

Advanced Steam Traction Trust

NEW BUILD STEAM THE PRACTICALITIES

www.advanced-steam.org

Why a talk?

UK Standard Gauge New Builds

No Donor Parts

- Crampton 4-2-0 SER 81
- LMS Patriot – 4-6-0 The Unknown Warrior No 45551
- LNWR Bloomer 4-2-2-2 No 670
- LNWR Precedent 4-4-0 King George the Vth No 2103
- **LNWR A1 4-6-2 Tornado No 60103**
- LNER P2 2-8-2 Cock of the North No 2001
- LNER P2 2-8-2 Prince of Wales No 2007
- MS&LR/GCR Class 2 4-4-0 No 567
- GER F5 2-4-2T No 789
- NER G5 0-4-4-T No 1759
- LNER Y8 0-4-0T
- BR 6P5F 4-6-2 Clan 'Hengist' No 72010
- BR 3MT 2-6-2T No 82045

UK Standard Gauge New Builds

With Donor Parts

- GWR Hawksworth County – 4-6-0 ‘County of Glamorgan’ No 1014
- GWR Saint – 4-6-0 ‘Lady of Legend’ No 2999
- GWR Churchward County – 4-4-0 ‘County of Montgomery No 3840
- GWR 47xx 2-8-0 No 4709
- GWR Grange 4-6-0 ‘Betton’ Grange No 6880
- LBSCR H2 4-4-2 ‘Beachy Head’ No 32424
- LNER B17 4-6-0 Spirit of Sandringham No 61673
- BR 2MT 2-6-2 No 84030



