1930/40s at the original Eveleigh Railyards
The full picture appears on pp 10 & 11

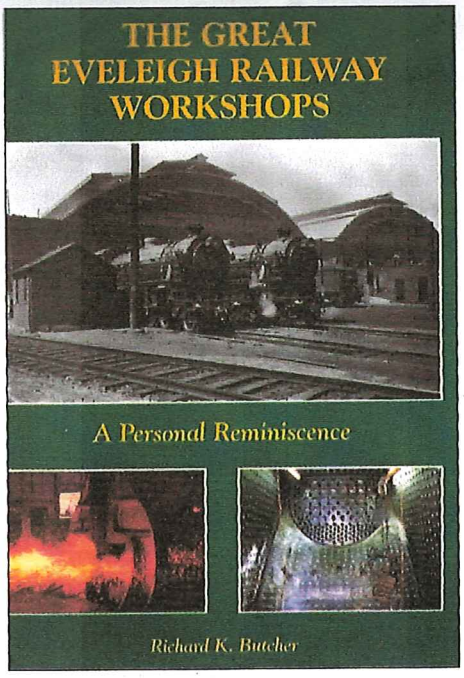
Australian
Technology Park

## THE GREAT EVELEIGH RAILWAY WORKSHOPS *by* Richard K Butcher

This is an absolutely outstanding work not only written but also published by the author. It is a hard cover A4 size book with dust jacket with its 240 pages packed full of historically significant information. Whilst the only colour appears on the dust jacket, there is a multitude of quality black and white photos within. Richard spent 15 years with the railways, much of this time at Eveleigh. In addition he has devoted some 38 active years to the NSW Rail Transport Museum.

The book is divided into three sections, 'The Place', 'The Work' and 'The People', of which 'The Work' forms the major part of the story. Whilst this must be the definitive description of the workshops and what was achieved there, to me there was an even broader story of historic significance in the great detail given to the manufacturing and repairing techniques which occurred there, techniques which one seldom had the privilege of seeing and many of which are probably being lost to this country in these modern times. Of particular interest are the tools and the methods used for forging and welding.

'The Place' goes into considerable detail about the buildings on the site, with their details and uses right from the beginnings to its final days, even including such minor items as the design of doors and windows.




There are many excellent plans and diagrams, mostly drawn by the author, though unfortunately on the 1887 plan of the workshops, which appears to be a photocopy, much of the text is illegible. Very few photos of the inside of the workshops or the equipment ever saw the light of day and we are fortunate to have the few the author has been able to collect.

'The Work' is the section that I find of most importance as it covers in great detail the tools and processes for manufacturing locomotive and rolling stock components and carrying out maintenance and repairs. The locomotives that were built there and those serviced there are also given a good coverage, both in their construction and technical detail, though it is a pity that he did not seek out more previously unpublished photos of those locomotives as quite a few are ex SRA shots which have already flooded the enthusiast market. Detail photos and diagrams again more than save the day. Nor is the story restricted to the workshops area, as the running sheds, carriage works and other properties and their functions on the site are also described.

'The People' is a shorter section delving into such things as humour, particularly practical jokes and the stories of various identities who worked there. These were mainly men on the floor, senior personnel getting mentions earlier in various places.

The book finishes off with a range of railway statistics, background and a brief description of wrought iron. Should the need ever arise again, I sometimes wonder whether we could re-create the technical expertise of the men who did such specialised work in those days of not so long ago.

At $77.00 plus postage from the Society's Redfern bookshop, it is great value, especially for the technically minded.

NOV. 2004 - ARHS

## THE MAPLETON TRAMWAY *by* John Knowles

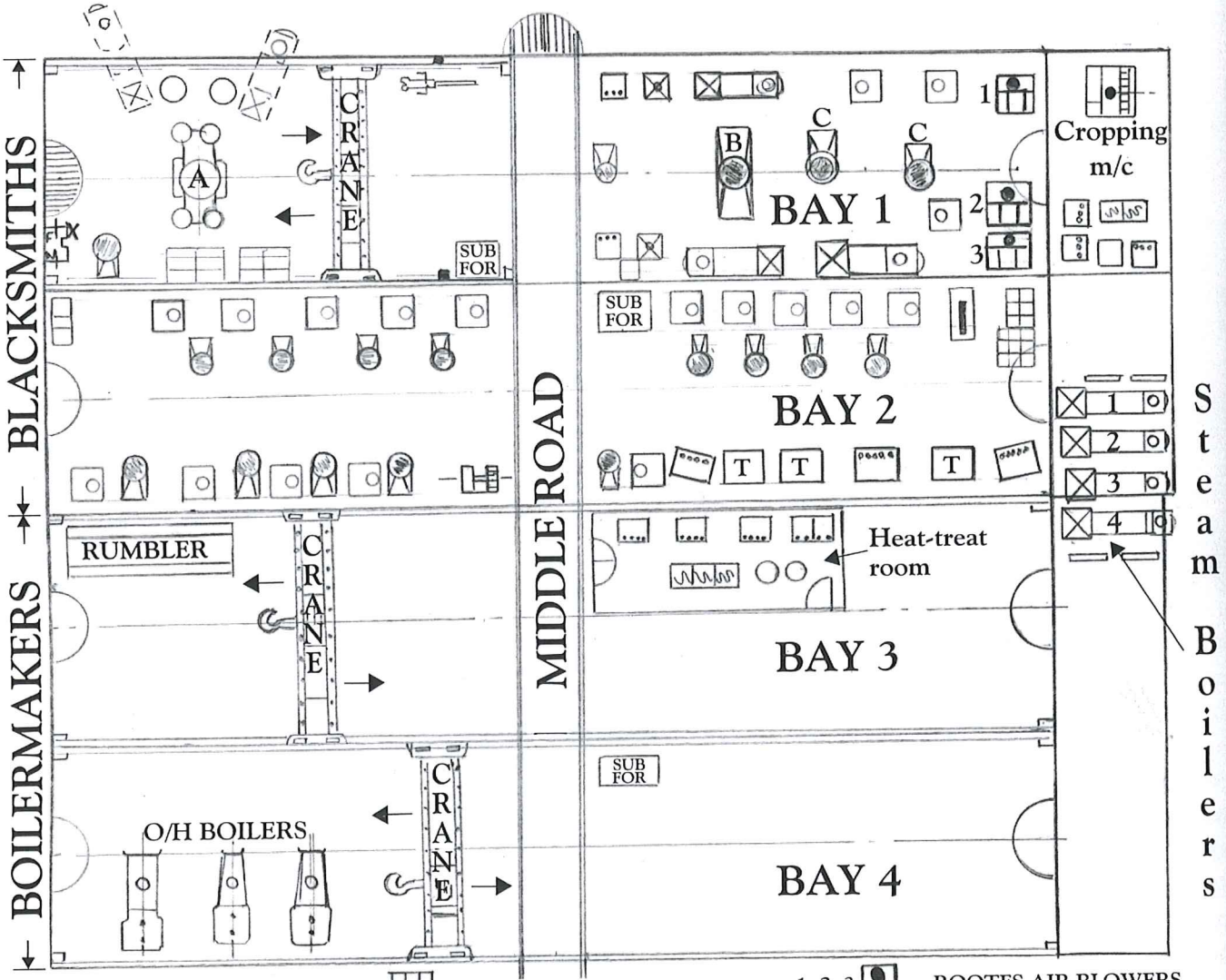
Whilst only a line of

Respect our pioneering past

t
s
t

# EVELEIGH LOCOMOTIVE WORKSHOPS

## Plan of Bays 1-4
## 1950s




## KEY

- BOLT MAKING MACHINE
- PRESSING MACHINES
- FORGE FIRE
- T — AJAX MC
- DIE BLOCKS
- A — DAVY PRESS 1,500 ton STEAM HYDRAULIC
- SUB — SUB FOREMAN OFFICE
- B — DOUBLE ARCH STEAM DROP HAMMER
- WATER COOLING BATHS
- 1, 2 ,3 — ROOTES AIR BLOWERS
- STEAM BOILER ALSO FURNACE
- GAS FIRED FURNACE
- SMALLER STEAM HAMMER
- C — HEAVY STEAM HAMMER
- FRAZING WHEEL

RKB

* Already half the Steam Hammers are 'GONE'?

Governor NSW

OFFICE OF THE GOVERNOR

SYDNEY 2000

Monday, 1 August 2011

Mr Richard K Butcher
11 Union Street
**EASTWOOD NSW 2011**

Dear Mr Butcher,

Thank you for your gracious thought in sending to me a copy of your book *"The Great Eveleigh Railway Workshops A Personal Reminiscence"*, and also for the extracts from the Caroline Simpson and David Moore book "*Eveleigh Railways, Relics and Romance*" with your own comments which are most informative.

I was deeply touched to receive these important tributes to the excellence of the railways services which did so much to build the prosperity of our nation. It is inspiring to see, through your own experiences and dedicated service, that "excellence" was always the standard.

The New South Wales Railways played a significant part in the life of myself and my family at Narrandera, as they brought us to Sydney to visit grandparents at special times, as well as to studies in Sydney and joyful holidays on returning to Narrandera.

Without Eveleigh, that influence in the nation's economy and the conquest over "the tyranny of distance" could never have eventuated, I believe.

Your diligent research and excellent book is an important contribution to Australia's history.

Thank you for this special gift. My warmest congratulations – and appreciation – for all you have achieved.

With best wishes.

Yours sincerely,

Marie Bashir

Marie R Bashir AC CVO
Governor of New South Wales

# Volunteer Certificate of Acknowledgement

This certificate from Australian Technology Park Sydney Limited (ATPSL)
is presented to

## Richard Butcher

For volunteering 39 hours of his time and his outstanding dedication to maintaining the industrial history and heritage integrity of Australian Technology Park over the last year.

**Australian Technology Park** Sydney

Innovation | Sustainability | Community

**Roy Wakelin-King, AM**
Managing Director
ATPSL
3 December 2012

International Year of Volunteers 2001

# Certificate of Recognition

Awarded to

Richard Butcher

in recognition of your extraordinary contribution
to your community and Australia.

2001

The Hon John Howard MP
Prime Minister of Australia

## * EVELEIGH RAILWAY WORKSHOPS *

MAY THIS STORY ABOUT EVELEIGH WORKSHOPS, AND RICHARD'S REMINISCENCES RE-KINDLE AN AGE AND ERA, WHEN THE RAILWAYS WERE AN AUTONOMOUS AUTHORITY, A WELL ORGANISED INTERGRATED RAIL SYSTEM THAT INCLUDED GROUPS AND CLUSTERS OF FINE BUILDINGS, WORKSHOPS, STATIONS, SIGNAL BOXES ETC. THE GOVERNMENTS PROMOTED AND JUSTIFIED SUCH AN EXISTANCE!

A FAMILY OF RAIL MEN AND WOMEN THAT CARRIED OUT THEIR DAILY TASKS WITH PRIDE AND ENERGY! THIS INCLUDED GROUPS OF NEW AUSTRALIANS THAT FITTED IN WELL WITH AUSSIE TRADITIONS, MANY RISING TO HIGH POSITIONS OF ESTEEM, AND THE RAILWAYS FOSTERED THAT DREAM! POLISHED FLOORS/ BRASS/ COPPER PIPES AND TAPS ON RAIL STATIONS. TRIMMED LAWNS, MOWED GARDENS, ANIMAL FIGURINES MOULDED CRAFTED HERE AND THERE. A GLOWING COAL FIRE ON A SMALL COUNTRY STATION MILES FROM NOW WHERE, FROM CITY TO COUNTRY THAT WAS THE RAILWAYS.

FRIENDSHIPS LASTED A LIFE TIME EVEN THOUGH EVELEIGH'S WORKSHOPS DOORS CLOSED LONG AGO. SHE SERVED HER MASTER WELL FOR OVER 100 YEARS, SHE ASSISTED IN EXPANSION OF RAIL SERVICES NEAR AND FAR. HER HUGE DIVERSITY OF SKILLS, TRADES, HER TRAINING, SHE NUTURED AND FOSTERED AUSTRALIANS TO BE COMPETITIVE, TAKE PRIDE IN THEIR WORK!

SADLY "GOVERNMENTS" PLAY AN INTERFERING 'OBNOXIOUS ROLE', THUS EVELEIGH'S DEMISE HAS FALLEN TO THIS MODERN MAD AGE DILEMA, FOR WHEN IN FULL FLIGHT, SHE PROVED TO THE WORLD HER AMBITIOUS ROLE, A TRAINING INSTITUTION, AN EMPLOYER, AN AUSSIE ICON? WITH CREATIVE ABILITY. *EVELEIGH HAD A "HEART AND SOUL"*!

Richard Butcher

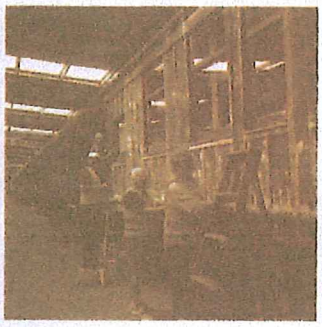
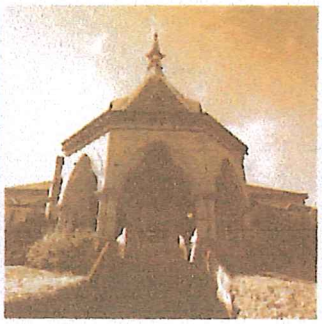
AUTHOR Richard Butcher

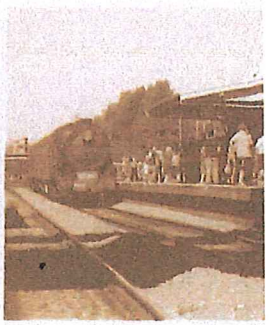
Hi there,
hope you enjoy my story

Richard Butcher Reminiscences

"The Great Eveleigh Railway Workshops"

Rail Heritage ~ Volunteer Awards



# Lifetime Achievement

2011

## Richard 'Dick' Butcher

### Valley Heights Locomotive Depot Heritage Museum

Awarded for outstanding contribution and dedication to rail heritage over a sustained period of time and shared within the industry.

Marianne Hammerton
Director, Office of Rail Heritage
Rail Corporation NSW

NSW | Transport RailCorp

Item A

EVELEIGH BLACKSMITH'S SHOPS BAYS NUMBER 1 and NUMBER 2

Compiled by Rail Historian Richard K Butcher, ex. Eveleigh Blacksmith/Engineer.

Author Published the book: STEAM DAYS ON THE NORTH COAST OF NSW: Technical editor or the book RAILWAYS RELICS and ROMANCE Eveleigh by Caroline SIMPSON and Photography by DAVID MOORE .

Author Publisher the book:-THE GREAT EVELEIGH RAILWAY WORKSHOPS

Mech.Engr. Dip.T. Life member NSW RTM. Boiler Insp. HDMEC. FWTIA

Within the walls of these Victorian Railway Workshops lies much of the original 1887 era Smithing Steam hammers, 1925 Davy Bros. 1,500 ton Press, a Double arch Steam Drop hammer, turn of the century Rootes Air Blowers, which produced naturally aspirated air to serve the Smithy's forge fires etc.

Numerous sets of assorted Tongs, to hold hot metal pieces, Swage blocks used to shape, produce a finished Locomotive component, drifts, punches, pad blocks, Water cooling troughs, essential to assist bend, twist form metal.

The essential, Anvil, a Swage block for assisting the Smith whilst punching holes, drifting numerous shapes. On the other side of the anvil a Steel block of steel, where locomotive draw bars, valve mechanisms, brake rods etc. can be jumped up/ or shorten in length, to obtain precision measurements, so a steam locomotive can perform at 'peak' horse power.

Coke fuel bins, to feed the forge, fire tools to assist building precise high wall banks thus obtain maximum forge fire efficiency for "fire welding" at the forge fire itself. The forge has to produce good heat, a water cooled "bosch" sits at the rear of the fire, this keeps the "tuyere" the air delivery call it spout cool not burn away! Sketches show the Forge Fire.

So much reflects the era of the "Steam Age" of these iconic 1887 workshops. Out side bays No.2. are four large ex Locomotive boilers, they produced "steam" to drive the steam hammer, and machinery. After all our every day electricity comes from coal fired Power stations, and we all like our steam cleaner's plus coffee machines or cappuccino drink.

Extract from Richard K. Butcher

Item 13

# A WORKING DAY.



A WORKING DAY IN THE HERITAGE 1887-1988

BLACKSMITHS SHOP

THE STEAM WHISTLE BLEW AT 7:27 am. three minutes Warning as START TIME 7:30 am. sharp.

WORKERS EITHER CAME BY STEAM TRAIN MAYBE FROM WOY-WOY OR MT.COLAH,WINDSOR AND OTHER PLACES, TO RICHARD FROM BRONTE, BY EITHER A NTH.BONDI TO CENTRAL TRAM, OR WALK TO BRONTE BEACH CATCH A TRAM FROM THE END OF THE LINE TERMINUS. PEOPLE LIVED NEARBY AND WALKED OR BIKED. BOTANY ROAD NOT FAR AWAY, THUS A TRAM, OR AN OLD DOUBLE DECKER BUS ETC.

IN A WORK$HOP LIKE EVELEIGH EACH SECTION HAD A TOKEN BOARD, WHERE WE HAD A SILVER ALUMINIUM TOKEN AROUND 35mm.dia. NOTE AT TIMES OVER 4,500 WORKERS ON SITE. CLOTHING WAS CASUAL, SOME EVEN WORE A SUIT, RARELY I NOTICED A PAIR OF SHORTS HOWEVER MY MATE FROM MAROUBRA WAY GORDEON HUTCHEN WORE SHORTS EVEN IN THE MIDDLE OF WINTER, HE GOT A CHEER EACH COLD MORNING FROM NUMEROUS WORKERS, WELL THOSE THAT WERE NEAR THE CENTRE ROAD. WE ALL HAD OUR TOKEN NUMBER, AND TALLY BOARDS OUTSIDE SMALL OFFICES IN EACH SHOP.

SOME SURVIVE AROUND THE SITE TO DAY. THEN AT LUNCH TIME A WARNING WHISTLE THEN COLLECT THE TOKEN FROM THE POCKET AND HANG BACK ON THE BOARD, 35 mins. LATER AFTER YOUR EATEN RETRIEVE THAT TOKEN, WORK THROUGH TO KNOCK OFF TIME AGAIN A WARNING WHISTLE, WASH IN THE BUCKET OF WARMED WATER, THEN LAST WHISTLE HANG THE TOKEN UP, HEAD HOME, THE CENTRE ROAD WAS A PITT ST. AT PEAK HOUR.

IN RICHARDS CASE I ATTENDED TAFE. FOR YEARS AT HARRIS STREET CITY. CLASSES STARTED USUALLY 5:30pm. to 9:30 pm. AT TIMES FOUR EVENINGS PER WEEK. LUCKILY THERE WAS A SET OF STEPS TO AN OVER-HEAD BRIDGE, ACCROSS TO CARRIAGE WORKS, THE C.M.E.s. or UP TO SYDNEY UNIVERSITY, WELL PATRONISED THE LONG DEMOLISHED OVER HEAD BRIDGE.A QUICK TRAIN TO THE CITY YOU OBSERVED. GENERALLY ANNUAL LEAVE WAS AT CHRISTMAS TIME END OF THE YEAR. THE GOVERNMENT RAILWAYS FEATURED A 'PICNIC DAY' EACH YEAR, IN WARMER WEATHER TIMES. BRONTE BEACH, MANLY, TWO COMMON POINTS TO CELEBRATE WITH THE FAMILY, ICE CREAMS, LEMONADE, BALLOONS,STREAMERS ETC. GREAT TIMES BY ALL THE FAMILIES.

IN THE SMITHS SHOP, WAS WARM IN WINTER, SMOKEY, SMELLY, BUT NICE SWEET COAL SMELL ADMIT. THE WORK, FAST, FURIOUS, FRIGHTENING FIRE WELDING PIECES OF METAL TO GETHER, SPARKS GALORE, HOT, BURN YOUR EYES-REFLECTED HEAT. NO COLD WATER, DIRT FLOORS, GREAT TEAM WORK, RESPECT FOR ALL THE NEW MEN MANY FROM MALTA, GERMANY, GREECE, ITALY, SCANDANAVIA, EUROPE ETC. AND WE LEARNT TO COOK, NEW HAIR STYLES and CUTS ETC.

RICHARD K BUTCHER

Item C

# THE ARCHITECTURE OF THE EVELEIGH RAIL WORKSHOPS

By Richard K Butcher

Sydney Sandstone plays a dominant feature of the construction of many a building on the heritage site, a very pretty stone, with light to dark colours flow, strilations of darker brown or even light yellow streaks flow through the surfaces, making an attractive building material. Most window sills feature a large slab around 2 metre long x 400mm x depth 200mm. and now very expensive, support large cast-iron window frames, arched at the top glass faced.

Surrounding the window top edge, yellow bricks radiating the top half section, often double rows. The actual bricks, are old style, laid precisely by the brickies in English bond pattern. Being very detailed, polychrome brick work. This makes a heritage styled building, and the roof hip design, raising in the centre to their highest point. The ends of each bay, were large round port holes, open in the centre, air flow. A series of high arched points, along the rows of 15 bays.

The interiors are carefully detailed twin columns of tapered cast-iron columns, they support- together, the weight of the building, are hollow to remove rain water and good enough to support many bays which have over-head travelling cranes, most appealing to the eye. The first four bays traditionally bays 1 & 2 the old Blacksmith's shops, then 3 & 4, being 300 feet in length x 60 feet wide. Further into the main body the bays reduce in width to 50 feet. The twin C.I. columns sit on footings specially designed to with- stand the arduous repetition from the forging hammers, presses etc. Under- ground again special engineering ; long wooden poles driven into the sub-surface, layers of 7" x 4" planks lie on their side, absorbing vibrations, thence inter linked are bricks in an arched pattern segmental arches spring from brick plinths between the wood piers acts a floating floor, here an epitone to building practices of the early1900's.The cast-iron columns made in Sydney by the Globe,Blacket and Mort's foundry company.

Was said the large wrought – iron roof trusses were the largest wide spanned ones in Australia at the time of construction, yes pioneering engineering really, Wrought-iron, Cast-iron vertical columns. When in bays 9 to look South through the succeeding bays,10,11,12,13,14, to 15 a HUGE OPEN SPACE AREA, very spatial, very imposing, very graceful, no wonder big names like David Jones and Myer have held the latest fashion displays within these open areas! Special lighting effects create visions of open, graceful, end-less vision, space etc.

It was said, the collection of cranes represented the best collection of over- head travelling cranes in Australia the oldest was 1885? So light and medium engineering was carried out under her old roof trusses, and frames, a place where men's work was darn hard, little automation, we had swinging arm gantry cranes, some -times a mobile old style English crane to assist in a specific operation.

Eveleigh played a significant role in the employment of aboriginal's, not only locally but created employment for country men and women . My great friend Ron Tognetti came from Dubbo to Eveleigh, and hundreds more sought employment in the historic railway workshops. She was the fore front of industrial relations, worker, employment security, a future, and with effort a chance to work your way up the ladder to a top job.

Any consideration to alter or destroy the antiquity, the fabric, the huge open spaces should be 'rejected', these shops are world standard, keep it this way.

Richard K Butcher
Mar 2015
ATP

Item 7

# A COMMON OPERATION

## WHILST WORKING AT EVELEIGH & CASINO

## LENGTHEN OR SHORTEN RODS

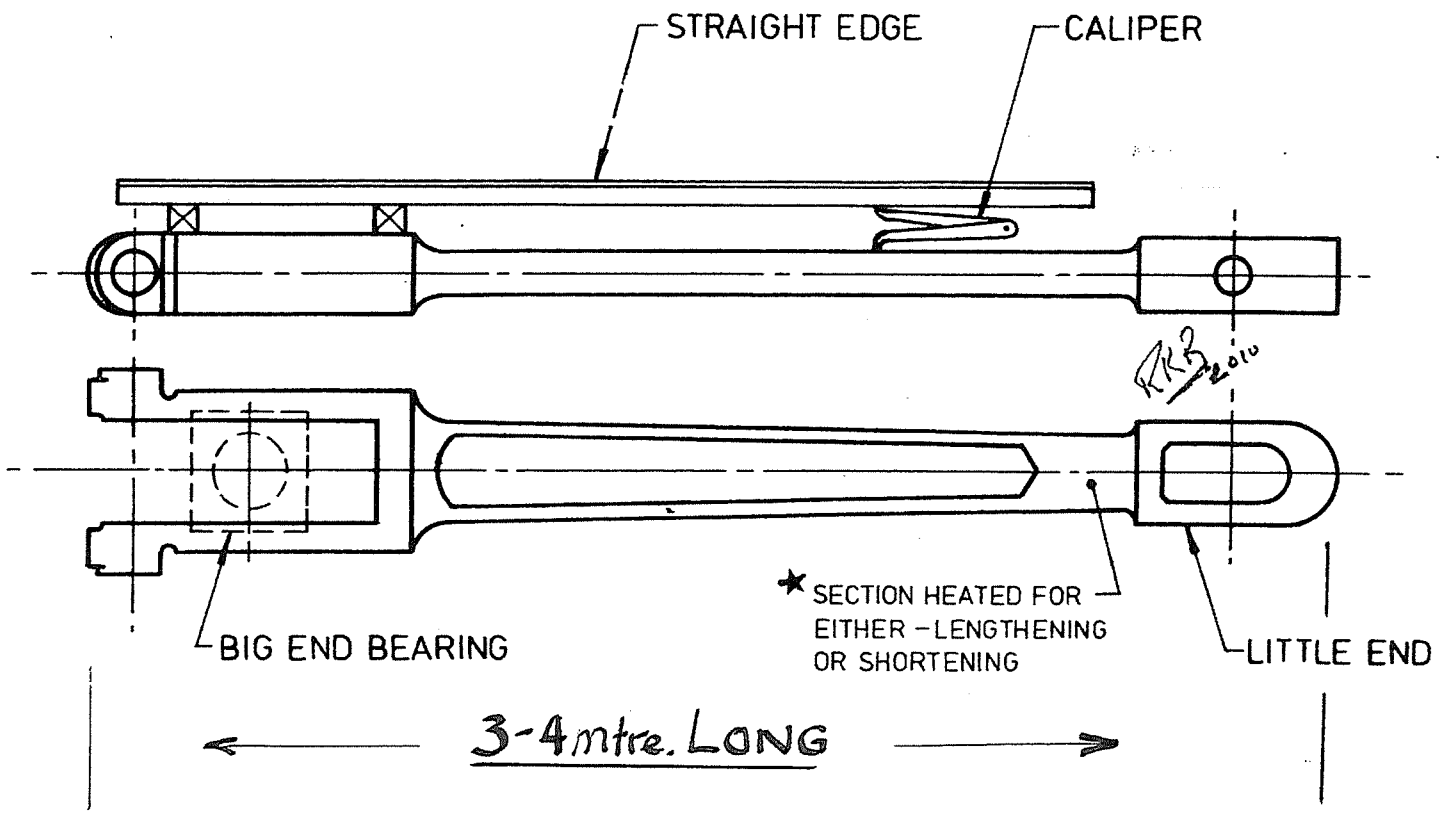
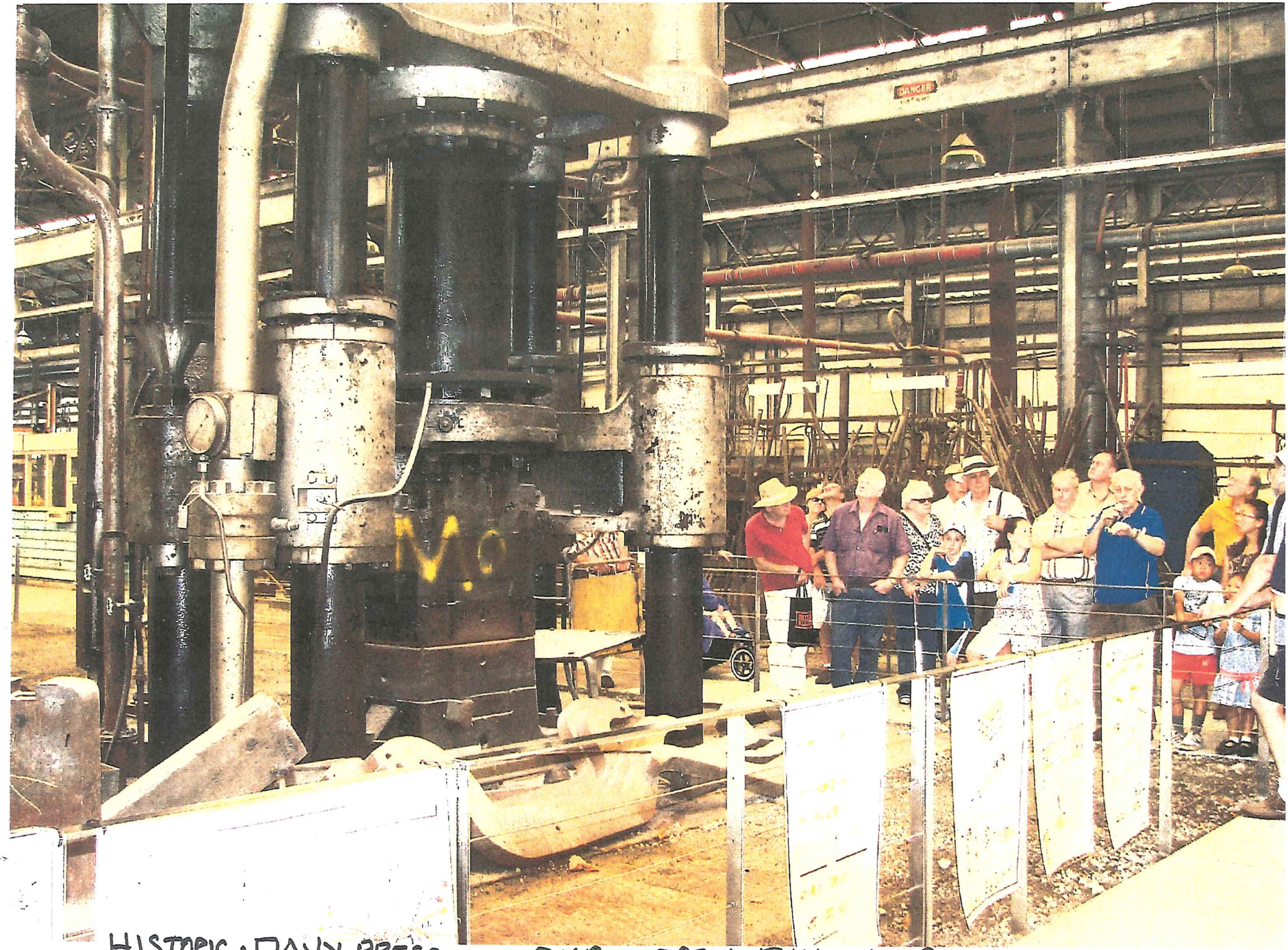



FIG.1 LOCOMOTIVE CONNECTING ROD

R. K. Butcher RKB '85

5




HISTORIC · DAVY PRESS

RKB · OPEN DAY · ATD.

HERITAGE EVELEIGH BAY 2.

RICHARD CAME FROM FOUR YEARS AT CASINO LOCO DEPOT BUT, A "RUNNING SHEDS", EVERY DAY TRAINS IN & OUT; WE CERTAINLY DID MAJOR WORK TO LOCOMOTIVES BUT NEVER LIFTED A BOILER FROM THE FRAME, THATS THE CITY MAJOR SHOPS OR CARDIFF NORTH AT CASINO, ALL WORK BY ANVIL AND FORGE FIRE, PLUS 10 to 28 lb. SLEDGE HAMMER, INDEED HARD SLOG.

AT EVELEIGH A STEAM SHOP WE HAD POWERFULL STEAM HAMMERS AS SEEN. ALSO AN ITEM CALLED A RAM, HANGS; EXCLUSIVELY USED TO SHORTEN THE CONNECTING & COUPLING RODS FITTED TO THE STEAM ENGINES.
RICHARD NEVER USED ONE IN THIS BAY

HOWEVER BAY 1, A REGULAR OPERATION, ESPECIALLY FOR C32; C36; C38 CLASS EXPRESS LOCOS. SOME RODS TO SHORTEN TO ½" shorter. YOU SELECT-TWO OR THREE MEN TO HELP PULL THE RAM BACK ABOUT 4-5metre. THEN GUIDED THE RAM TO HIT THE END OF THE CONN. ROD, E'R SOMETIMES YOU MISSED.

R K BUTCHER

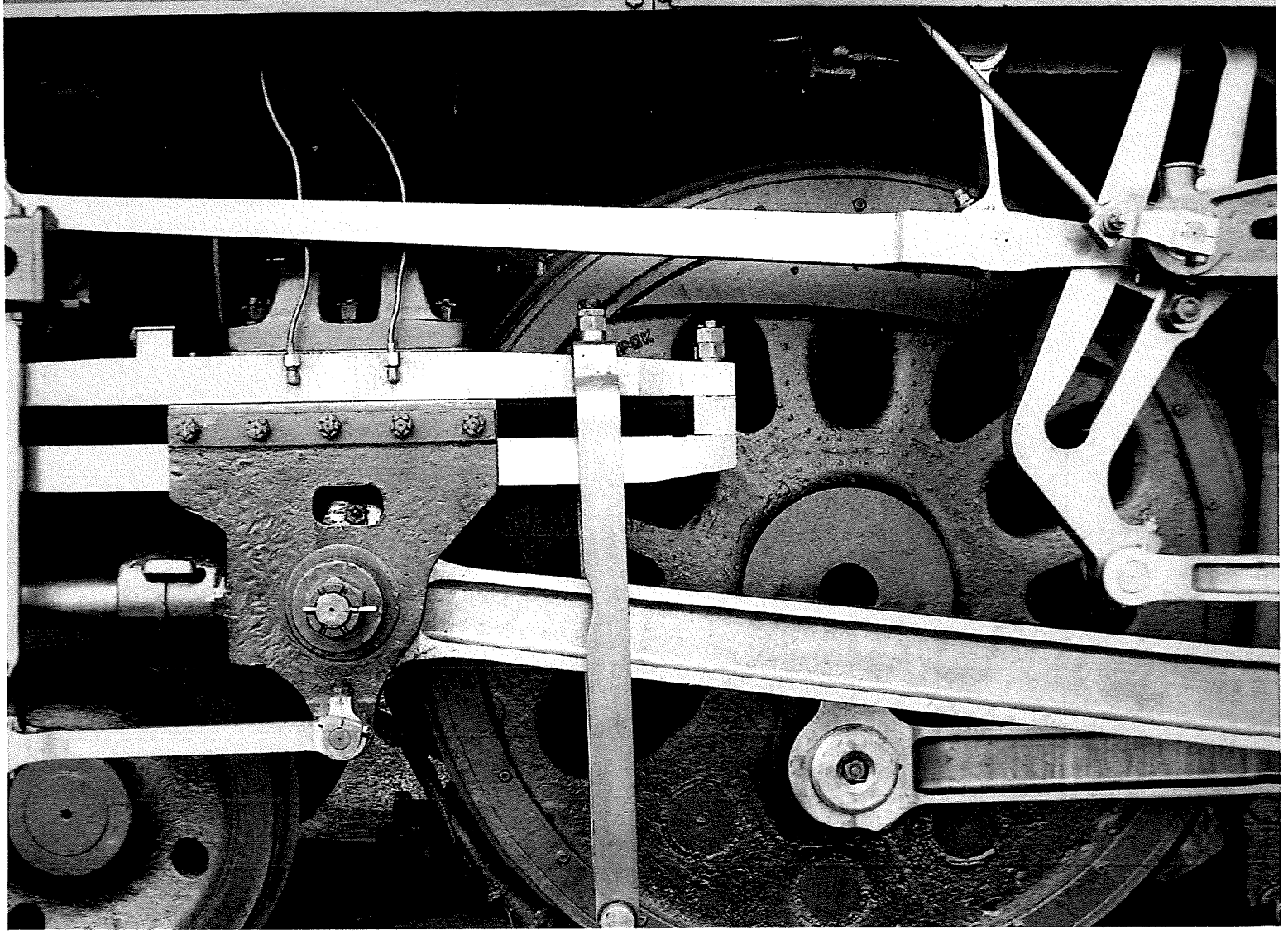
RKB

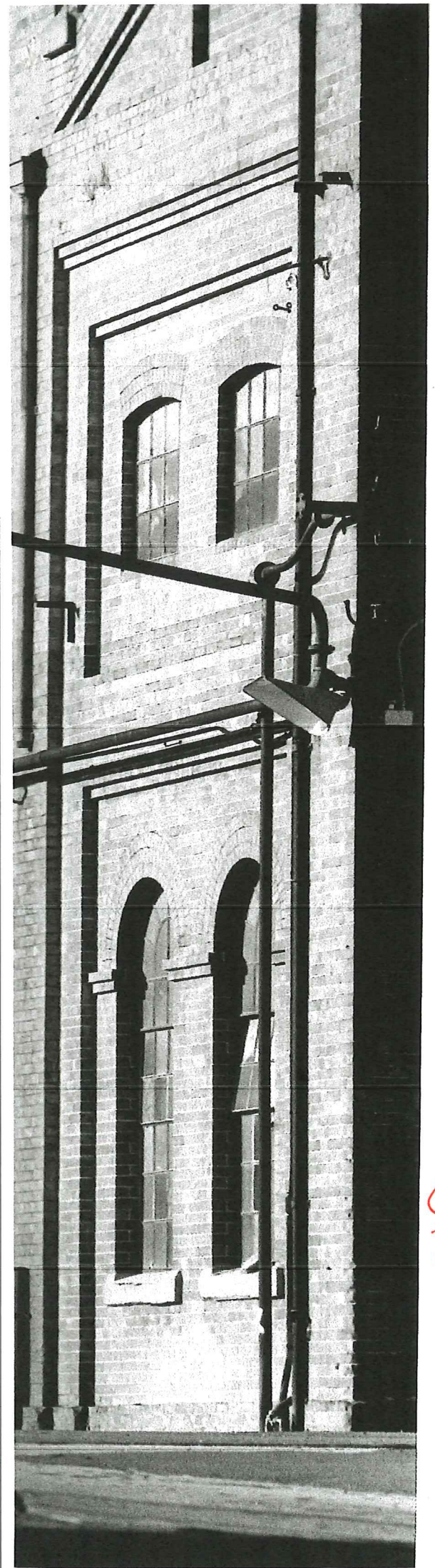
FANTASTIC OPEN - SPACES - OUR TREASURED ICONIC EVELEIGH

# *Railways Relics and Romance*

# *The Edinburgh Railway Workshops*

## *Photographed by David Moore*





# *Railways Relics and Romance*

## *The* EVELEIGH RAILWAY WORKSHOPS SYDNEY NEW SOUTH WALES

## *Photographed by* DAVID MOORE

FOREWORD BY **W.C.WENTWORTH**

INTRODUCTION BY **EDMUND CAPON**

A TRAIN OF THOUGHTS
BY **GAEL NEWTON**

HEAT AND SPARKS: GLORY DAYS
AT EVELEIGH BY **ROBERT MILLIKEN**

COMMENTS FROM EVELEIGH WORKERS
AND ASSOCIATES RECORDED
AND EDITED BY **CHRIS ASHTON**

Caroline Simpson asked Richard to Technically edit this masterpiece & I never sought a penny - Such is life!

*Published by*
**CAROLINE SIMPSON**
*Sydney*

To Richard Butcher
With best wishes
Caroline Simpson

Plate 43: *A blacksmith's forge tools, Locomotive Workshops.*

"Someone's left an old pair of boots there. Boots were essential because we had forging, and we had coals and sparks, and we had pieces of molten metal underfoot. In the blacksmith's shop, with its dirt floors, there was enormous heat. We weren't allowed to wear gloves, they'd make you clumsy, and wi the machinery we had it would have been dangerous. We didn't wear goggles - that would have been sooky. But we had to watch steel get up to within a hundred degrees of melting point, until it was in a totally plastic condition. The risk of getting your eyes burnt out was enormous, but I never even had medical card when I worked there. It was tough, hard work. People wouldn't go through with it today admire the people who grew up in that era. It was a wonderful era.

"We had the great single arch steam hammer, and when a VIP came through we would pick out the l hammer driver in the workshop: he would put a gold watch on the face, and the steam hammer would going up and down, always moving, and the whole idea was to bring it down 'til it barely touched the glass of the watch, just making a couple of little shadow marks on it. A steam hammer can hit with a of two tons. You can imagine what would happen if the driver opened it up. You wouldn't find the w It showed just how fine a control these hammer drivers had.

"The other thing was working in the heat and dust. No one would now go through this. For instance when I first came here the foreman in the shop gave me a bucket and said, 'There you go, Dick Butch off you go.' And I thought, what the bloody hell do I have a bucket for? Well, we never had proper washing facilities. You got a bucket, you filled it up with water, you heated a piece of iron in the forge just before knock-off time and, when the first whistle went, you dunked it in the water, heated it to the desired temperature, put your hands in, your face in and your feet in, and had your wash before you when the 4-12 whistle went. That's true."

DICK BUTCHE

Extract from David Moore Brilliant book

R·K·B article

readers write

Road rail debate

Article from ARHS Railway Digest

## Eveleigh Workshops

One reads with interest the recent *Railway Digest* article *Eveleigh Workshops threatened with demolition* (October 2005). Eveleigh deserves some mention as to her role, in early times the original Cleveland Paddocks was not serving the expanding role of the state of New South Wales. John Whitton required modern workshops to serve NSW, the result being Eveleigh.

I have tried to convince State and Federal Governments to create a National Transport Museum for many years. A 1990 report did get a response from a Senator as a "brilliant idea", however we have recently spent $12.5 million setting up the National Maritime Museum at Darling Harbour.

My idea was to create an active Working Museum to train young apprentices in various skills, with viewing zones for the public. Ironicly Queensland has injected well over $22 million in the hands-on/working Ipswich Rail Workshops Museum - it can be achieved with a little vision.

We are crying out for tradesmen. Eveleigh was also a huge source of new apprentices. It employed (in the mid 1950s) around 4,800 with a capacity to construct main line sleeping carriages, horse-boxes, Dental or TAFE Training carriages, the famous Silver City Comet - the list is endless. Then there are steam locomotives, from the dimunitive C30 Class to the mighty C38 , Everleigh achieved all! Today the railways have the capacity to build zero.

From 1885 to 1988 Eveleigh was a modern Railways workshop and served the nation well. The Governments of the era fostered and nurtured the railways back then! Gone also are Chullora, Clyde Wagon Works, Cardiff Workshops, Goulburn, Civic, and Bathurst.

Earlier this year I was invited to speak at Sydney City Council Planning Committee meetings at Sydney Town Hall. Presenting my talk I could see virtually no one knew much about these Victorian Heritage Railway Workshops. Our pioneering spirit is lost in a mist of time! As a young nation we seem intent on destroying our past, Eveleigh is our industrial heritage.

Threats abound to move 3801 Ltd and the Power House Museum exhibits. The Tempe Bus Museum is also under threat. Will they survive? It becomes more clearer that we need a Transport Museum at Eveleigh.

Finally if Eveleigh is to exist to preserve the wonderful age of Railways and Steam, ask yourself, what can I do to assist, for once its gone, its gone forever.