New Builds – not just steam

- Aircraft
- Ships
- Cars

UK New Builds – not just steam

- Vickers Vimy
- 2 Built and flown



The Original Vimy F.B.27

The Vimy Replica

UK New
Builds – not
just steam

- Westland
Whirlwind



UK New Builds – not just steam

- Westland Whirlwind
- In build



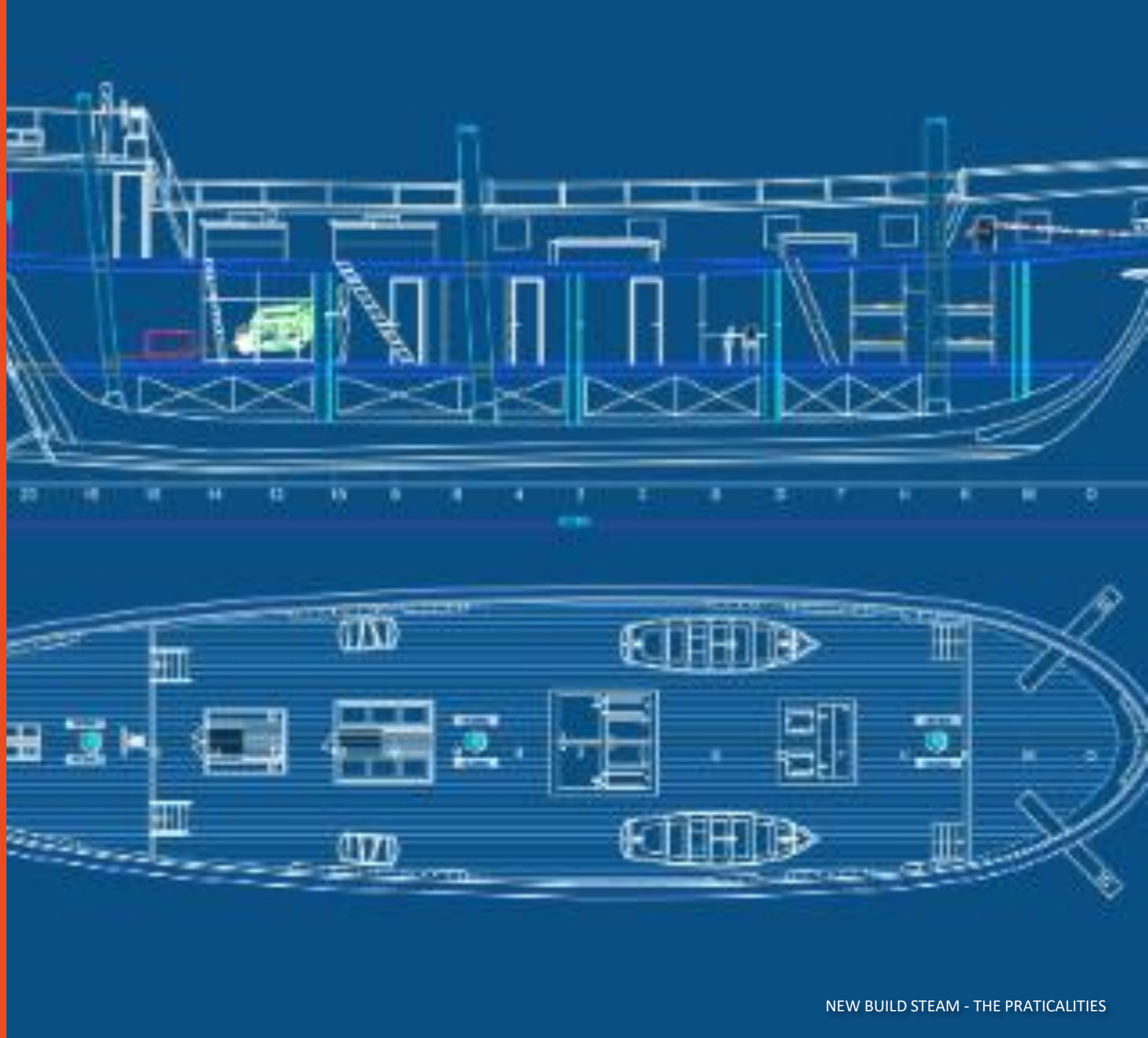
The Matthew of Bristol

- Replica of John Cabot's 1497 ship
- Built between 1994 and 1996



HMS Beagle

- In planning
- Fundraising
- <https://hmsbeagleproject.org.uk/>



Continuation Series Bentley Speed 6

- Commercial Project by Bentley Mulliner
- £1.5 million each
- 12 only
- All sold 'off plan'





Not just the UK

Australia – 4-4-0 SAR Z199



USA – 4-4-4-4 T1 Pennsylvania Railway

A grayscale photograph of a steam locomotive, numbered 72010, in a workshop. The locomotive is dark-colored with a white front plate that reads "THE MASTER CUTLER" and "72010". It is positioned in the center-right of the frame. The background shows a large industrial building with various metal structures, scaffolding, and equipment. The foreground is filled with mechanical parts and tools, suggesting a restoration or manufacturing environment. The text "New Build is different to restoration" is overlaid in a large, black, sans-serif font on the left side of the image.

New Build is different to restoration

Why is it different to restoration?

Restoration

You have the fundamentals to work with



Why is it different to restoration?

New Build

You start with no parts

Building in the fundamentals of strength and accuracy

You don't have a one stop shop

You need lots of money!



Money

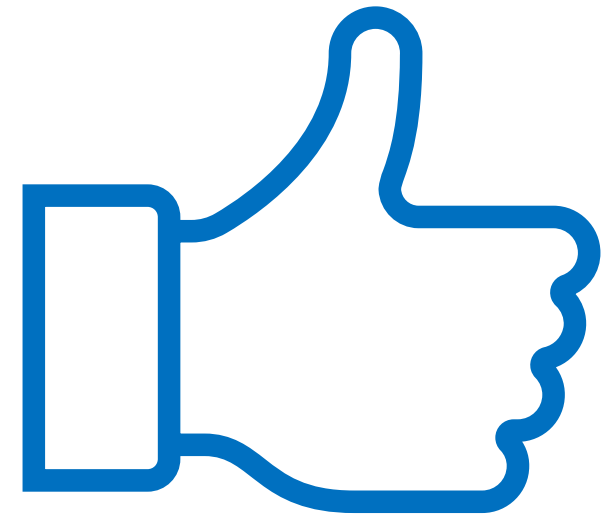
Money

Very little happens without it!

You can set up a Facebook page –
that's free

Generates lots of likes!


But no money!






77021 Locomotive Group New Build Steam

1.6K followers • 12 following

 Following

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...