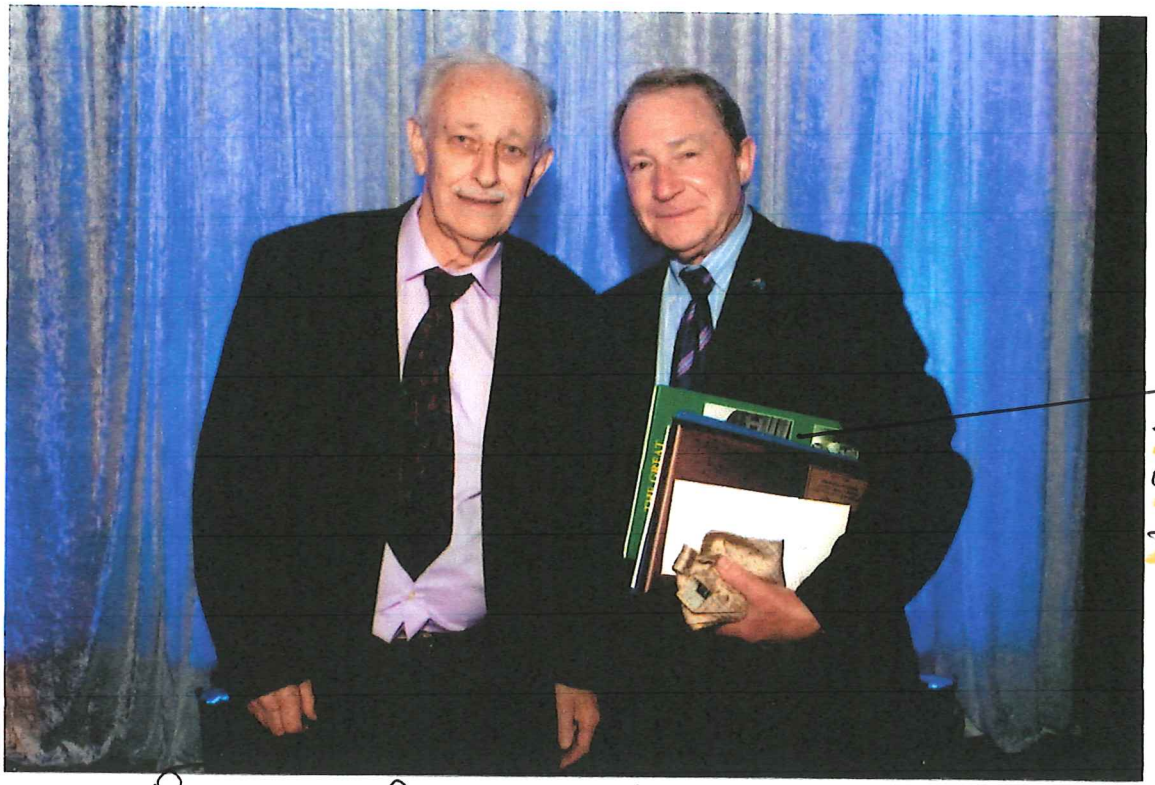
Richard Butcher
Eastwood NSW



## catchpoints

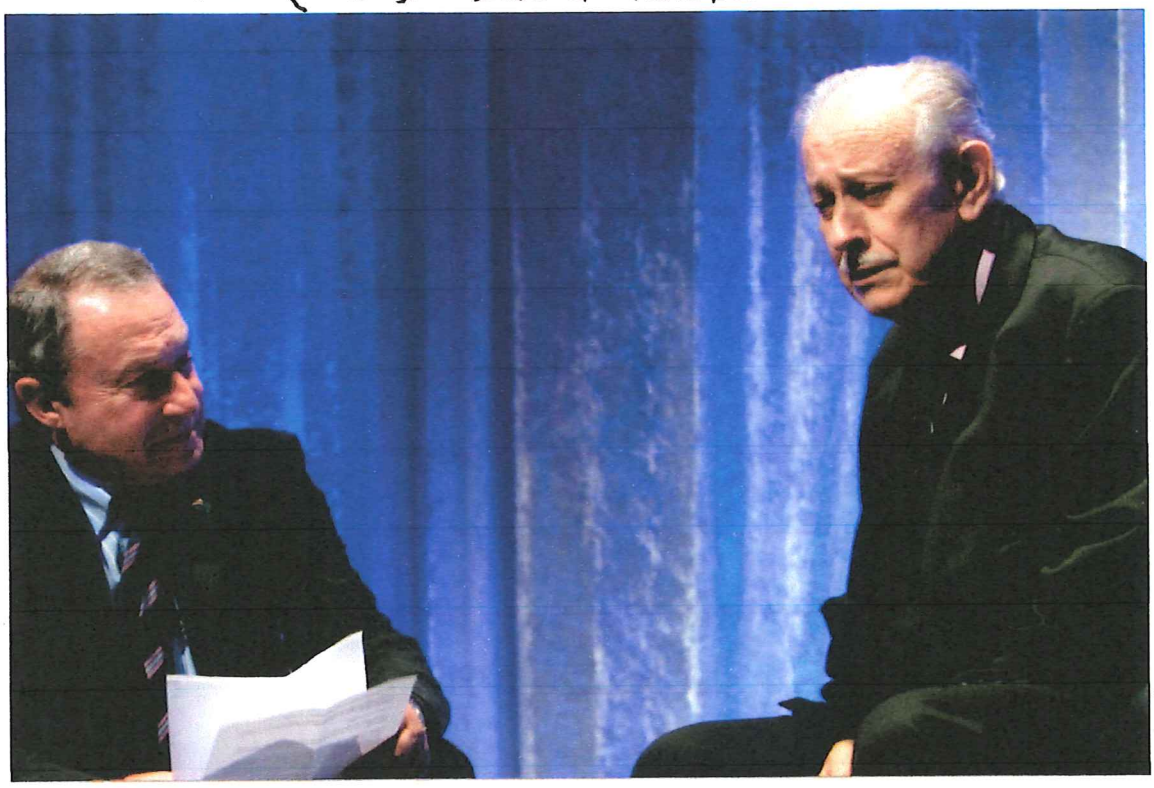
October 2005, page 12
In the article *Goulburn Day train* on page 12 of *Railway Digest* October 2005, "Kingsford" should read "Kingsgrove.

2005-Oct.



Presented Steve Liebman a Eveleigh Book

RICHARD BUTCHER & STEVE LIEBMAN Richard presented a Copy of my EVELEIGH WORKSHOPS BOOK 120 Years (R&T) Rail & Transport Health Fund Dinner



Steve

Frowning Richard

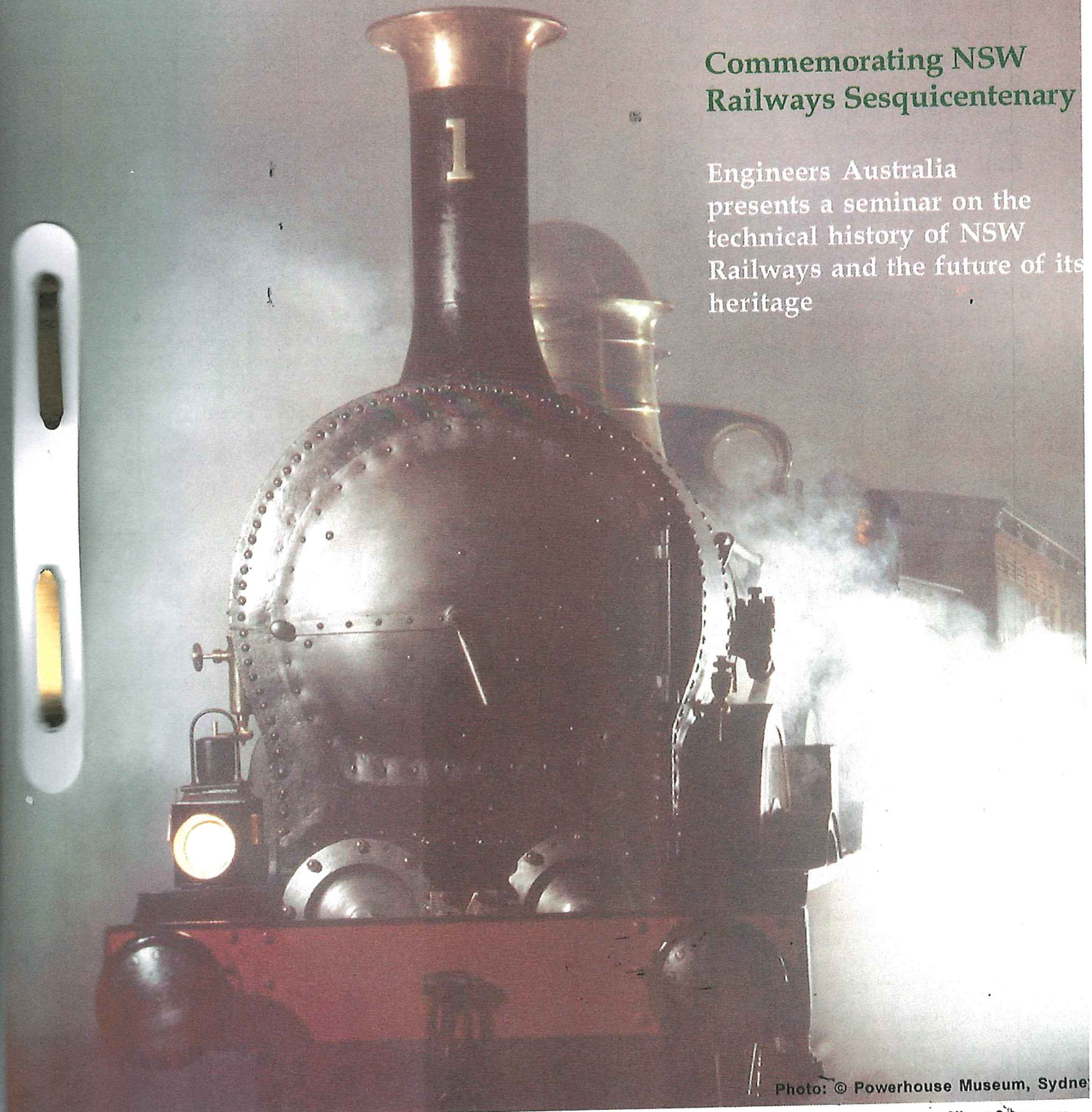
At Eveleigh Carriage Works R&T Health FUND "Oldest" in AUSTRALIA 120th Annvir. Dinner Radio/TV Personality Interviewed Richard & 120 Gathered Gods Celebrate Funds Life Formed by Eveleigh Workers.

# NSW Railways History Seminar

in association with the

## 2nd International Engineering Heritage Conference

Thursday 22nd September 2005, Powerhouse Museum, Sydney, Australia



### Commemorating NSW Railways Sesquicentenary

Engineers Australia presents a seminar on the technical history of NSW Railways and the future of its heritage

Photo: © Powerhouse Museum, Sydne

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150 NSW Railways 1855 - 2005

ENGINEERING HERITAGE

*Celebrating 150 Years*

# NSW Railways History Seminar

## ...PROGRAM AND REGISTRATION FORM...

### Seminar Program

8.30am Registration

**Morning Session 9am - 1pm**

- **Future of Railways Heritage in NSW**
  Reece McDougall, Director, NSW Heritage Office
- **John Whitton - The Introduction of British Railway Technology to Australia**
  Robert Lee, Railway Historian and author "The Colonial Engineer - John Whitton"
- **The Great Zig Zag**
  Basil Hancock, Chairman
  Zig Zag Railway Coop
- **The Changeover to American Bridge Technology in NSW, Why 1892?**
  Dr Don Fraser, Railways Historian and Heritage Consultant and author of "Bridges Down Under"
- **Railway Sleepers and Sleeper Getting in NSW**
  Jim Longworth, Railways Heritage Officer & Historian

**Afternoon Session 1.30pm - 5.00pm**

- **Locomotive No.1 & the Coming of Railways to NSW**
  Andrew Grant, Powerhouse Museum
- **Electrification of Sydney's Railways**
  Ian Brady, Railways Historian
- **Eveleigh Railway Workshops**
  Richard Butcher, Railways Conservator and author of "The Great Eveleigh Railway Workshops"
- **The Development of NSW Railways Signals**
  Dr Robert Taaffe, Railcorp & Railway Historian

**Gala Dinner: Engineering Heritage Conference & Railways History Seminar**
Thursday 22nd September
7.00pm for 7.30pm - Watersedge, Pier One
Tickets $88.00 per person

*CANCELLATIONS:* If you are unable to attend, a substitute delegate is welcome at no extra charge. Where no substitute is available, a fee of $55 (incl GST) will be deducted from your registration fee for cancellations received by The Meetings Manager in writing at least 14 days prior to the event. A 50% refund, plus seminar documentation, will be given if cancellations are received in writing between 14 and 7 days prior to the event. Thereafter no refunds will be made, but seminar documentation will be sent by mail following the event.

*OUR PRIVACY POLICY:* By registering for this seminar, relevant details will be held on a database by The Meetings Manager and Sydney Engineering Heritage Committee. A delegate list will be provided to all seminar participants (name, position and organisation only). If you do not wish your information to be used in this manner, please advise The Meetings Manager.

NAME _____

PREFERRED NAME FOR BADGE _____

POSITION _____

ORGANISATION _____

ADDRESS _____

CITY _____

STATE _____ POSTCODE _____

COUNTRY _____

TEL ( ) _____ FAX ( ) _____

EMAIL _____

**SEMINAR REGISTRATION FEES:** *All fees include GST. Registration fee includes: admission to all conference and seminar papers on 22nd September, conference and seminar papers (on CDROM posted to delegates following the conference), morning tea, lunch & afternoon tea.*

☐ $150.00 Early Bird* ☐ $170.00 Standard

** Early bird registrations must be received by 15 July 2005*

**PAYMENT DETAILS:**

Seminar Registration Fee $_____

Gala Dinner:

No of tickets ____ @ $88.00 per ticket Total $_____

**Grand total** $_____

**PAYMENT:** A cheque made payable to The Meetings Manager Pty Ltd is enclosed ☐

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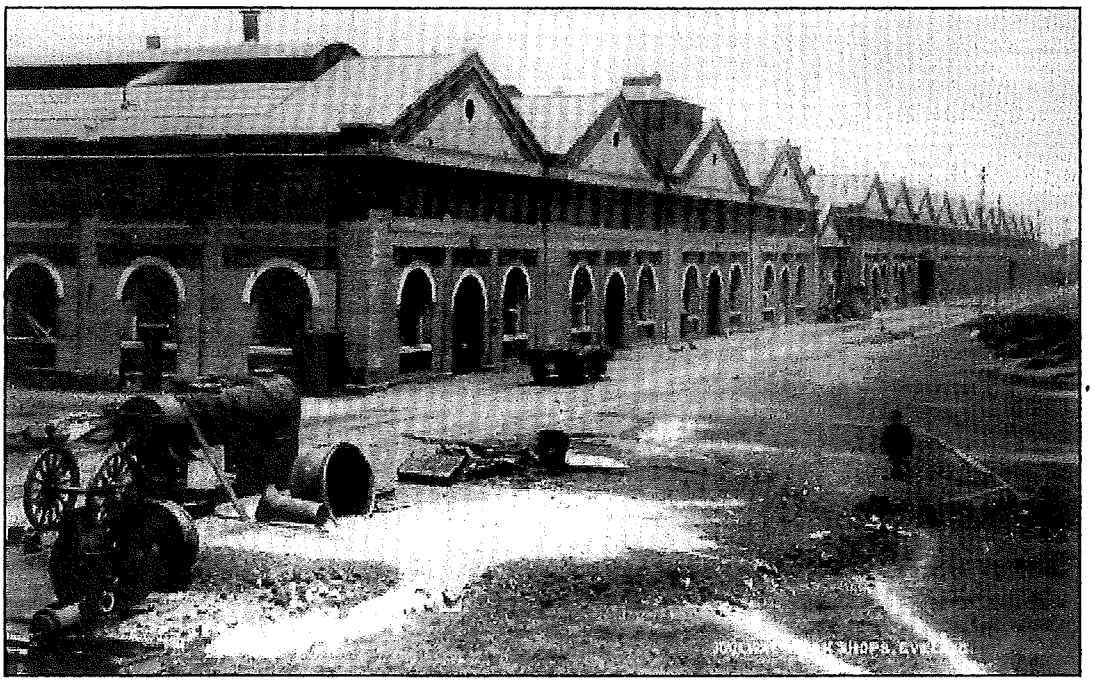
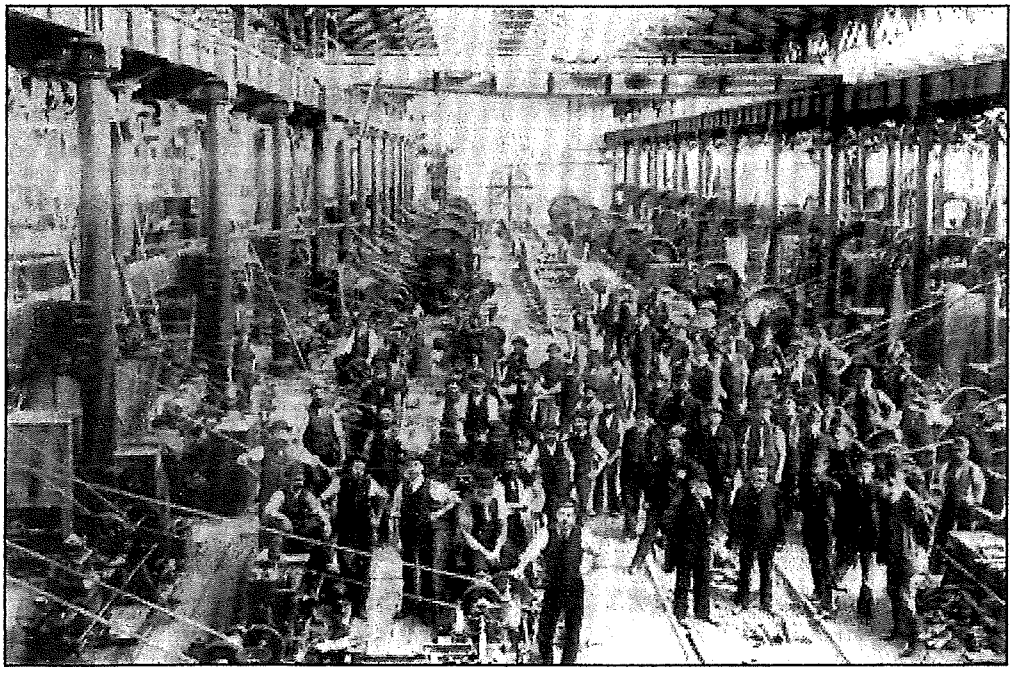
# The Story of
# Eveleigh Railway Workshops



**Presented by Richard Butcher**



A Rail Heritage Seminar 22nd September 2005

Presenter Richard BUTCHER

INTRODUCTION

A SBS Film Documentary about the Eveleigh Railway Workshops gained a BEST FILM DOCUMENTARY in the later 1990's. presented.

V H S Video time 7 mins.10secs.
Thanks to Take One Video's & Marcello!
Historic talk from ex. workers and Heritage experts spoken on the Audio Visual presentation.
SPEAKERS-Video
Guido Goveneour Leasee of heritage Smith's shops 1 & 2
Richard Butcher ex Blacksmith/Author/Publisher new book
THE GREAT EVELEIGH RAILWAY WORKSHOPS

Allan Harland ex Blacksmith/Forger
Don Godden Heritage Consultant Godden,Mackay, & Logan.
Richard Raxworthy Rail Historian
Fred Rushworth ex Worker
Richard Butcher ex Blacksmith/Weld.Engr. Author.

## RICHARD BUTCHER'S REMINISCENCES OF - EVELEIGH RAILWAY WORKSHOPS

Where is "Sydney's Industrial Heritage" ?
Where did just under 5,000 men and Women work- "Simply two"(2) stops from Sydney's C B D Central Business District ?

### The Eveleigh Railway Workshops REDFERN

Situated on a large 62.5 acre site, featuring Heritage Victorian era Heritage buildings. Ironically some sections are still active to-day 2005!

Richard's intro days to Railways.

As a lad growing up in a country town in far northern NSW during W W 2, my father employed as a leading fitter/machinist at Casino depot. My oppurtunities were great, dad allowed me to move (under his watchful eye) D50, C35 and C36 class locomotives, boy what a start!

Dad was also relief Sub-Foreman, and served at NSW's furthest Northern depot Yeeronpilly (South Brisbane) relieving as District Locomotive Engineer. These events left an indelible mark & link to Steam locomotives and Railway operations

Richard started as a Call-boy,(1950) 15 years of age, for the first six months then decided to start a trade apprenticship as a

Blacksmith at Casino.
I hated school but soon loved the trade, the work, the atmosphere and encouraged by the Railways Institute Correspondence team in Sydney. I could not believe when the Chief clerk at Casino depot stated-
The Commissioner Redge Windsor announced you topped the state in your Blacksmith's trade course, in my 1st year, that event continued for 4 further years.

Another letter arrives asking me would I attend Sydney Head Office of the NSW Railway's at Wynyard as a place in the Design office, was alocated to learn technical drawing and more!
I spent 9 months with the Mechanical Engineering section, and Jig/Toolroom design under Ray Richardson 'Chief Design Officer' stating I should start an Engineering Degree course? The year 1955.

## EVELEIGH RAILWAY WORKSHOPS

1956

I started in the now historic Blacky's shop No.1, doing general forging. The work was very differnt from the Running sheds at Casino. At Casino one had to weld loco frames to-gether, Carry out metalling bearings with white metal for varying axle boxes, Z12+13 class, Z19,C32,C35,D50 class cross heads, valve equipment. Aligning staff exchangers. At Casino all forging was done by the anvil and a 10 lb. 5 Kg. sledge hammer.
Eveleigh was WHILST "king" - EVELEIGH LOCO STEAM HAMMERS they were f-a-s-t, hit very heavy blows, dangerous in the wrong hands. Plus a heavy steam/hydraulic Davy 1,500 ton press and more. But an overall look at EVELEIGH SHOPS. Its impossible to cover the real story here!

## EARLY TIMES THE 1880's

Early times found 'SMITHs' Carried out a huge diversity of Engineering Tales. THE WORK very interesting

John Whitton proclaimed the "father" of the New South Wales Railway system, could see as Engineer in Chief the increasing growth of the state. The problems maintaining the then present rolling stock, locomotives and requested a brand new workshop!

## THE SITE

The purchase of a site near the original Cleveland paddock's half way between Central station and Redfern seen a parcel of land - the John Chisholm Estate purchased for 100,000 Pounds, or $200,000 around 1880.
Land area was 62.5 acres.

## PURPOSE

Whitton required as follows:-
A) a small marshalling yard
B) a Locomotive depot
C) a Carriage Workshop
D) a Locomotive workshop

OPENED UP DVD CASE

by Dr. P. Radcliffe

More recent documentary EVELEIGH by Dr. Peter Radcliffe May interviewed ATP Management Richard Butcher (2 DVD)s

# Steam, Science & Style

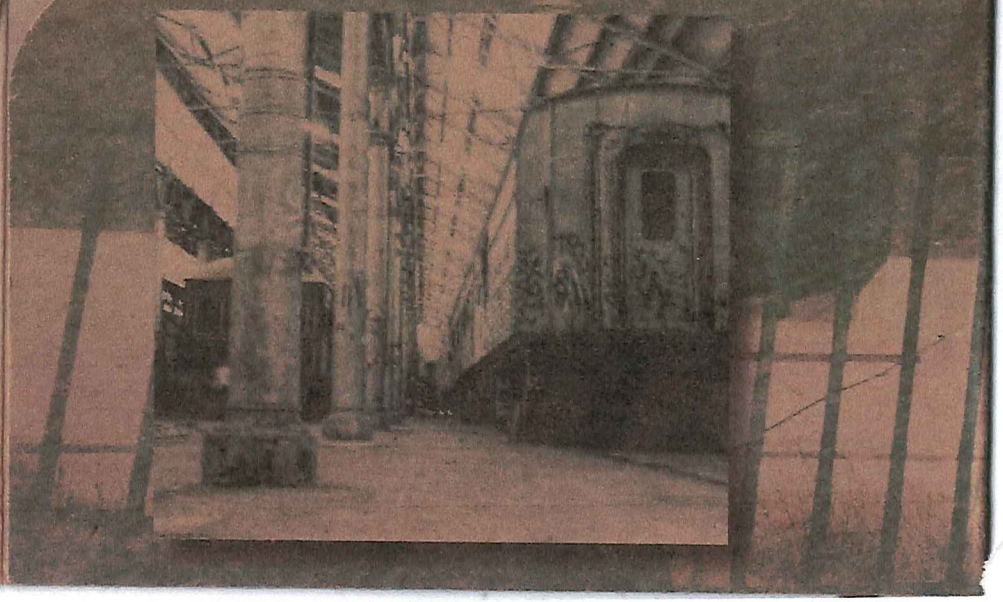
# The History of the Eveleigh Railyards

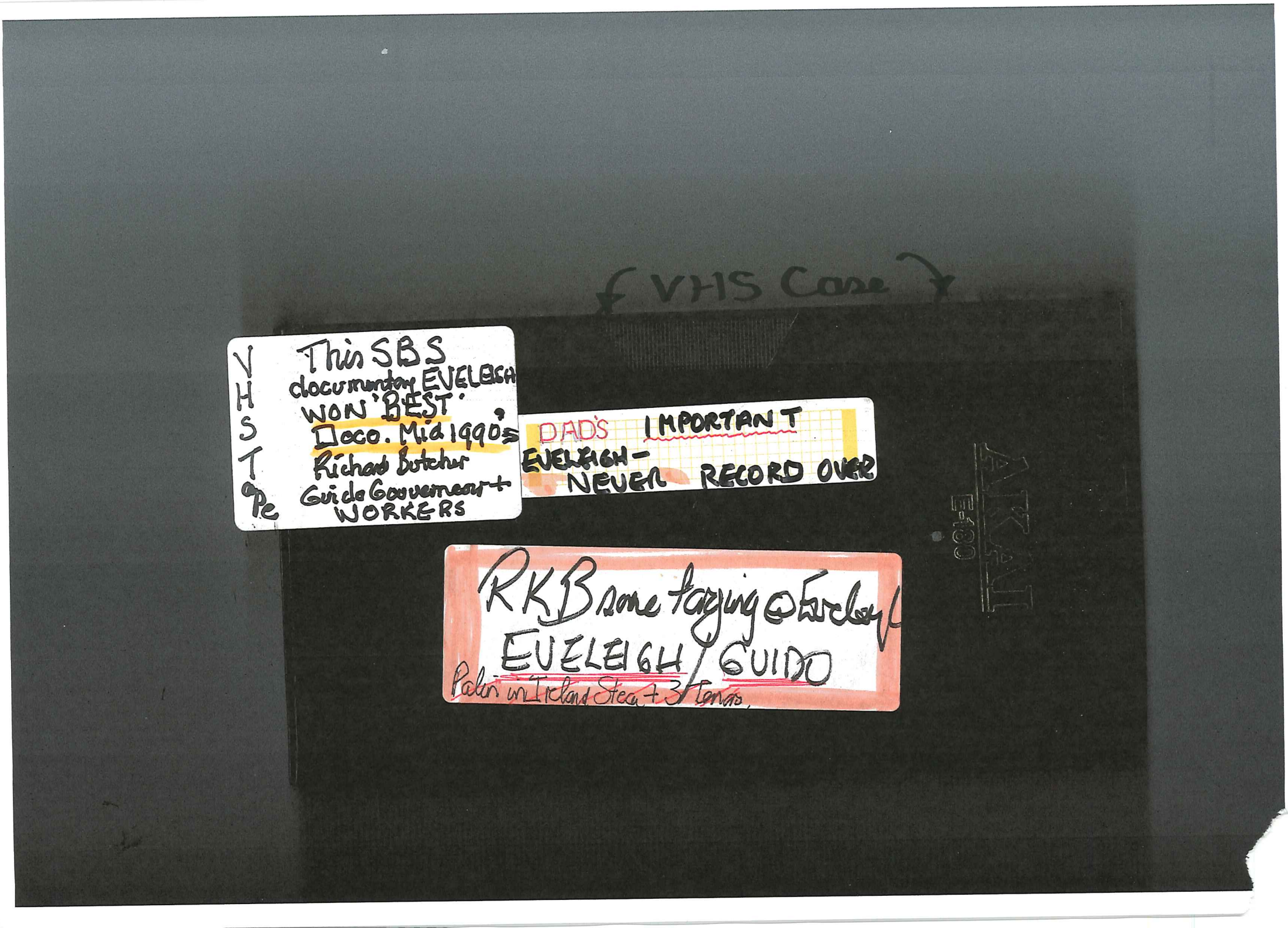

## Part 1 - Steam



## Part 2 - Science & Style






{ VHS Case }
VHS Tape
This SBS documentary EVELEIGH WON 'BEST' Doco. Mid 1990's
Richard Butcher
Guido Gouvernaur +
WORKERS
DAD'S IMPORTANT
EVELEIGH -
NEVER RECORD OVER
RKB some taping @ Eveleigh
EVELEIGH / GUIDO
Polar in Iceland Steam + 3 Tenors.
AKAI
E180

One Short Story. 1 of 24.

One Short Story I produced a series of stories asked by Minrac Indirectly Common Bank Card Heritage + More earlier 2018.

## WORKING LIFE AT EVELEIGH

By Richard BUTCHER ex. Blacksmith /Welder/Engineer

Once a period in time, an era, the passing of time; one can only comment re the "WORKING LIFE" at the heritage rail Workshops for the years 1930's to the 1960's. My father worked at Eveleigh from 1925, rode a push bike from Bronte, to Eveleigh, other times a tram from Bondi Road at Watson St. to the Railway, or Central; then a red rattler to Redfern or Eveleigh shops. Early most mornings the tram driver gave you a wave, "hello", people were friendly, you gave up a seat for an older person ,a pregnant lady etc.

The workers came by train, by tram to alight at Botany Road, also rode bikes, walked, very few could afford a motor vehicle, a few rode a motor cycle. My Smithy mate Don Frohmuller travelled by steam train Woy-Woy to Redfern each working day, up at 5 am. Start work at 7:30 am. Knock off at 4:12 pm.

The Eveleigh shops were for the era quite modern, good machinery, well maintained by shifts of Millwright's, whom serviced and maintained machinery. The main function at Eveleigh was to maintain a fleet of hundreds of steam locomotives, at specific periods to construct New ones. At Chullora, outer suburb another locomotive workshop existed & younger than Eveleigh. Certain items/components were forwarded to Eveleigh for over-haul, repair, renew etc. all inter-grated for their specific function. The C M E's Redfern unit worked out each depot or work - centres needs, like Boiler over-haul, often done at Chullora workshops, as heavier lifting cranes; Boiler shops at Eveleigh Bay3;4;4A -kept busy over-hauling fire boxes, boiler barrel's, cleaning all the scale, rust, dirt from superheater and fire tubes from a variety of loco classes.

Richard' era 1950's to late 1960's large loco's like the D57 & D58, C38 classes saw different parts forwarded from Chullora shops to Eveleigh, for over haul, rebuild or total replacement. As a Smith in bay 1, one regularly rebuilt Sampson Beams, Brake beams, altered the dimensions of Coupling & Connecting rods all classes of engines, when completed the items returned to Chullora shops.

### LOCOMOTIVE CONSTRUCTION

Eveleigh built nearly 185 new locos, the last were in 1952 period; the Mountain Class three- cylinder D58's. very powerful machines, also being restricted in their operations, axle weight and width the main factors, namely South to Junee, South Coast to Thirroul, West to Lithgow. With the D58 engines, a total of 13 built, another Northern workshops at Cardiff near Newcastle built only two, (2) numbers 5807 & 5813, yes a little strange on reflection. Was told a few D58 class returned to Cardiff for Over-hauls. The years 1952 the last 58 built, dieselization on the horizon, and additionally two classes of steam locos- imported, were:-

D59 Oil Burners 5901 to 5920, American Baldwin Lima Company 1952-53; a batch of AD 60 Beyer Garratt's from Beyer Peacock England, 1952-56; the most powerful steam locomotive in Australia, in recent time one operates, they weigh about 260 tons, being long the weight on each axle is lower, or spread out thus a versatile loco. All AD60 class assembled at Eveleigh Workshops, both classes brought in by special ships and unloaded in Sydney.

Thousands of Apprentices from a grand variety of backgrounds served at Eveleigh, whether Carriage works or Locomotive shops now the Australian Technology Park, in passing, the workshops closed in 1988 after 100 years operating. An Iconic Industrial giant from the age of steam!

Eveleigh supported various wars in manufacturing different products. Example not many women worked at the shops, however WW 2, ladies called to help and the manufacture of 25 lb. artillery shells they made. Special lathes and machines installed to manufacture these items. Even a few Air Raid Shelters exist under the embankment outside shops 4,5,6 area, to-day, a legacy to protect a vital service.

The huge Foundry assigned to cast the Gun -turretts for the Australian CRUISER TANKS, some 65 built mainly at Chullora but the Eveleigh foundry cast special materials armour plate strength, and quench to maintain a Hi Strength, very unique.

A little earlier I mentioned 'ladies', there were usually 2-3 as Tracing Girls in the Works managers unit, the Canteen Bay 5, had around 8 to serve the workers, meals, sandwiches, drinks etc. and a Nurse at Car Works her name was Sister Lyons, and near famous Red Square Loco works beside the Potash cleaning unit, Sister Nadia at Loco.

The work yes DIRTY, a steam loco burns coal or oil, the motion gear all oily, greasy, climb under and nuts and bolts on the brake gear, the horn-stays, axle boxes all D I R T Y. Before I oxy cut any work asked the fitters mate to clean off the worst grime, they used kerosene and waste cloth. At the Large Erecting shop, our new Australian friends got their wives to make Berets, many reversible, keep the grease from your head, at 1958 cost 2/6d. or 25 cents cheap.

Of a Friday throughout the whole shops was wash afternoon, hot water, sunlight soap, a bucket or drum boil up, a fire under, a wooden stick to stir and lift out your overalls, then hang somewhere to dry.

Back then workers smoked using a "pipe" or rolled their own cheaper than buying at a shop, called a "fag", and roll up in a thin rice paper, a good brand was "Tally Ho". In the 1950's a pack fresh off the shelf 20 cigarettes cost 2/6d or 25 cents. Brands I recall were ARDATH, 333 's. Sailor, Woodbine.

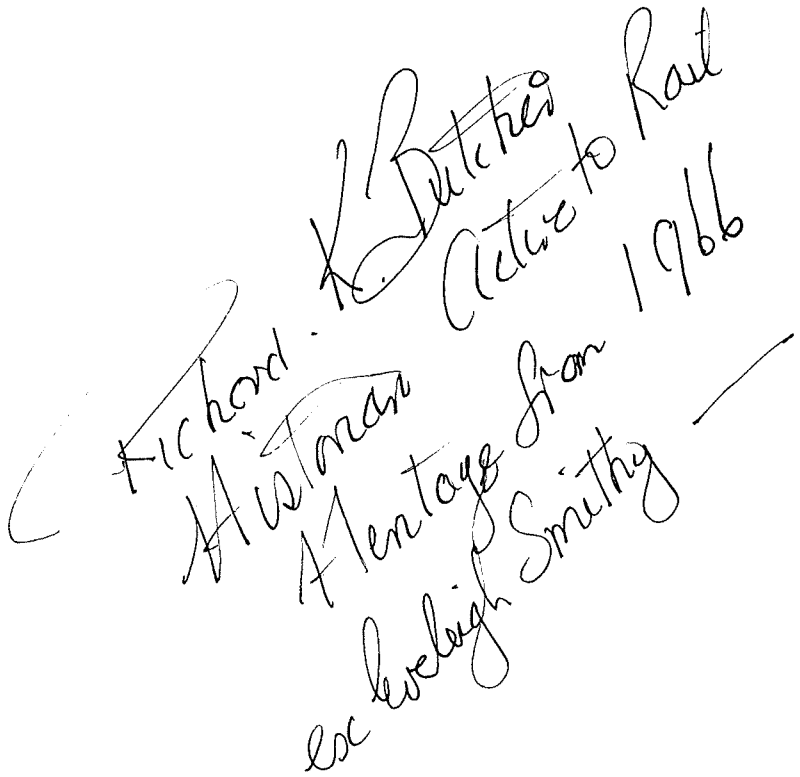
In the 1920's near all workers wore a felt hat, many a Bowler hat, had beards, and many a large moustache, my era followed workers along platform 10 Redfern, wore neat suits, through the now sealed off tunnel Platform 10, and when at their lockers changed into blue overalls and simply a floor worker. Each worker was allocated a token a small round aluminium circle disc with a number stamped to identify the person, and each day we had to remove and replace the token onto small boards which were locked after the shift began, if late docked 'double the time' late that is 10mins. To 20 mins.

The work was hard, tough, at times HOT, all various tasks, cleaning locomotives, clean down machines, the huge windows, Watchmen on the gates for security purposes. Locomotive crews, Fuel-men to service the fires, coal the tenders, rake out a fire box. Clerical bods, time keepers, Foreman, Sub-foremen, Leading hands, tradesmen, trades assistants, Apprentices, Shop-boys.

Approaching the shops the smell of coal, plumes of steam, and smoke being there, shunting small locos, puffing here there. Many a day you seen a fresh black, maybe green painted engine after their over-haul sitting in the yards or near the Large Erecting shops, looked superb. With so many local and outer suburban trains in operation, the going out (road to Central station) roads 1 upper, the other down the dive under Redfern station, I think the smoke stacks are still standing where smoke poured from when the loco went down under. Every loco would have to 'whistle out of loco' three short whistle blasts, to let the signal box not far away back then- "permission to enter traffic", and even boats standing at Circular Quay when a ferry backs out "three blasts of their whistle heard"!

A working day we heard the whistle blow 3 minutes before start up at 7:30 am. The final for the day blew 4: 09 pm. Final blast at 4:12 pm. And wow, a crush, a rush, as thousands stormed out the gates headed for usually an electric train, but steam still operated up to 1970's. The Woy Woy trains, the South Coast lines, and - the Main South. Regular services like train No.49 South did NOT stop at Redfern, nor its partner- The Southern Highlands Express, or the famous Northern line NEWCASTLE FLYER to Newcastle, being Express trains limited stops.

Many a worker found friends for life at Eveleigh, I still communicate with an ex. Loco Casino chap, Reg SMITH a Call-boy at first at Loco Casino, to a fireman on the brilliant C38 class locos. Met Smithy 1948 so 70 years friendship, and know other rail workers for decades. We all say STEAM ON, STEAM AHEAD! Pioneers of Australian Railways Industry.



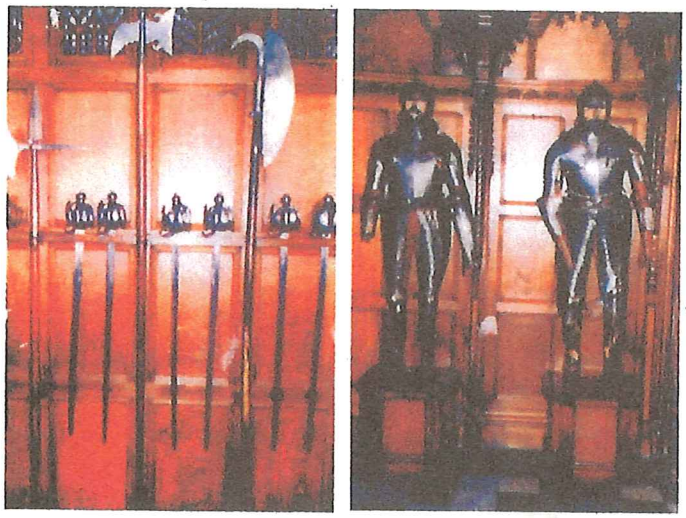
# The Blacksmithing Trade

By Richard K Butcher F.W.T.I.A.

I have given some thought about writing some information regarding the very ancient trade Blacksmithing. Many people would know of my Eveleigh background and my involvement with the newer Australian Technology Park (ATP) on the old Locomotive Workshops site at Eveleigh. I commenced my trade serving a five-year apprenticeship through the great Railways Institute firstly at Casino for four years then to Eveleigh Loco shops Nos. 1 and 2 (of 1887 vintage). I served at the Eveleigh blacksmith's shop from 1956 to about 1960, then moved to the Welding Shop and another change to the Large Erecting Shop at Eveleigh, then finally to the Laboratories as a NSWGR Welding Engineer.

The Smithing trade goes back a long way, the word "blacksmith" from the activity of forging Iron or Black metal plus layers of 'slag' or surface oxidation. Smith is derived from 'smite' an old term for 'Smith', meaning 'to hit'. In mythology, we look at Hindu – Tvastar, is known as Blacksmith. In Latin,

The Author standing beside a 5 ton ingot at the ATP Eveleigh open day in 2012. The 1500 ton Davy press is in the background.

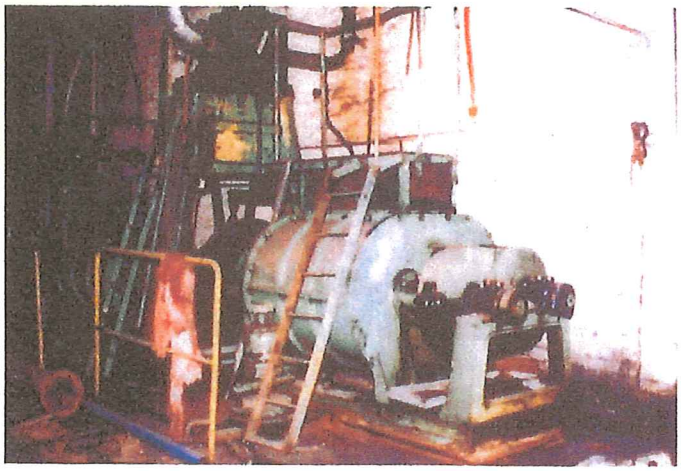


A collection of swords, battle axes and suits of armour. These are centuries old forgings. There was even special armour made for horses.

Hephaestus – Vulcan. In Greek mythology and also Roman, a supremely skilled artisan whose forge was a volcano, the weapons forged were spears, daggers, swords, shields etc.

The Celts had their mythology as well. The role of the Smith is held by Eponymous (their names mean Smith). The Anglo Saxons Wayland Smith, known in Old Norse as Volundr, is a heroic Blacksmith in Germanic mythology. Therefore, before the Iron Age, man worked, formed and forged nonferrous metal. Gold, copper and silver go back over 36,000 years. About twenty years ago I visited the Sydney Art gallery to observe a Chinese Exhibition, there I noticed ancient Chinese brass and bronze artefacts that were 'brazed' together thousands of years ago.

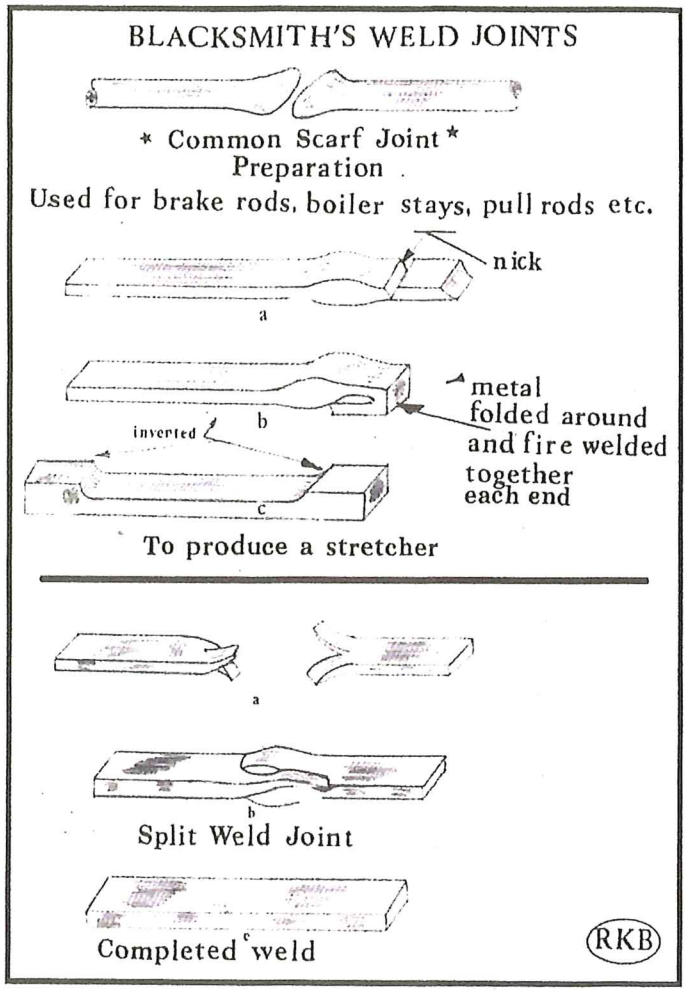
Of course these metals were malleable, readily forged or formed to desired shapes. Generally we cannot harden or temper brasses, coppers, bronzes, however, they can be "work hardened". These metals can be annealed (softened) by a heating and quenching process. Casting was common way back.