Raise Money

Very little happens without it

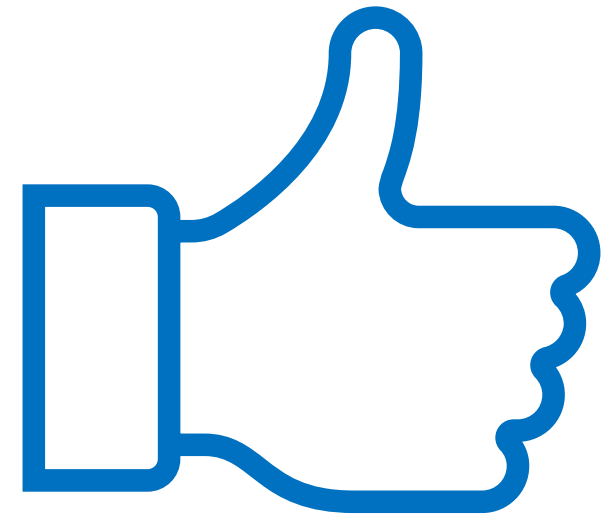
You can set up a Facebook page – that's free

Generates lots of likes!

But no money!

You need lots of it!
about £40,000 ton

Once you have money you have a problem
How do you spend it wisely?



People
make
projects

Not AI!!