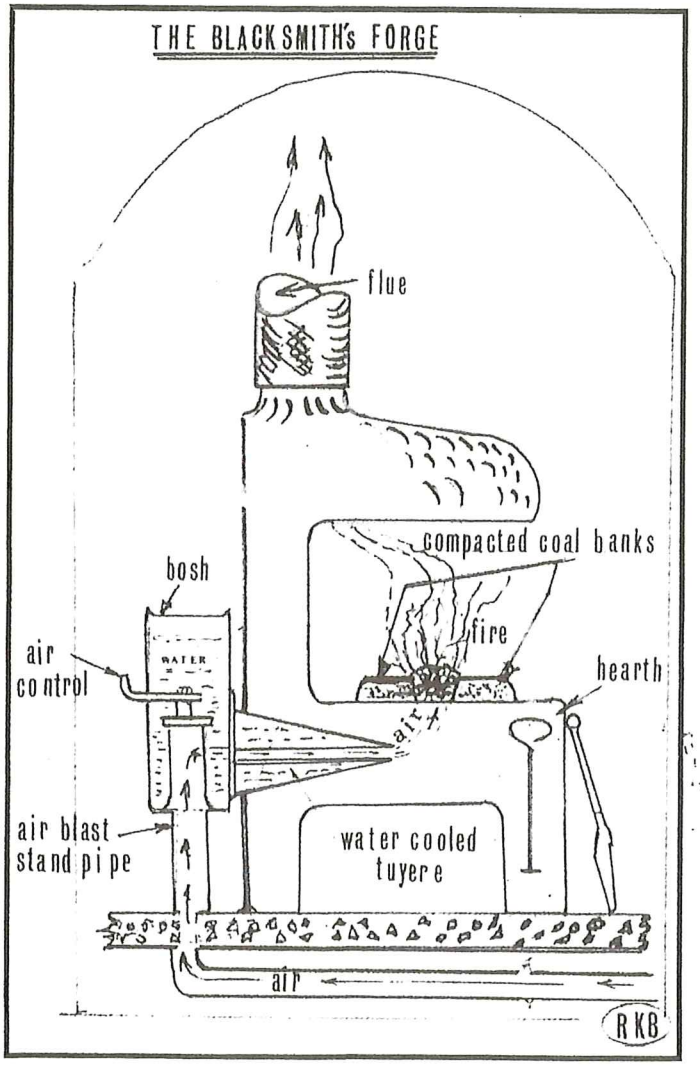


One of the three circa 1900 vintage Rootes Blowers still being used at the ATP Eveleigh No.1 Blacksmith shop. These steam driven blowers were reasonably quiet in operation.

impregnated within the wrought iron. This formed a harder tougher item for war, yes daggers and swords were still being used, however, in battle they were too soft and often had to be stood on to straighten them to continue to fight. Historically the Romans also noted that during the fourth Century the Celts had iron, but not good steel, again in battle the swords bent, thus they had poor knowledge of the material.

Through the great instructors at the old Railway Institute at Homebush (that was an old carriage shed now demolished)




we learnt through Master Smiths Ron Kirkness and Jimmy Kirk the fine arts of our trade and much about the heat treatment of tools.

## Fuel used by the Smiths

Initially to light the forge, small pieces of wood, then coal were fed into the fire. At Eveleigh we used crushed peanut sized coke, which was excellent for our work. Coke burns with little smoke, and that's a good thing!

The fire was centred in a hollow (above the tuyere iron) where the air is delivered to the fire, the tuyere surrounded with water to keep cool and not burn away. We used fine slack coal to create high banks (walls), we controlled what we wanted the fire to do, plus at Eveleigh we had "pure air" so to speak to give maximum heat for much of the "fire welding". At the old 1950s forges (still being used - well done ATP) three Rootes style air blowers sit at Bay No.1. They deliver 'good dry air', I mention this as most modern Smiths use compressed air that induces water into the heart of the fire. This is a no-no especially for maximum heat for "fire welding" at around 1300 to 1400 degrees C – water creates a 'clinker' which is a congested mass of burnt expired coke that blocks the air ways!

Fine wetted down slack coal was patted down to form a hard wall or banks totally essential to the fire, so we control what's cooking! We used 'coke'. Why not charcoal? Contaminants within charcoal do not provide the ideal source for our work, if we use coal, then we get too much sulphur which is detrimental as it causes "red shortness". To put it simply, it becomes brittle when the job is hot and the component could crumple away! Phosphorous is also a problem; this creates Cold Shortness brittleness when the job is 'cold'. We did chop and change but in the Blacksmithing trade there are many aspects to the work.

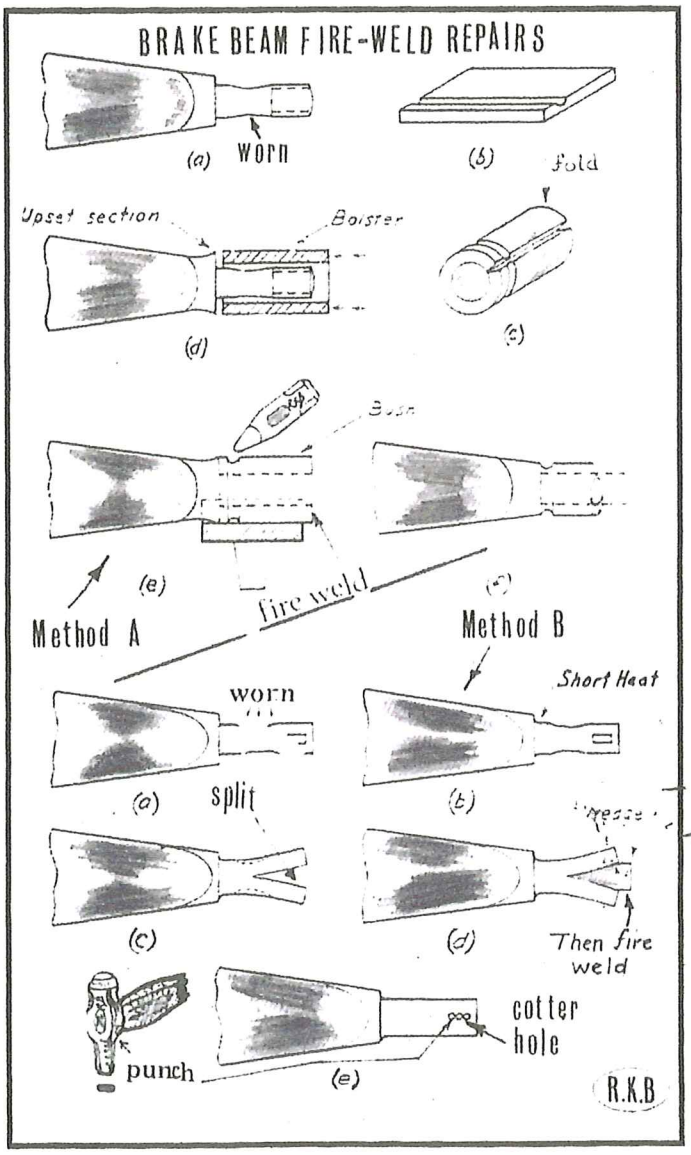
2

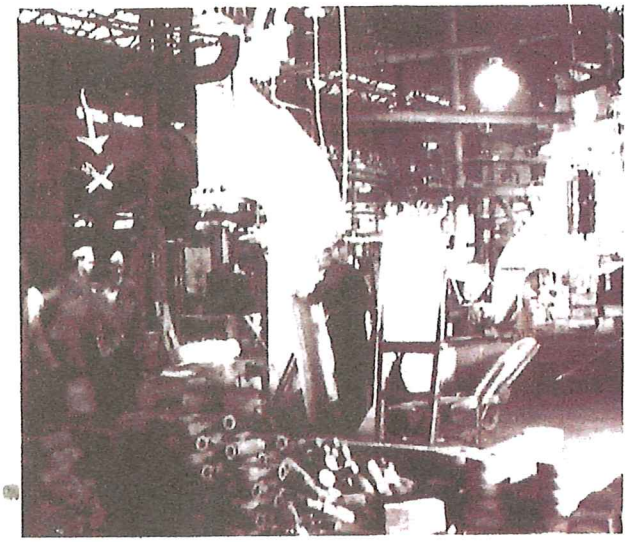
## Other elements

So far I haven't mentioned the other elements, we have nickels, chromium, copper, manganese, aluminium, many other elements found in every day steels, and many are forged. We use coke, a solid carbonaceous material, derived from coal by destructive distillation of low ash/sulphur bitumen coal. It is burnt in a special baking oven or numerous ovens. Coke can even be found naturally as volcanic deposits. More importantly it does not contaminate the work piece with added carbon. Airless ovens and furnaces utilised water cooling at specific periods, at a large plant on the NSW South coast Illawarra region, Coke is used in the blast furnaces to assist in the manufacture of steels.

## Fire welding

Fire welding is a very old welding process. At Eveleigh all the important locomotive parts were joined together this way. In No.2 shop I welded locomotive longitudinal stays around four metres long. Tender and Locomotive brake beams were all fire welded in No.2 shop. Yes hot, heavy, fast, sparks, heat and sweat but I survived! To carry out a weld, both pieces of metal are heated and each end jumped up (upset or thickened) to form a common scarf weld. Each weld face has to be convex; we do not want slag trapped within the joint. One used a 'flux' sand, where it melts and forms a silicate of glass around the ends of each component that helps prevent oxidizing. We used the Anvil to carry out this weld.



Eveleigh No.1 Blacksmith shop in the mid 1950s. Ste hammer operator "Harry" forging swing links for a C32 loco at the heavy 20 cwt. hammer. On the right is the d arch 40 cwt. heavy drop forging hammer. Behind "Harry" of the C30 class boilers used to provide steam to drive the hammers.

## The weld

Each piece is placed into the fire, side by side, say dia. (1") round, slowly rotated under the watchful the 'Smith'. As the temperature rises, the black mater eventually start to glow dull red, then to a red, then to a red which means it is now at around 850 degrees C. N increase the blower/air supply, the colour now graduall yellow then to a yellow white. Now we throw a small ha of sand over each end. We require, if wrought iron, nea C. or within 100 C. of the metal's melting point. Note: v no coloured welding glasses, no safety goggles, no leather this was normal for the era! No cold water was provided tap over our cast iron cooling tank.

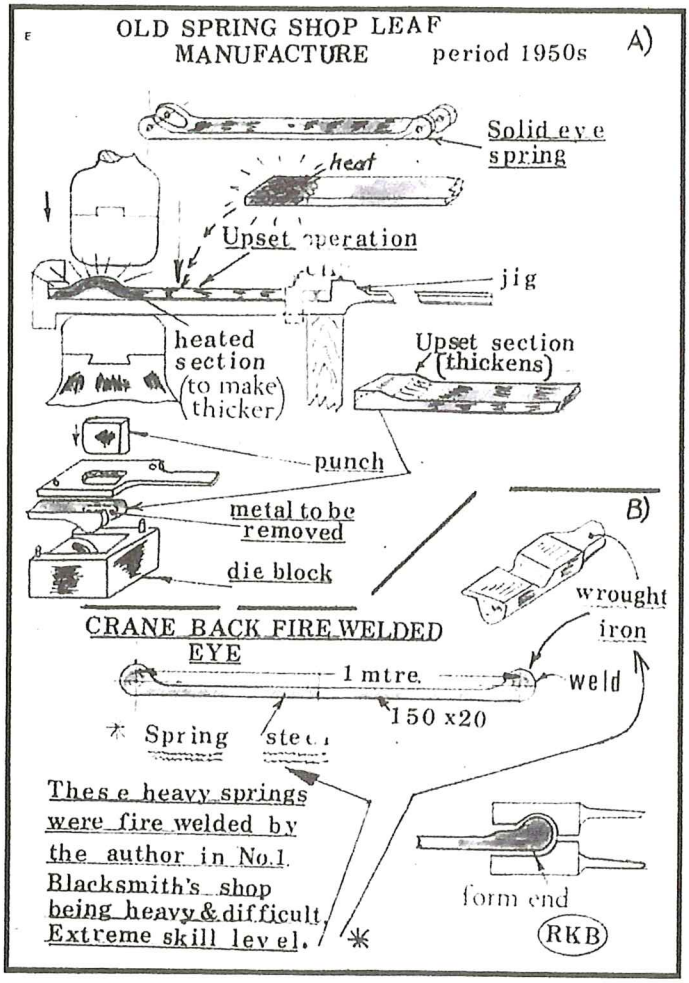
As the blower (air supply) slowly increased, small would commence an upward path and the Smith becam engrossed in what was happening when he saw the me liquid. He watched until the material was near plastic melting away. A spectacular sight on reflection, then he race to the anvil and gets the striker to place one piece anvil, the Smithy lined up the two pieces then rapidly har away, or forged them together to form one piece. Note, w Smith approached the anvil he hit the two pieces on th horn, this removes the silicate or glass oxidation protecti of sand.

In the No.1 Blacksmith shop I served as a double st two strikers which was much heavier style work. A lot beams, big Sampson beams for under the cabs of D5 C38 and D50 class utilized a beam. We had to use a sm as the weight may be 120kg., we also needed an efficier hammer driver, it was totally team work.

Historically, the earliest Smith's forged the wheel of steam locos. Drawing away each individual spoke w work of art, the skills have declined dramatically especia the introduction of other forms of construction ie. Ca opposed to forging!

Shipyards produced ship's anchors as an all forged plus the individual chain links and all handwork, wh amazing. In later years electric resistance welding su the hand forged work, and may I say thank goodness Wrought was the iron used, commonly welded, forged but it was replaced with mild steel.

3




## Wrought iron

Near pure iron (Fe) has glass-like longitudinal seams running through it, a fibrous nature with a minute trace of carbon. Great to forge and fire weld, under each forge we had spare pieces stacked for that special job. We also had off-cuts of loco tyres, they were medium carbon steel with around 0.5 – 0.6% carbon content.

A current example of a wrought iron structure is the railway bridge over the Parramatta River at Meadowbank, no one paints it — truly marvellous. Throughout the 25 hectares of greater Eveleigh, the massive roof of around 29,000 square metres is held up by wrought iron structural roof girders and beams, a near pure iron with little carbon contained in the metal.

## Carbon's influence

We now cover a little more about Carbon's influence in steels.

- Wrought Iron has near zero carbon.
- Mild Steel has 0.1 – 0.25% carbon. Generally used for bars, sheet metal, nuts/bolts and is now a universal steel.
- Medium carbon steel has 0.26 – 0.6% carbon. It is used for hammers, punches, drifts, chisels, tools all sorts of axes, adzes, etc. Medium carbon steel has to be heat-treated requiring a temper colour to reduce 'brittleness'.
- High Carbon steels have 0.6 – 1.5% carbon. High carbon steel is used for tools requiring an overall hardness example a File, Broaching tool etc. again requires heat treatment as it can be very 'brittle' thus break.

Outside the Smith's at Eveleigh were huge steel racks containing all types of steel held within the racks. Each type of bar had a colour code painted on each end and they made a pretty picture, regrettably I didn't record this, red dots, blue stripes, white background green double dots – etc., blast!

## Cast iron

Earlier I mentioned the Ancient Chinese Cast iron.

Cast iron contains from 4 – 4.5% carbon. Thus carbon changes the properties greatly, more brittle, good in compression but no good in tension! In the old railways we had the big Eveleigh foundry and a lot of casting done, loco cylinders of 22" bore 28" stroke, and thousands of cast iron brake shoes. Cast iron is totally weldable "if" you know what you're doing, a skill near lost now, the brilliant Oxy-Acetylene bronze welding the ultimate bond!

Carbon is abundant on planet earth, coal is a fine example, or those pure Diamonds that take millions of years to evolve. I have brazed industrial diamonds to specific tools, drills, wheel dressers etc.

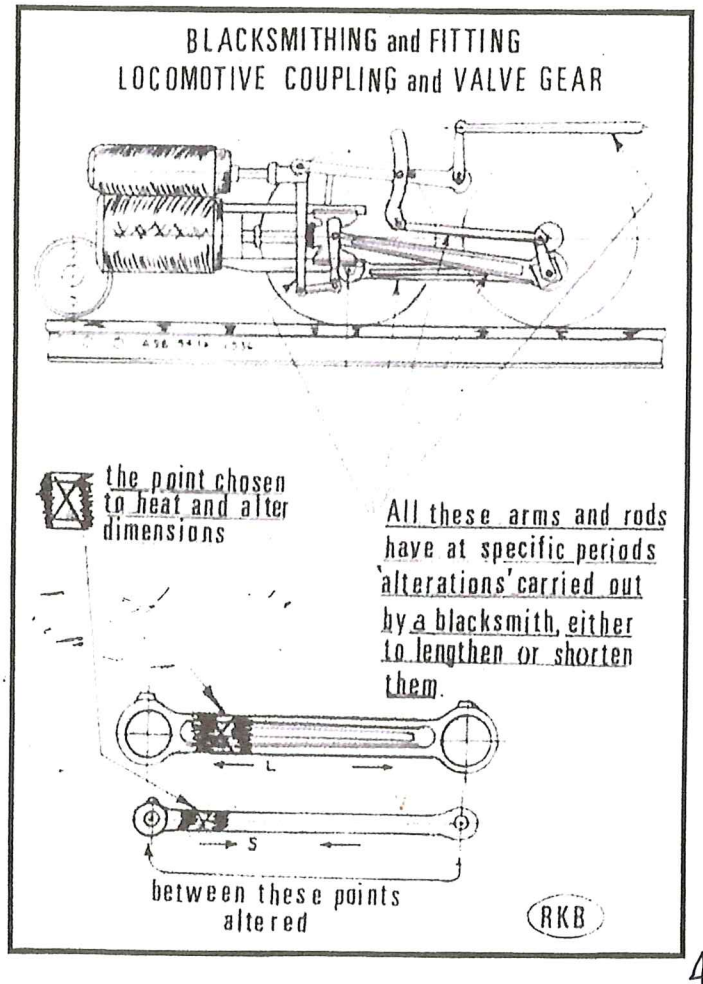
## Cast steel

Yet another of the Carbon family, however it has a lower carbon content of around 2.0 – 2.5%. In the Large Erecting Shop I often welded busted cylinders, frames of Garratts, C38, C36 class etc.

Folks I am trying to keep it simple, as it is quite a deeper subject than I am writing, so now on to other strange things we had to understand regarding steel.

## Metallurgical structure

Have you heard of Austenitic Stainless steel? It is used for kitchen cutlery, pots, pans, sieves, cups, etc. It contains generally 18% Chromium and 8% Nickel. However, there are numerous grades of stainless steel, what about the Surgeon's scalpel, cutting saws, implements? Well they are heat treatable types of Stainless, the Ferritic and the Martensitic, this is the metallurgical grain structure observed through high-powered microscopes generally located at Laboratories -- Eveleigh had all this. All metals have a specific grain structure, for example: Troosite, Sorbite, Austinite, Eutectic. The Critical temperature



range of AC1 AC2 AC3. To carry out successful heat treatment we have to know the colours of heats and the influence of carbon plus other elements. Heat treatment was carried out in Bay 3 at Eveleigh during my era there.

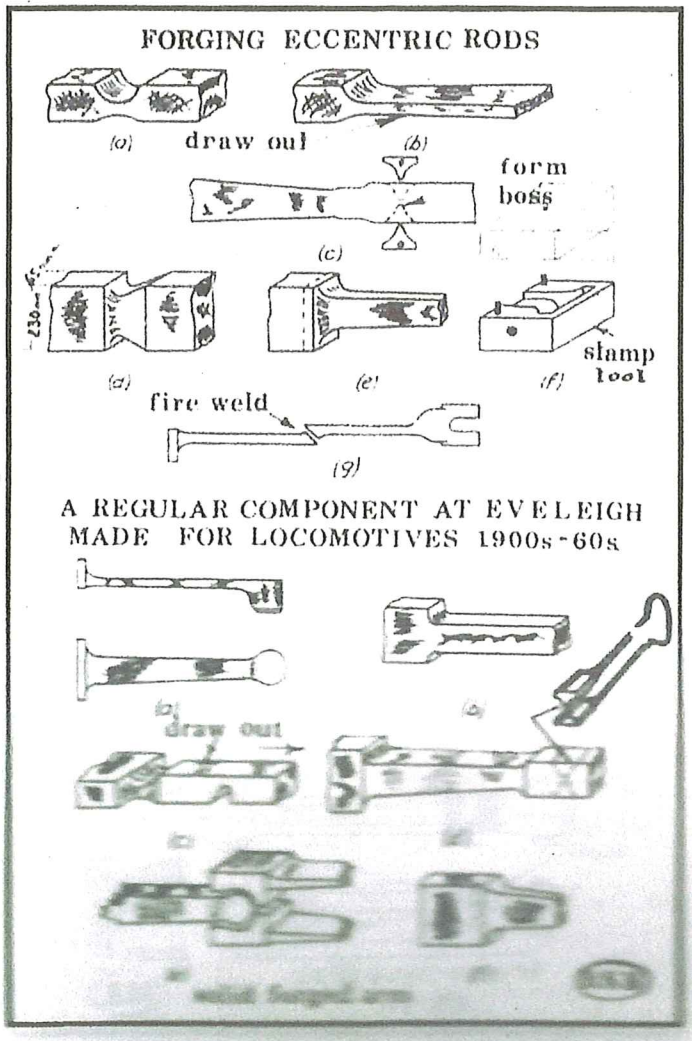
## Colour of metal while forging

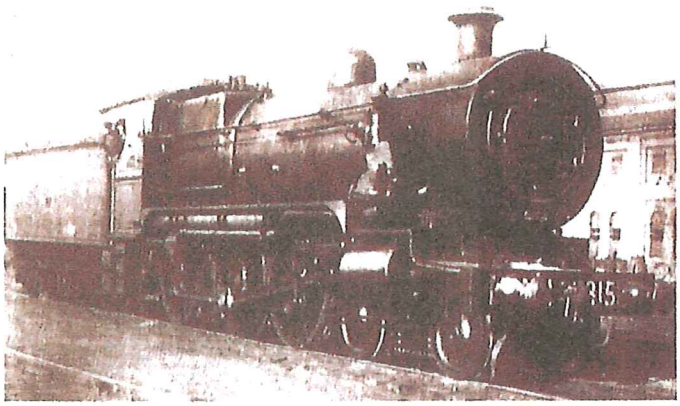
All forging and Smithing activities need knowledge of the material being worked upon. Under the mighty steam hammer, silicon manganese used for loco or carriage springs had a critical forging temperature range, plus when cooling, the hammer used to "double bounce". A bad hammer driver can loose control of the hitting capacity. Just blink and watch out! Often hitting with the power of two to four motor vehicles per blow you can get hurt if something goes wrong. If the driver trips the steam hammer and opens more steam it can be really dangerous.

Example: commence heating a piece of mild steel say 25mm diameter. It is black to begin with, then, via atomic vibration, the molecules vibrate more and more to produce a colour – a dull red, then red, to cherry red at around 850C., continue to a dull yellow now at 950 – 1000C., then continue to bright yellow at 1250-1300C., now a white colour the next step has showers of sparks that ignite and go up the chimney, or if the job is burnt, the Higher C. steels crumble away, if hit with the hammer the job shatters apart. If we get a little technical we can tell another story but no, we won't confuse you!

## The light

No I haven't seen the light -- but dimly lit conditions are superior for forging, in sun light it is too hard to tell the correct forging temperature colour on the job. The use of coke means there is little smoke generated so there is less haze to impair your vision. The bottom line is that years of experience, often a life time, has shown that each application can produce different results that require an adjustment of technique "on the run". The old Smith's were masters of metal.




A C35 class loco "Nanny". These were designed and built at Eveleigh. 35 were built but only one survived.

## Double striker fires

In Nos. 1 and 2 shops there were many two striker forges, we had to use small cranes to manipulate, rotate, turn over, spin around 50 kilos of heavy weight. This was swung (with a rope) from the tall wrought iron structure holding the roof up throughout Eveleigh. Locomotive connecting and coupling rods were lengthened or shortened; trammelling (measuring) the correct final dimension was essential. Note, I am not mentioning heavy forging here, nor the 1,500 ton Davy Press.

## Smithing tools

The old anvil is the key unit for the Smithy weighing from 1 cwt or 122lb wt. to Eveleigh anvils of 5 cwt or 560lb or about 280kg even larger ones at 6 cwt. These sat on a heavy base that was usually a solid block of hardwood. The anvils were used to forge or hammer upon.

A swage block of cast steel with various round and square holes is a very useful tool. Turn the swage block on its edge and the four sides all have varying shapes to nestle an item into to form a definite shape with round or square the most used. Drifting round holes on say a D50 class goods loco with all the spring hangers to drift 1⅛" diameter being a typical application.

The sledge heavy hammer from 5lb; 10lb; 14lb and 25lb being all useful sizes, all made by Smith's with medium carbon tool steel whether it be at the anvil or under the steam or the air hammer.

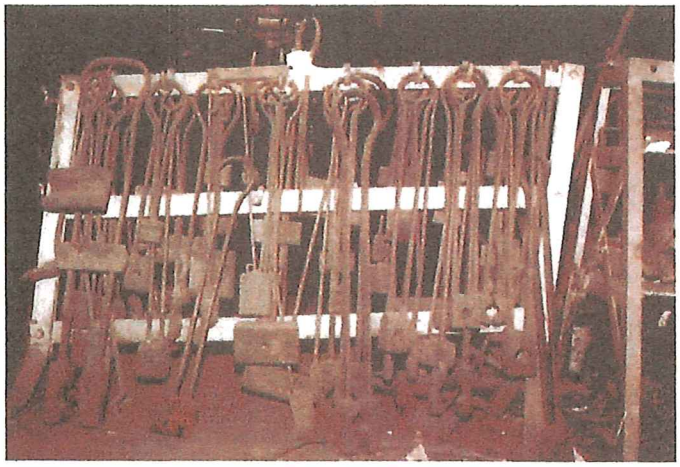
## Steam or air driven hammers

The steam hammer was superior to the air hammer. I found that an air hammer had at times irregular beats or strokes when near finishing a forged item. An extra blow heavier than required would make the job undersize and ruin it. In No.1 Shop, was the big Double arch steam drop hammer of 40 cwt (2,032 kg) capacity where each blow was powerful stuff. Other steam hammers ranged from 5 cwt; 7 cwt and 10 cwt. (Note One Cwt. (hundredweight) is one hundred and twelve pounds weight or 50.8kg).

The steam hammer could squeeze, hold or hammer components with a very fast stroke rate. There was usually a [illegible] beside a Smithy used for cooling all metal or forgings or even a certain position to say make a 90 degree bend, or quench copper to anneal or soften it.

## Tongs

The work was "HOT" thus a pair of Smith's tongs were essential they came in all shapes and sizes. There was the general

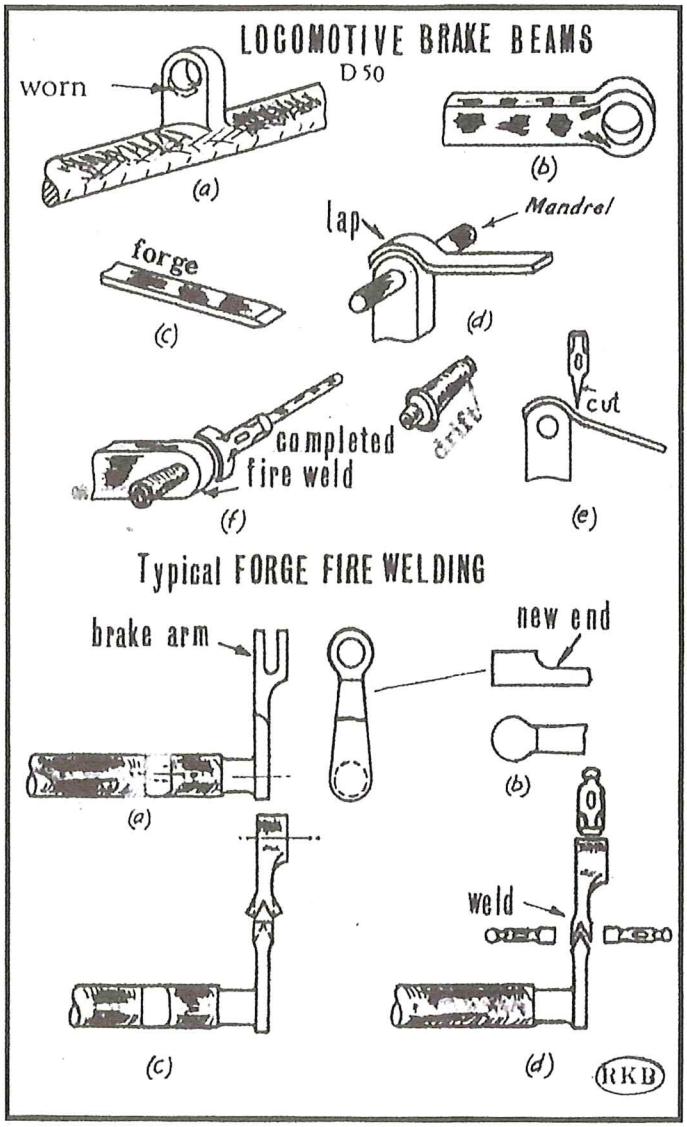


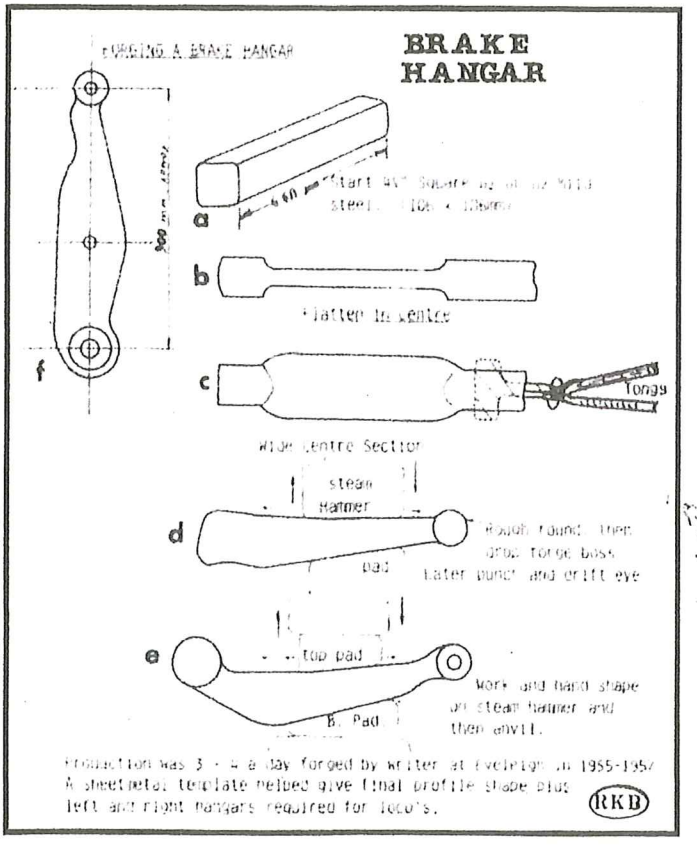
Eveleigh treasure! A large rack holds numerous swage blocks. These form tools kept the fleet of locomotives mobile on the NSWGR for nearly eight decades. They are probably one of the greatest collections of historic tools in existence. A Victorian era workshop stands today as a tribute to our pioneers.

'pick up tong' and the 'round bit tongs' from a small 10mm to possibly 250mm holding diameter. Then 'square bit tongs' from small to very large, plus rectangular mouth's on tongs and special shaped or purchase tongs, all created by the Smith. The heat radiated from a piece of forging metal is really intense. Big jobs use long handled tongs to keep the Smithy further from the heat and some were very heavy to lift.

## Top and bottom swage blocks

These have a half-round profile shape forming the top swage and the bottom swage. In the anvil there were often two square holes to place a bottom swage in. The smith held the top block! Some swages had iron handles others wooden handles. If the striker miss-hits the iron handle bends, if the wooden handle is hit it may split but not always.




A very useful collection of Smithy tools. There is a large array of pick up tongs on the left side. These were used to pick up large forged pieces of steel from the hammers or after being cut to a predetermined size.
In the centre area are heavy forge tools, formed swages and pads for forming corners and quickly reduce a slab of metal to a smaller size.

Davy Press

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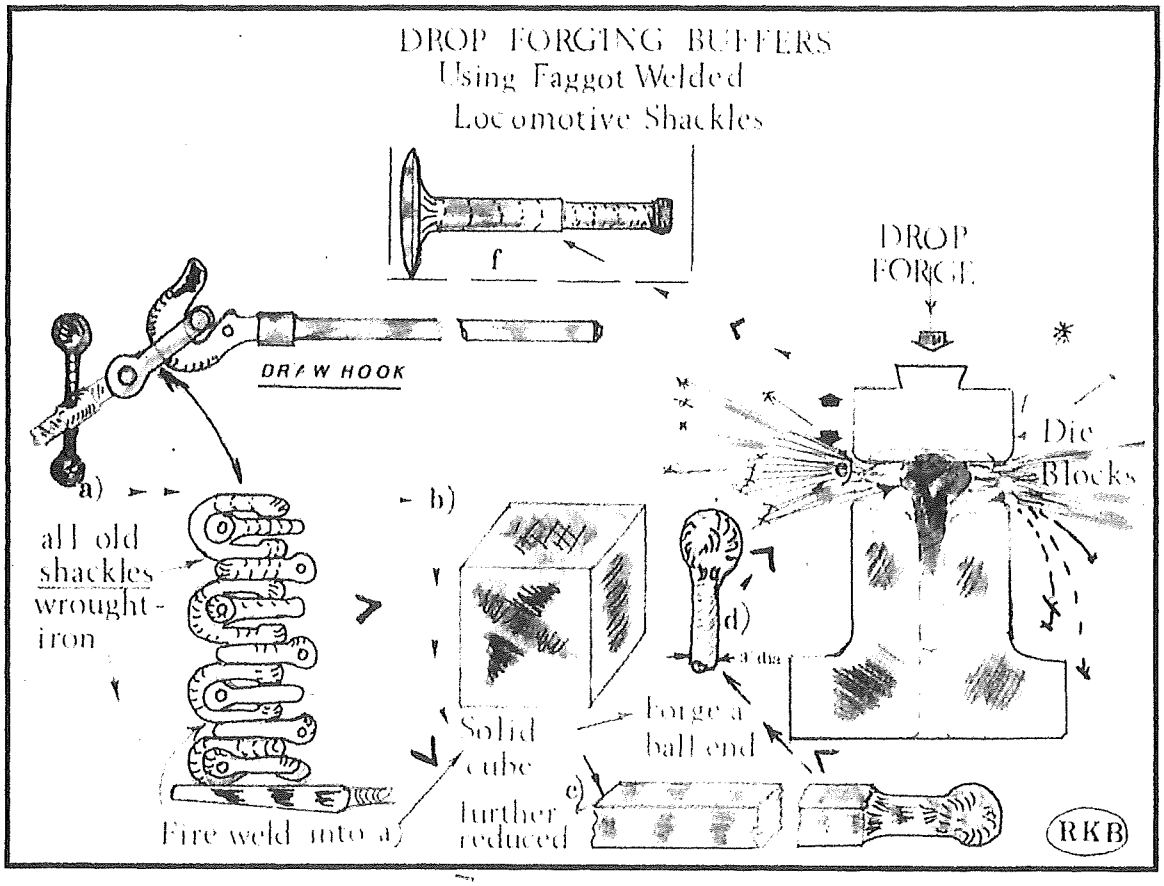
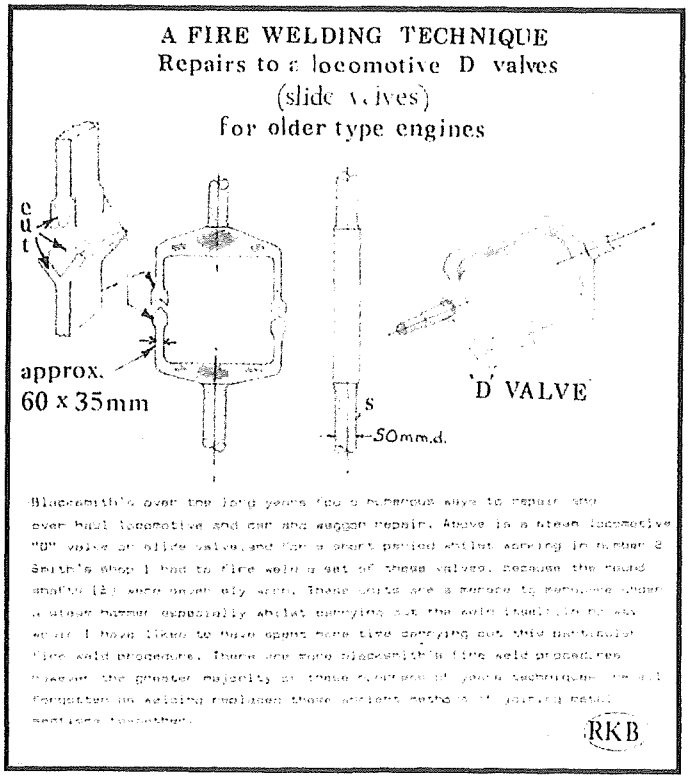



If the Smith is knocking up, say a sledgehammer, the eye (where handle goes in) an oblong punch was used, we placed coal into the hole after a few blows so that it formed a gas and helped release the punch. Mandrels are another well-used black item.

When a component was too long it was "hot set" with a 30-degree angle used to cut or slice through the heated metal. Inversely if 'cold' a 90-degree included angle 'cold set' was employed.




## Use of a furnace

Some Smith's use oil, gas, or LPG as a heating source. Place the article to be forged into the furnace and adjust the flame then wait until the correct heat is obtained. One problem however, oil creates additional carbon content (carbonaceous) and can be detrimental in specialized work.

## The Blacksmith's floor

Because of the risk of 'fire', dirt floors are very good, wood will catch alight, tar or bitumen floors will ignite and cement actually explodes or shatters. With a dirt floor, the Smith can lay the finished article on the earthen floor and all is well. Many forging locations had a heavy cast steel block of steel on the floor where you could stand on the anvil and jump or upset metal items. For example: hitting the block to shorten loco eccentric rods, or at times a loco draw bar had to be made shorter.

## Final finish

Within coal are combustible products emitting tar. Oily substances are also within coal gas, coal tar or water creating volatile constituents not really desirable to forging.

To make coke, special large air-sealed heating ovens, some times rows of them are used. In the USA a plant has 2 kilometres of long row furnaces or baking ovens where heat up to 2000C is generated. Like all things, there are various grades of coal, some called "Coking coal", others called "Steaming coal". Certain bituminous coals are needed for specific operations. Quality control of the moisture content, the ash content, volatile tar, plasticity and special blending is needed. It was found by NASA, that the heat shielding properties of "coke" was important in the Apollo Space program. Technically its final format was called AVCOAT, 5026-39. More recently it has been used as a heat shield on the Mars Pathfinder vehicle.

On the other end of the spectrum in England the first locomotives were using 'coke' as there was little smoke emitted so as to comply with requests to – "consume their own smoke". It wasn't long before coal ruled the locomotive footplate.

## Conclusion

So have I confused, made you think a little more, enlightened? In Australia today Smithing is still carried on. For your interest, at the Eveleigh Open day an old Smith, who was Eveleigh trained, told me about a firm he helped set up. It was originally at Thornleigh, NSW then moved to Gosford in the Central Coast of NSW. He has supplied some detail that will appear in a future AME. The old trade has survived and mechanical machines still help twist and turn heavy billets of hot metal.

# Locomotive Cylinder Repairs on the NSWGR

**by Dick Butcher**

During my years with the old NSW Government Railways, either in the running sheds, or in the city workshops, or laboratories, was a voyage of discovery. I attended TAFE doing studies for some 14 years, but you still learn on the job.

## Locomotive steam chests and cylinders

Two main types of metals are used:

a) cast iron

b) cast steel

Being a Blacksmith and Welder, and in later years, as Assistant Welding Engineer with the Railways Testing Laboratories at Redfern, assisted me greatly in the understanding of these two metals.

Both materials were repaired by various welding techniques during the years that I served the NSW Government Railways.

In reflection — I marvel at the work we carried out, photographs shown in this article will clearly show the extent of some of the situations we faced.

Cast iron of the grey type served the original older classes of locomotives. It was found in many blast pipes, frame stays, valve chests and cylinders most were castings. Being generally simple to mould and cast, plus cheap to produce.

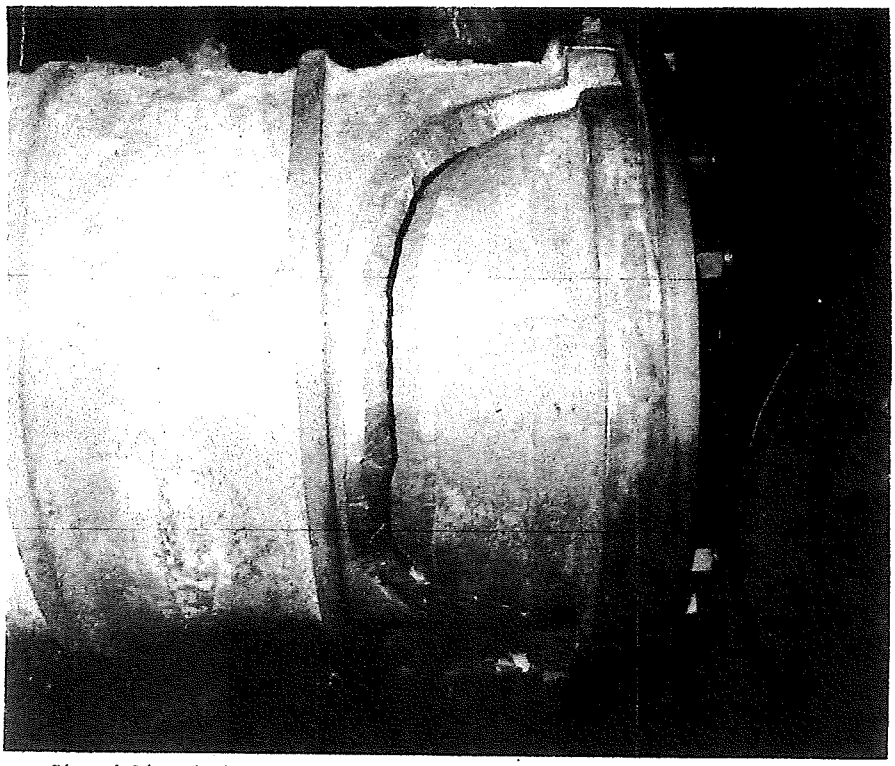


*Photo 1. The cylinder from locomotive 5456 being repaired by oxy-acetylene welding. Note the flame-cut steel disk being used as a dummy cylinder cover to keep the broken segment in place during the repair process.*

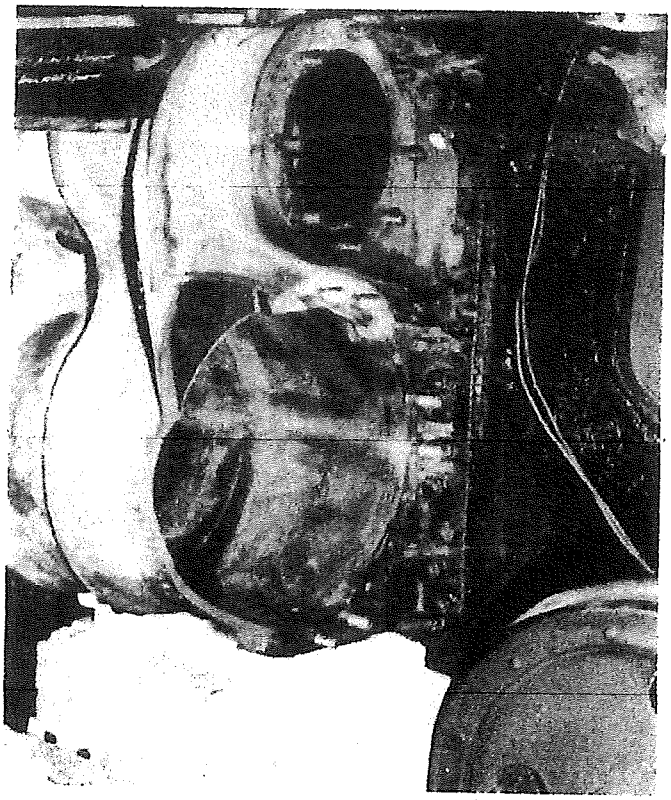


*Photo 2. A C36 class cylinder failure.*

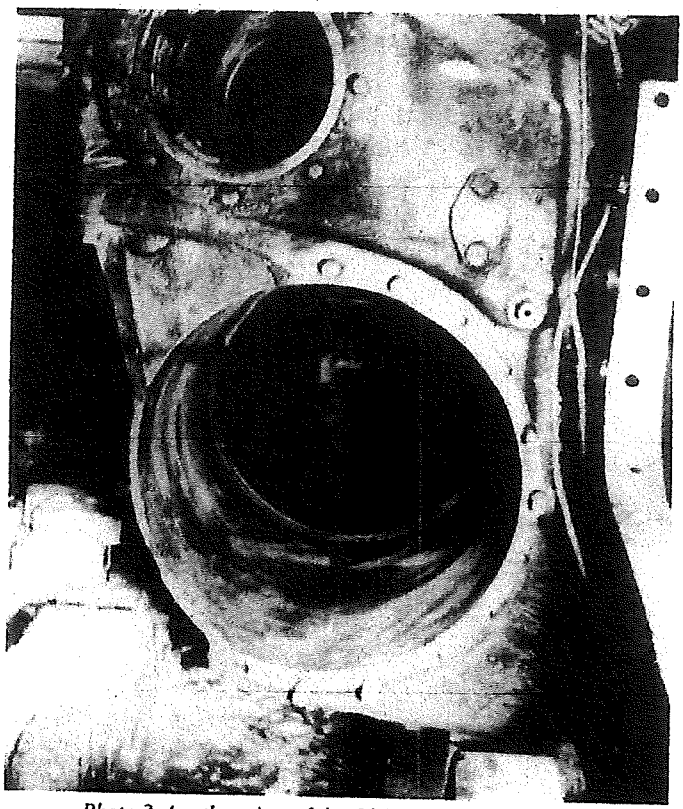


*Photo 3. Another view of the C36 class cylinder failure. Note the use of firebricks to build a small furnace under the cylinder prior to welding.*



Article from Richard. K. Butcher
Typical Eveleigh Workshops repairs

Richard Butcher

One of the attributes of Cast Iron is its excellent in compression, however weak in tension. How many cheap cast iron "G" clamps have you broken when tightened?