People

Passion

- for the engine
- for the task

People

Passion

- for the engine
- for the task

Engineers

- There are different types of engineer

People

Passion

- for the engine
- for the task

Engineers

- There are different types of engineer

Marketing

- To spread the message
- Generate the environment for fund raising

Engineering Disciplines

Design engineering

CAD Draughting

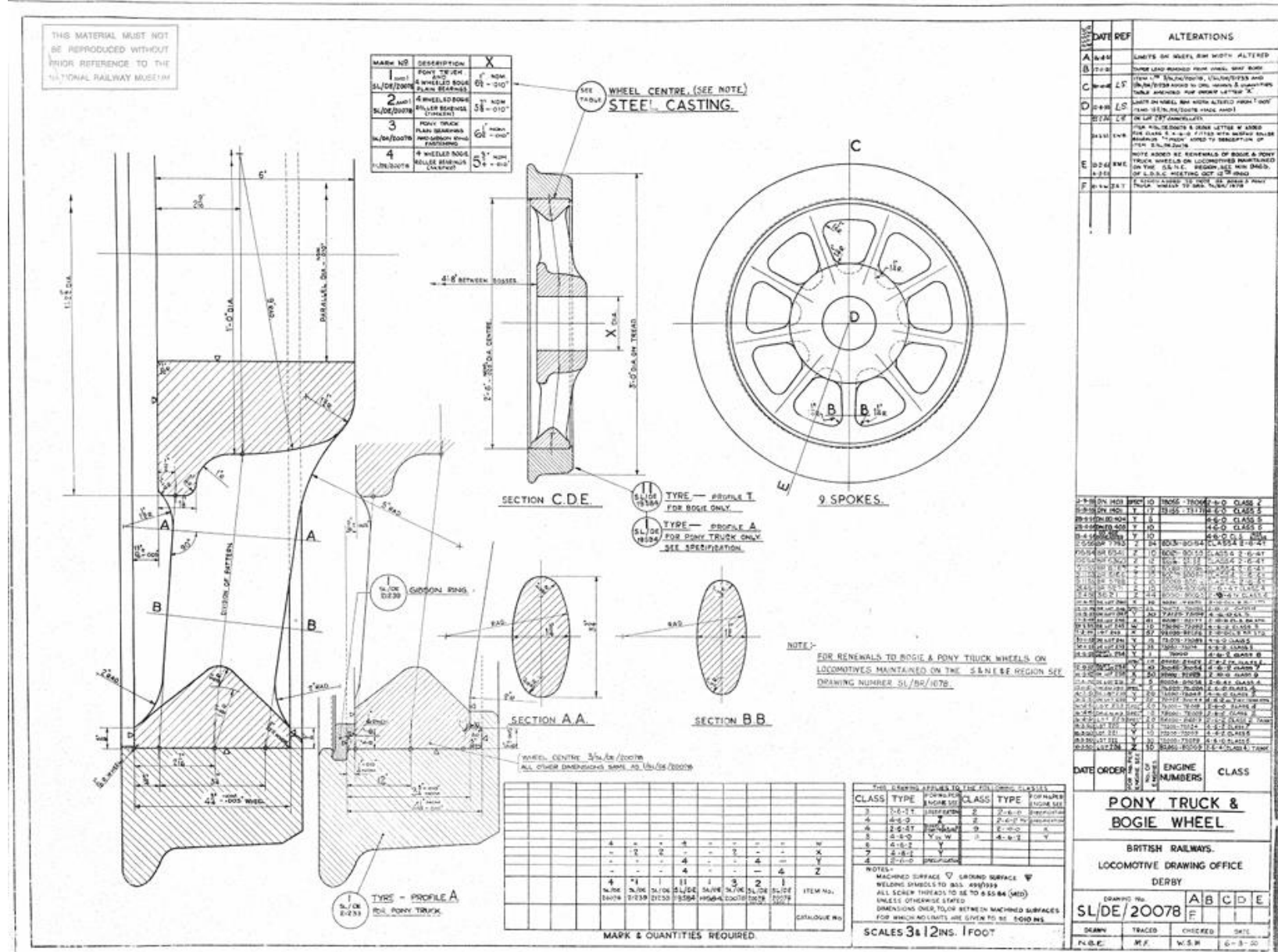
Purchase

Craft Disciplines

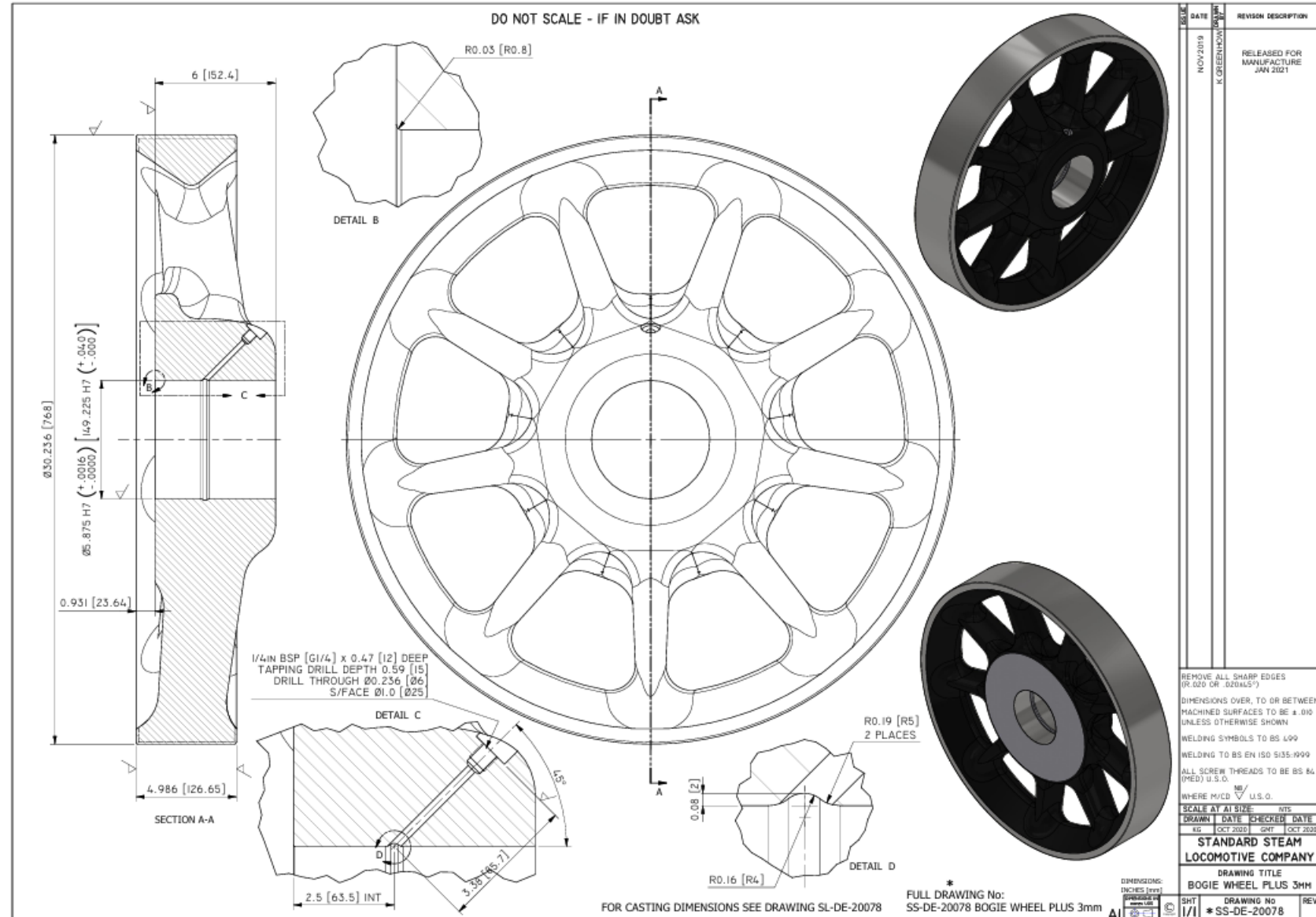
- Machining
- Welding and Fabrication
- Boilermaking
- Fitting