## General Analysis

| Grey cast iron | |
|---|---|
| **Percentages** | **Elements** |
| 3.5 to 4.5 | Carbon (C) |
| 0.6 to 0.7 | Manganese (M) |
| 1.0 to 3.0 | Silicon (Si) |
| We always find 0.005 % Sulphur (S) and 0.005 % Phosphorous (P) as impurities. | |

The last two elements are always present and have to be controlled due to the fact to much Sulphur causes hot shortness, meaning brittle when hot, while excessive Phosphorous causes brittleness when metal cold.

Each element serves a purpose, for example, Silicon — its presence has a decisive role influence on the formation of graphite and softness to the metal.

Grey cast irons are the most widely used. as cheap, the proportion of Carbon governs the hardness and brittleness of the material, a greater part in the form of graphite or free carbon, being distributed in flake formation and breaks up the metals structure into cellular or spongy like structure. This breaking up of the metallic structure by graphite flakes accounts for the brittleness that is the characteristic of Grey Cast Iron. The presence of the graphite flakes also gives the metal its grey colour — grey cast iron

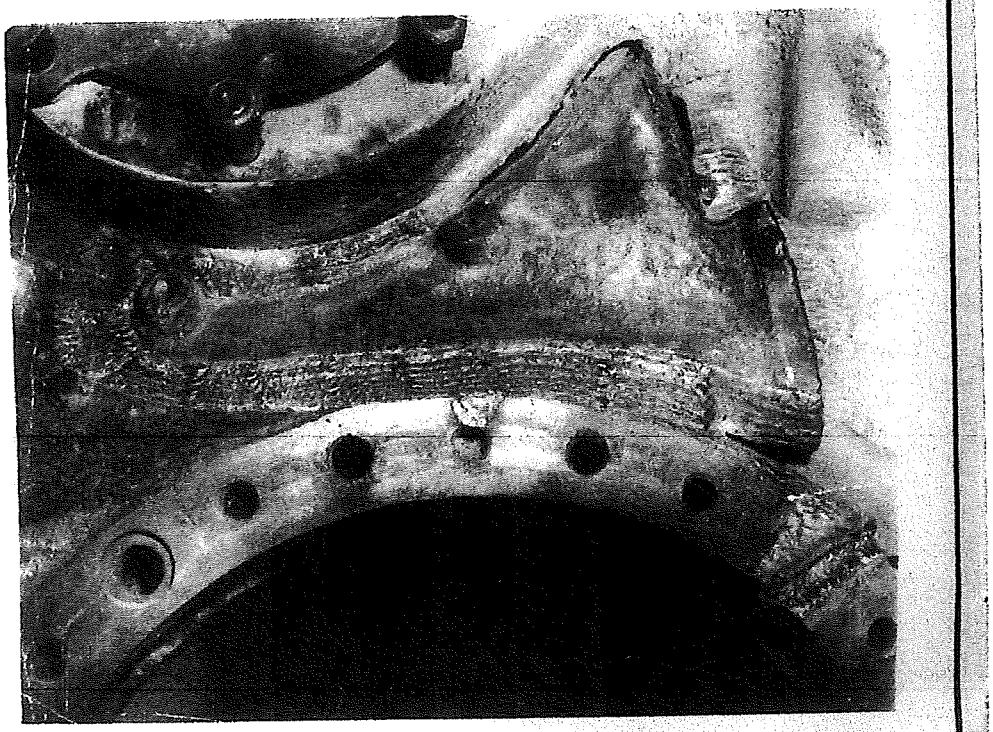


*Photo 3a. A C36 cylinder block with repaired damage between the piston valve and the cylinder bore. The repair was carried out at Eveleigh using high nickel electrodes. Each batch of welds are 50mm long, the sequence and cascade technique was used.*

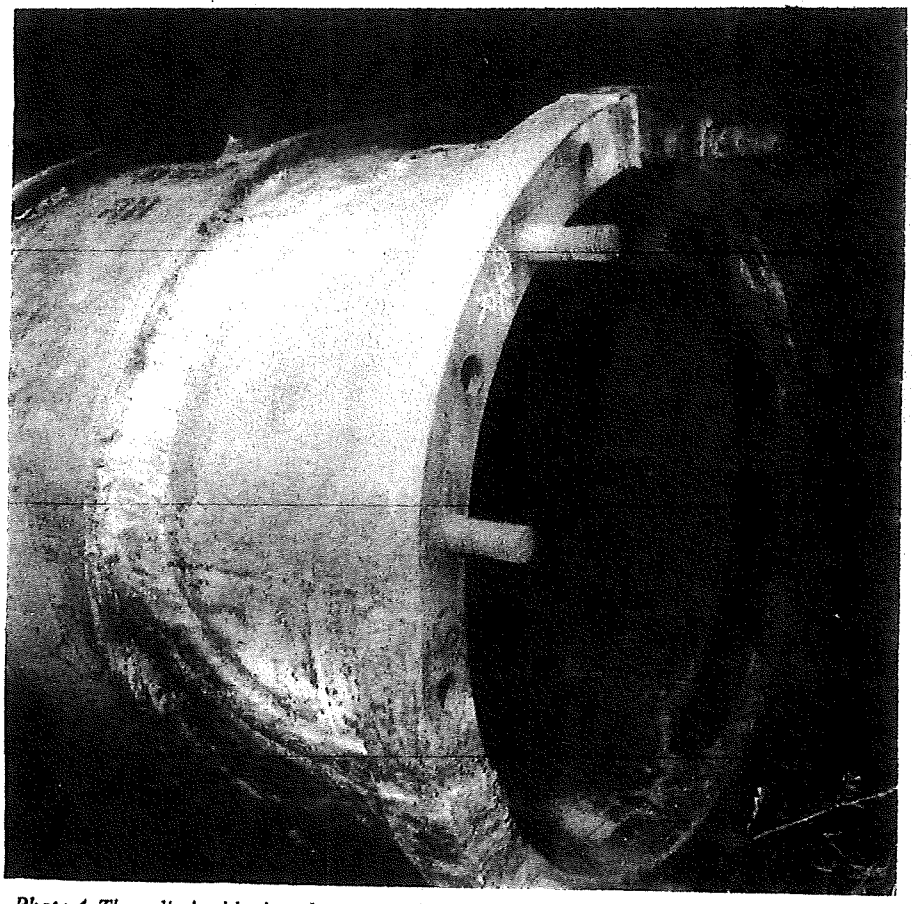


*Photo 4. The cylinder block on locomotive 5323. The damage was repaired by bronze welding — on refelection... how did we do such big jobs?*

When heated above a red heat, as in fusion welding, the free carbon combines with the metal to form iron carbide Fe3C, and if cooled too soon reverts into a hard and brittle cast iron called white cast iron

With rapid cooling, Grey cast iron changes from a grey to a white appearance in any fracture, thus white cast iron.

With the normal amount of Silicon present in grey cast iron the metal when heated and cooled slowly returns to a normal soft condition. Therefore if the Silicon is lowered greatly, for example 0.5%, the cast iron becomes extremely hard, even with slow cooling the fracture becomes whiter in appearance.

During welding, the metal is raised to a high temperature and when melted, considerable amount of Silicon may be lost from the weld melted fusion zone by oxidation: the air around the weld pool and flame influence.

- i) the brittleness of the metal which may cause the forming of fractures- when heated and cooled
- ii) The necessity for slow cooling to ensure soft metal
- iii) the necessity for a sufficiently high Silicon content filler rod to ensure a soft metal (no hard spots).

The Railway's Eveleigh foundry produced a super high silicon filler rod, found superior to trade brands of the era.

## Cast Iron Varieties

There are other types of Cast Irons

- A — Malleable cast iron

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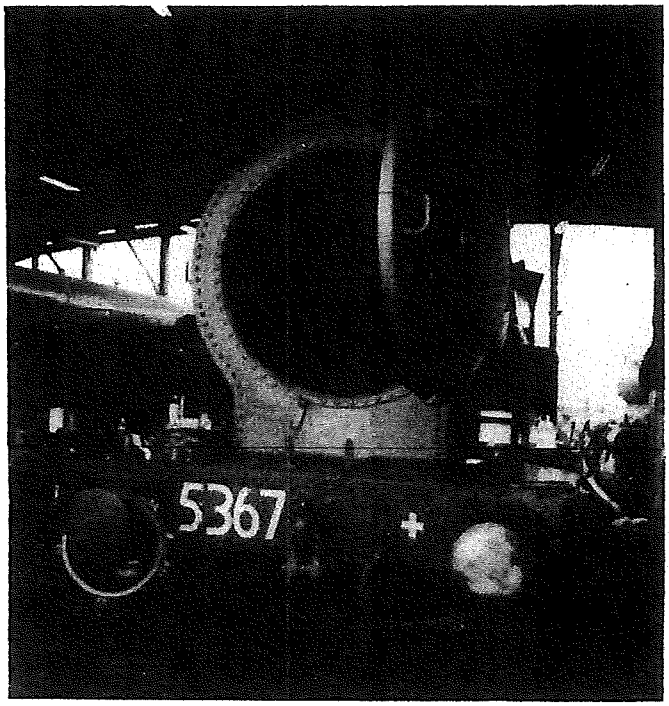



*Photo 5. 5367 undergoing restoration at Cowra.*

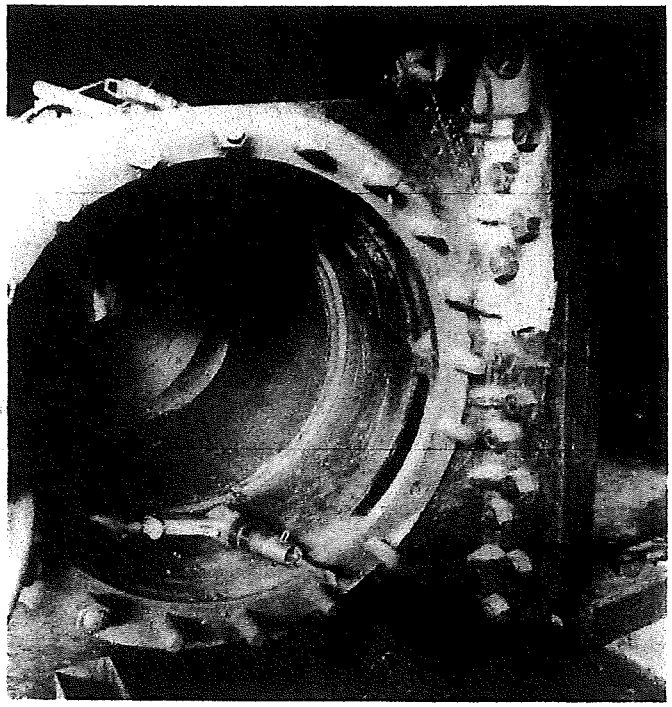


*Photo 6. 5367s cylinder is in need of repair.*

- B — Spheroidal cast iron
- C — Alloyed cast iron

If we increased the alloy content or alter the heat treatment of the metal a different product can result.

The best process we ever tested was the oxy-acetylene brazing process for welding cast iron, even the special creep resistant turbo chargers on the mainline diesel fleet. However, with oxy welding:

- 1. The bronze welding process
- 2. The fusion welding process

With (1) there is a different colour match but the greatest strength, we tested to destruction not only on the Railways but with 25 years of my TAFE teaching service.

With (2) you obtain the same colour match but the weld is more brittle.

With (1) the braze welding of cast iron and malleable cast iron plus cast steel, using bronze filler rod continually tested in the TAFE and the Testing Laboratories obtained strengths greater than 450 MPa.

Manganese and Nickel-Bronze filler rod commonly used. With brazing, tinning is essential.

*Photo 7. A closer look at the damaged cylinder on 5367*
*A penetrant dye highlights and defines the problem cracking.*

## Tinning

The action of the flame heating the surface of the fractured metal expands the molecules and grains of metal, the molten bronze filler rod flows out and enters the grain boundaries of the metal. The surface is said to be tinned, the bond depends on molecular attraction at the junction of the weld face.

## Alloying

A diffusion of the bronze into the cast iron and a corresponding diffusion of the parent metal constituents into the bronze takes place in e narrow zone.

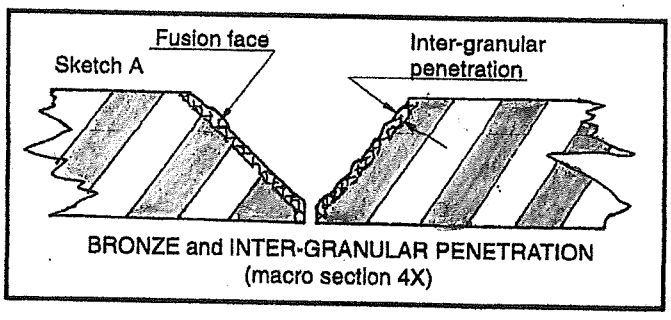
## Intergranular penetration

A decided penetration of the bronze into the crystal structure of the cast iron and a corresponding infiltration into and around the grain boundaries, clearly visible under microscopic examination. See sketch A.

## T T factor

An essential factor is Time temperature factor. If overheated, the weld surfaces shall be burnt, and no bonding will occur inversely if not hot enough — artificial strength is obtained, testing quickly shows the fault.

My 25 years in TAFE we taught many trades the best way to weld cast irons those



trades were:

- Blacksmithing
- Boilermakers (now called Metal Fabrication Course)
- Fitting and Machining
- Automotive Trades
- Panelbeating

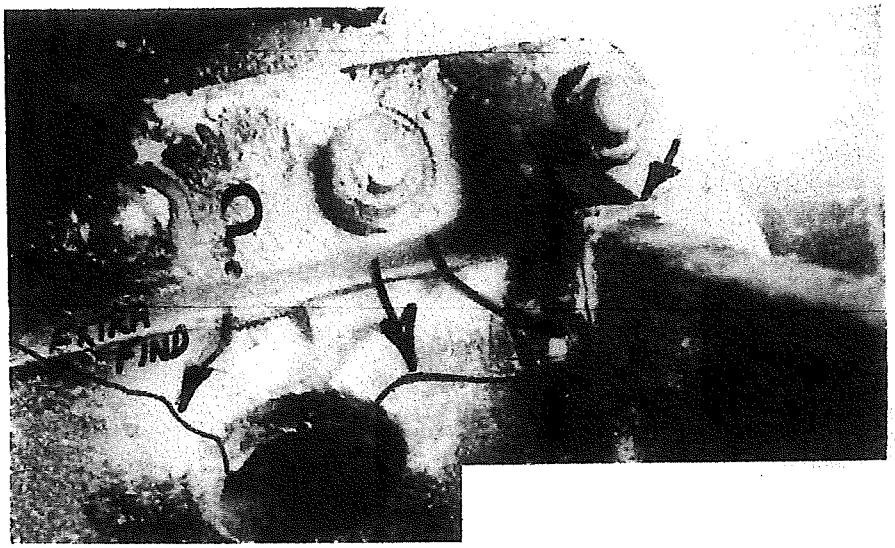


*Photo 8. The dye picks up furthe damage on the top portion of 5367s cylinder.*

*Photo 9. My assistant, Robert Bucholtz chipping a deep vee preparation prior to electric arc welding using a high nickel electrode.*

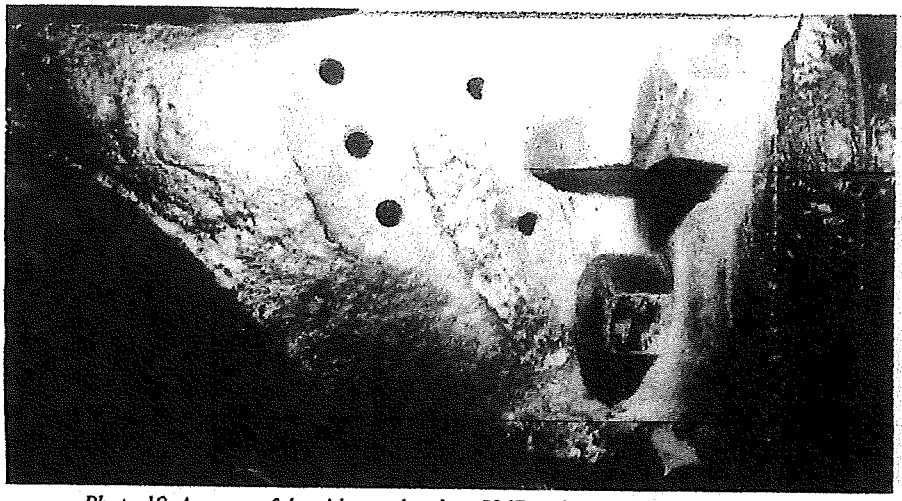


*Photo 10. A successful weld completed on 5367 at the Cowra locomotive depot. The drilled holes were for the mechanical brace that held the crack together prior to the more permanent repair.*

The whole TAFE structure changed a few years back and it was sad to see welding hours severely reduced, to all trades, some not even taught now.

## Technique

The brazing of cast iron required a special technique to successfully deposit the added filler metal. As photographs show many of the welds are carried out in the vertical up position, the bronze becomes very fluid, and gravity has nasty effects to the molten weld pool.

The molten bronze is well controlled by using a triangular pattern while progressing slowly up the incline. In fact total control achieved by placing the broken pieces in the 45 deg semi-vertical up position. And the other secret is to allow each triangular deposit to cool, then off again. Oh yes it does take years of practise to perfect the weld technique.

## Testing (destructive)

The simplest and best method was to carry out a weld, then break or snap it open and look and see the strength of that weld.

With the fusion technique (same as base or parent metal) the weld broke right up the centre of the weld joint.

With bronze welding technique, much harder to snap or break open, shows superior strength, plus the weld actually breaks behind the fusion face and pulls (the deposit) metal structure away from the parent place. This proves the strength of the bronze weld See sketch B

## Locomotive cylinders and valve chests

Steam buffs generally know that within the cylinders of a loco, if the cylinders cocks are not left open for a specific period of time, the loco primes and huge volumes of water globules spew from the chimney.

Imagine with a load of say 1200 tonnes, and a D57, D58, or Vic, R class combined with a cool winters day, and gallons of water accumulated within the valves end cylinders, and no where to escape. Well look at some photographs to see the resultant. Yes what a disaster, whoosh off goes the cylinder, and the poor old welder is faced with this enormous gaping hole to repair. See photos. 1, 2, 3, 3A.

A new cylinder was most expensive, so the depot DLE would ring the Loco-Superintendent, in turn the Welding Engineer. A welding Inspector would generally go to the respective depot and line up a competent welder to effect repairs.

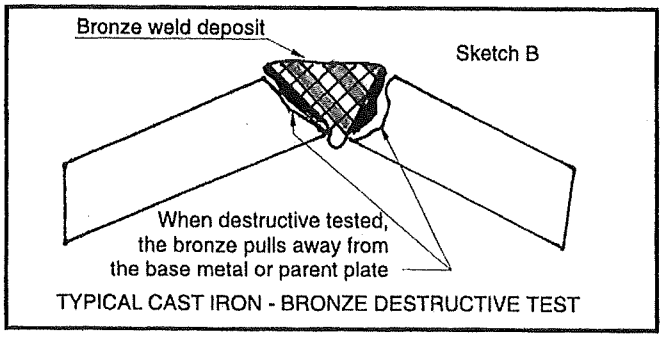
If say, at Eveleigh or Cardiff workshops, a break was the kind that the cylinder needed required some support to locate and hold in correct piece, a suitable mild steel ring (annulus ring) would be flame cut.

The cylinder stud holes located and drilled, the broken section bolted into position.

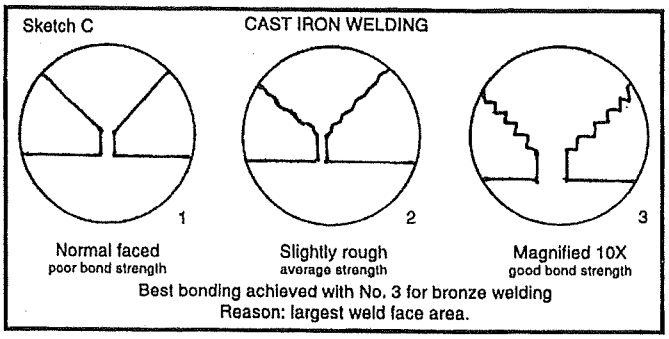
## Weld preparation

The biggest job is the veeing of the weld faces, the base or parent metal may be up to 30 to 45 mm thick — heavy stuff!

4



TYPICAL CAST IRON - BRONZE DESTRUCTIVE TEST



Best bonding achieved with No. 3 for bronze welding
Reason: largest weld face area.

Employing a heavy compressed air hammer made the job a little easier for weld joint preparation. See photos 1 and 4.

## Weld face

It is found that a roughened weld face is the better for maximum bond strength. Additionally with a bronze deposit filing was no good, it bought too much graphitic substance to the weld edges (face) and weakened the bond. The rougher the surface the better the weld strength. See sketch C

## Pre-heating

It was necessary to heat the cylinders or valve assemblies prior to bronze or cast iron fusion Oxy-acetylene welding process.

Old timber, shavings, kero soaked rags etc. being placed in the cylinders and a fire commenced. With cast iron we do not want to create sudden expansion or stress effects, otherwise more fractures can occur. The temperature achieved between 300 to 450C. Welding then commenced, and yes it could be 4 to 8 hours later till completed. Welds carried out with the bronze welding process, competent welders end faithful oxy-acetylene welds lasted from 45 to 55 years, proving the process is extremely suitable for the hard endurance encountered by the reciprocating steam locomotive in service.

## The manual metal arc process

Here we can use the *hot* welding process, often used more was the *cold* process. What does this mean?

With the first, hot welding electrodes of the medium carbon range used, or the low hydrogen type. Now with arc welds the high temperature of the arc measured up to 6000 C. in laboratory tests, can revert the Grey cast iron to the harmful one white cast iron Hard and Brittle, thus failure the resultant.

Each job has to be measured on its own characteristic, and there is where experience counts. Small work generally satisfactory, larger work can also be successful, but the old oxy process proved A1 each time.

## Cast iron cold welding

Well not really cold but total control has to be exercised, stress cracking quickly occurs.

I well remember a C36 at the large erecting shop at Eveleigh. The loco was, after 28 days in the shops on major overhaul, tested for cracks. The driver's side cylinder was found to have a 30" crack from top to bottom. No way the foreman would remove the cylinder, so it took four days of cold arc-welding with reasonable control of welding. When back in steam it leaked like a sieve. cold welding is at times an unreliable process, so after a heated debate, the Supervisor Jack Knight had the Oxy welders, Jack Pogson and Happy Johnson oxy weld the unit up in five hours — 100% successful.

## Cast iron cold

The electric welder plus 55% and 100% Nickel electrodes used, sometimes monel (a Cu Ni) rich alloy employed. Weld runs no longer than 50mm are used, which means that no great heat input is allowed. In fact you must be able to place your hand on the completed weld just after you run the short bead. Patience is required, that's where the failures occur. See sketch D.

A classic example occured in 1995 when I was requested to travel to Cowra, and help the Lachlan Valley Railway weld up their loco 5367 *Rosie* off-side cylinder. See photos.

A good friend of mine who helped for 12 years on the partial restoration of the NSWRTM's 5711, Robert Bucholtz, did the weld preparation for me. The Dept. of Transport would not allow 5367 to continue to operate with a mechanical strap repair, it had to be welded.

Unfortunately most of these cylinder failures occur in the vertical or horizontal planes, thus welding has to fight the laws of gravity, that's where experience and skill counts.

I used Rocol® penetrant dyes to do the fracture tests, we then discovered that there was another crack about 7" long on the opposite side of where the initial crack was!

Robert started to chip away at the first crack and the diamond shaped chisel turned up being too soft. The chisel was quickly re-hardened and tempered and presto it was A1 again.

The metal was cast iron and ranged from 1" to 2½" thickness at the crack site was deepened out by Robert, so after 1½ days the weld preparation was completed, ready to commence the welding operation.

I decided to butter the weld faces with 100% Ni. electrodes, and use the slightly cheaper 55% Ni. rods for the fill in. Beads of 2" adhered to the metal, preventing further cracking. It's a good idea to drill a small hole in the end of the crack to prevent it from propagating (running).

While welding I lightly pein each bead to spread the soft Ni. deposit and counteract shrinkage. See cylinder photo 5, 6, 7, 8, 9 and 10

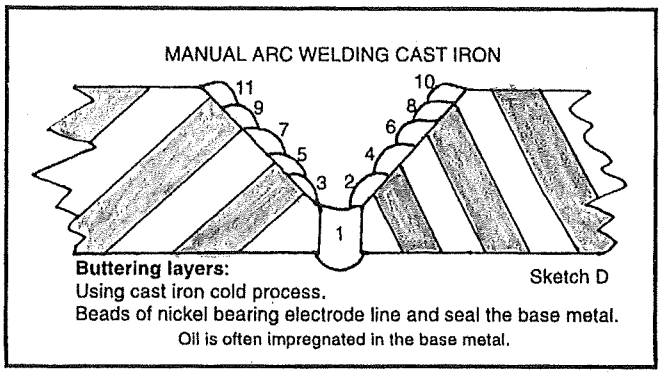
I admit the cylinder temperature was warming up a little, and one of the LVR boys was having trouble metalling some side rod brasses. We had a short break to help them.

A couple of days and the welding was finished. The repaired area was sprayed with the three basic cans of Rocol penetrant — all clear.

## Conclusion

Different cast irons can be successfully welded, but care is always necessary — after all it is difficult to tell just how much stress could be in the component. The welding process is another factor, yes the skills are disappearing in time — what we used to do I marvel at today. A fellow club mate ex TAFE teacher Brian Day of HME has told me about the achievements of the now closed Cockatoo Docks, some brilliant things were carried out there, however we call it progress, I really wonder. ?

The NSWGR mainline diesels then entered the era, and did we carry out major welding on the fleet! Con rods do break and what big holes they left in the side of the block! We welded many of these. I was recently told that the State Rail Authority hasn't got the personnel or skills to carry out such repairs these days — it's a sad situation!



AUST Technology Park Conference

AN INTERNATIONAL RAIL CONFERENCE ATP 2009

Sarah Jane Brazel Rail Heritage Officie

Mid 2016 Brian Durnell Rail Man

Juliet SUICH Great Lady Heritage

Manager of A.T.P book) Roy Malcolm KING

Guido Gouveneur SMITH's

Wendie McCaffley SMITHS

3801 Friends Secl Ruth.

Ex PHM Machinist masters

UK Visitor Richard Trapper Rail Historian

2009 nter-national Richard BUTCHER TOUR GUIDE

Prof. Lucy Taksa Univ. NSW. 23-10-2009

Richard Butcher Historian The ATP 10/23/2009 TOURGUIDE re Conference

Richard asked to Produce a Series of Shat Stories for MIRVAC, Comm Bank City Sydney C. etc a few of 24 Stories

# HIDDEN POWER.

HIDDEN EVELEIGH POWER ( or Power to the worker with a Twist)

Within the boundaries of these heritage Victorian rail Workshops lie some "large monolithic style

# RED SQUARE

3

RED SQUARE A STORY FROM RICHARD BUTCHER

YEAR APPRX. 1957

# Manager's Timekeeper's. *Picnic day.*

6

THE WORKS MANAGER'S & TIMEKEEPER'S BUILDING also RAILWAY PICNIC DAY

Brief from Richard K BUTCHER

An impressive brick building stands to the Southern side or near Redfern rail station, a ramp we used

# WORKER, BOSSES, PUB'S, HAZARD's.

7

# A STORY TWO GREAT MEN

2

A STORY OF TWO GREAT MEN story by Richard K Butcher

# EVELEIGH the Architecture.

4

THE ARCHITE...

# What Eveleigh Produced

5

# Working Life 1920'-1960's

1

WORKING LIFE AT EVELEIGH

By Richard BUTCHER ex.Blacksmith/Welder/Engineer

A period in time, an era, the passing of time; one can only comment re the "WORKING LIFE" at the heritage rail Workshops for the years 1920's to the 1960's. My father...

HISTORIC EVELEIGH ATP STORIES SBS 1990,s DVD

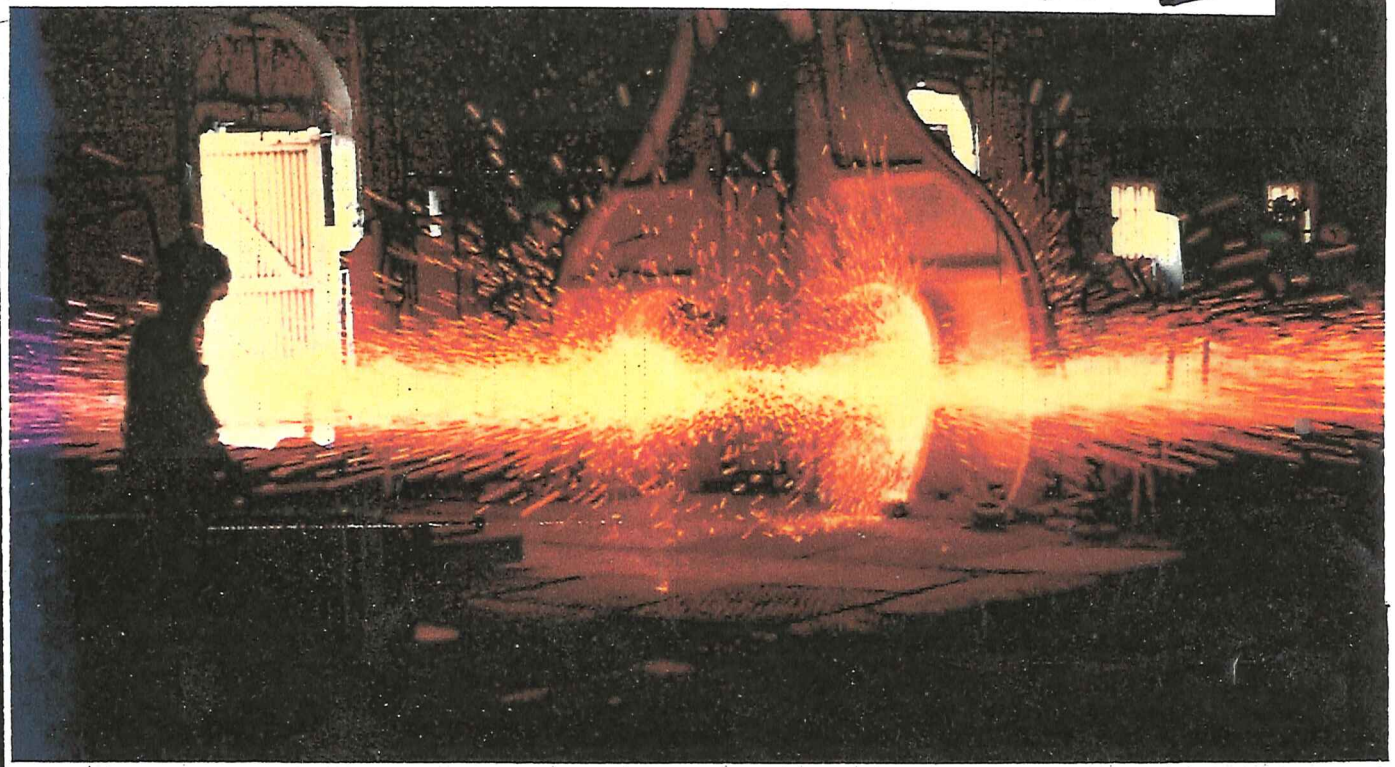


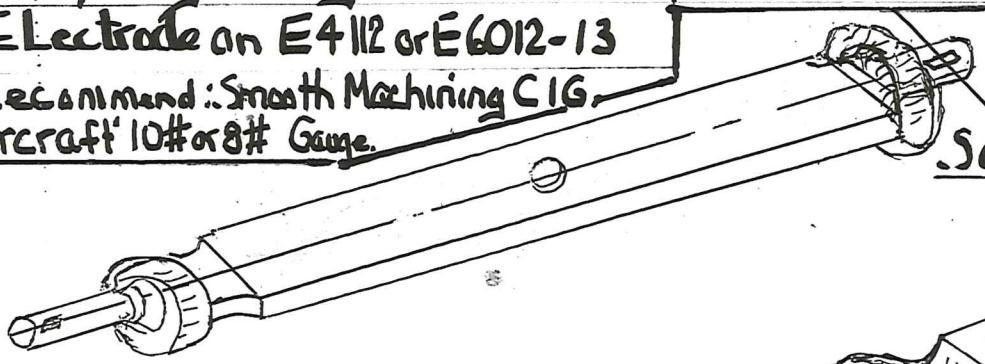
PHOTO COURTESY RON TOGNETTI & RICHARD BUTCHER

Richard @ 2018 Asked to Make a Procedure Sheet for P.H.M 7th Feb 2018

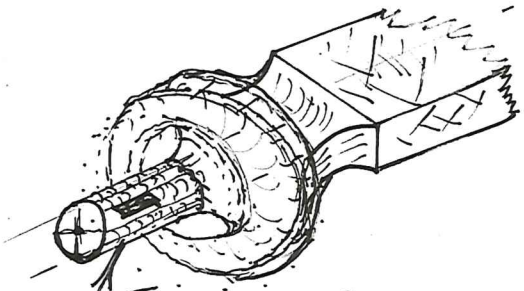
# PROCEDURE SHEET for Reclaiming LOCO BRAKE BEAMS. NO. 1A

## Metallic Electric Arc Method - MMA

Electrode Size: Either 3.2 or 4mm. dia.
Amperage Range: 110 – 155 Amps.
Electrode an E4112 or E6012-13
Recommend: Smooth Machining C1G.
'Aircraft' 10# or 8# Gauge.



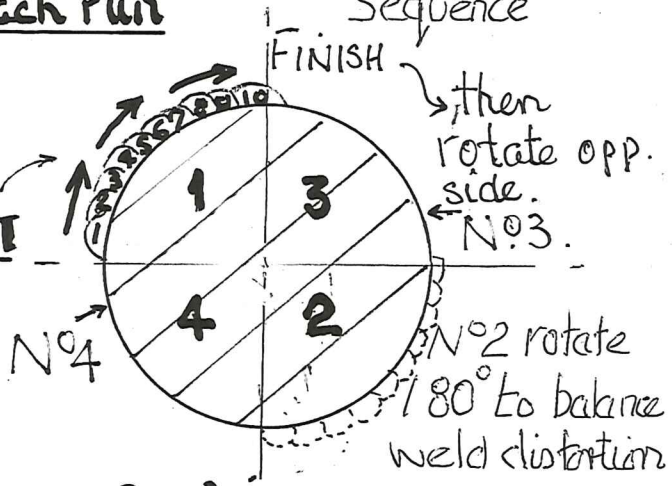
Section X-X



FULLY BUILD UP WORN SECTION by ARC-WELDING

## Stringer Bead
Bi-sect each run

Weld Sequence




Section X-X

Note: Depending on the amount of Wear: additional runs could be applied Suggest a 'pause' time, to reduce distortion. Stringer bead weld deposit, over-lap each previous bead/deposit.

| Material | SPECIAL NOTE |
|---|---|
| Usually a forging of i) Wrought Iron ii) Mild Steel G2-63 or G4. Most Probable been Case Hardened. But wear should be acceptable to weld over. | At each end of the beam a Rect. Cotter Safety Pin hole. CARE NOT TO FILL Later a Punch or drift to make good. |

**INSPECTION**: The nature of the material NOT prone to Cracking
**EQUIPMENT**: 1 Welding Machine either DC. DC. Inverter or AC/DC.
**METHOD**: Chipping hammer. Wire Brush. Shield. Anti-flash Glasses
Divide into 4 Quarter - hand rotate. NOTE: Heavy *

REQUEST from Mr. R Boswell for ZIG-ZAG Railway Plus Valley Heights Heritage Museum Applicable to most B.B. repair.

DRAWN: R.K. Butcher
Date: 6th Feb. 2018
Welding Engineer
Pressure Vessel Welder
F.W.T.I.A

Preparation: Clean surface either Grind or file even Heavy Duty Emery Paper Grit 60-80
Pre-Heat: NOT REQUIRED
Consider Final Machining to original Round Sect. Shape Even Consider CASE HARDEN each end!

# The Craftsman

PART 2

**by Richard K. Butcher**
*Head Teacher, Granville Technical College, NSW*

I sat on the WTIA Natl. Editorial Board 1981–2001 Asked to Write Stories re Practical applications One page of a Series Eveleigh main centre RK Butch

The blacksmith is the tradesman or craftsman, who formed, forged and created various shaped components, from the Iron Age to the present day. Often he would fire weld metals

the most common fire welded joint was the common scarf joint (Figure 1). This diagram shows the upsetting of the end of a piece of metal, by 'jumping up' the heated end, then the upset ends are further forged to give the scarfed shaped ends.

A flat or convex face was better, because the sand or borax that was thrown over the two ends formed a glass, which helped prevent oxidation, if the joint trapped scale or oxides it would weaken the bond.

When glowing white, and near 100° C below the melting point, the material was pounded and forged together, to give a homogeneous bond.

In fact when the author worked at Eveleigh Railway Workshops, the longitudinal boiler stays were all fire welded.

The author was delegated later to try fire welding of crane spring backs (Figure 2). Figure 3 shows the forged piece of mild steel to be welded to the main spring leaf.

Trying to get the two metals to stick together was no easy task. However, with perserverence and help from an old Scottish foreman the author mastered the fire welding process. Two forge fires were required and another smith would assist, one to heat the block of preferably wrought iron whilst the main smith would heat the spring steel leaf, of 150mm by 15mm cross section and near one metre long.

Being placed into a swage block underneath would be an ideal die block, to

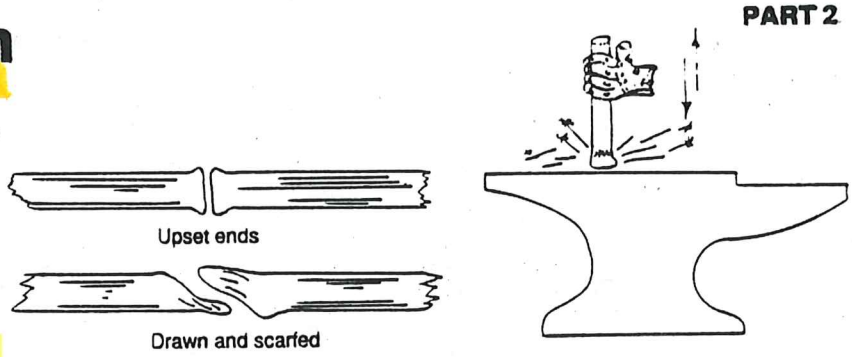



**Figure 1. Common scarf preparation**

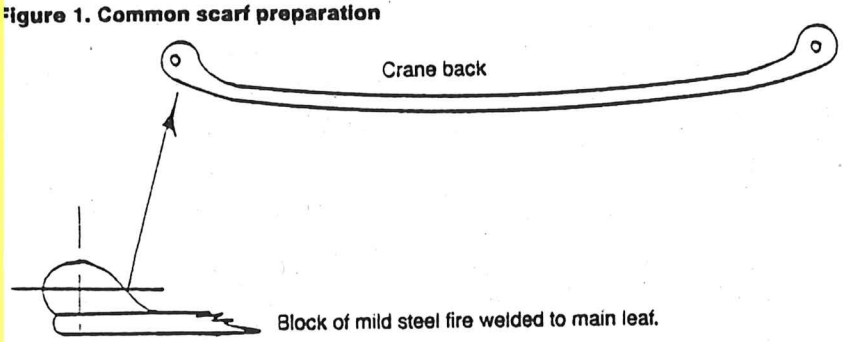



**Figure 2**

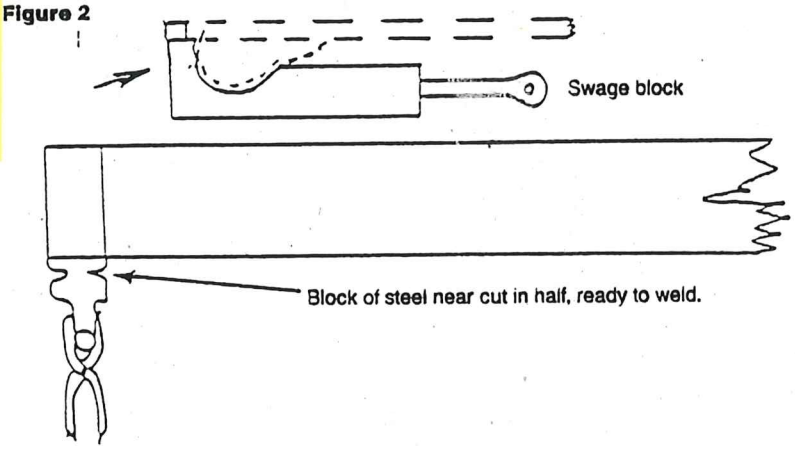



**Figure 3**

REPAIR WORK
Locomotive or rolling stock

BRAKE BEAM

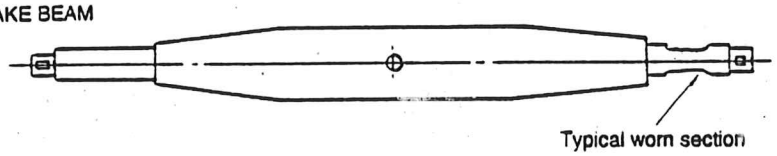



**Figure 4**

Repair Method 1

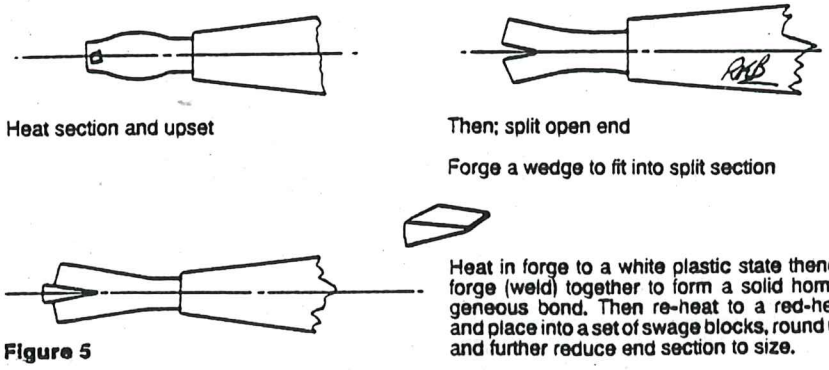



**Figure 5**