Quality

CAD Draughting



CAD Draughting



Corporate Knowledge

Corporate Knowledge

The first steam locomotive was Trevithick's 'Penydarran' in 1804

Last built in main works was 'Evening Star' in 1960'

Over a 150 years, the experience was built up on how to design and build with increasing sophistication

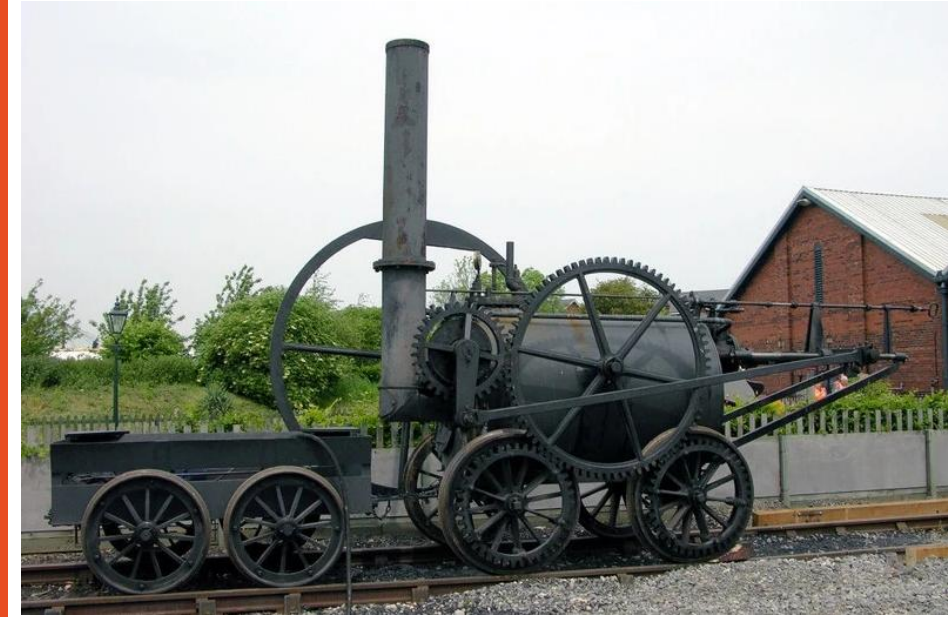
The training system ensured continuity of knowledge

Organisation and methods improved

Some of the knowledge can be found in archives, drawings and books

Some of what was **NOT** written down is *just about* available from apprentices who started in the mid 1950's and early 1960's

- *They are in 80's and 90's*



By Tony Hisgett from Birmingham, UK - Evening StarUploaded by tm, CC BY 2.0, <https://commons.wikimedia.org/w/index.php?curid=27715895>

Corporate Knowledge

Engineering knowledge is around

- Oil and Gas
- Automotive
- Energy
- Renewable Energy
- Defence
- Modern Rail
- Etc

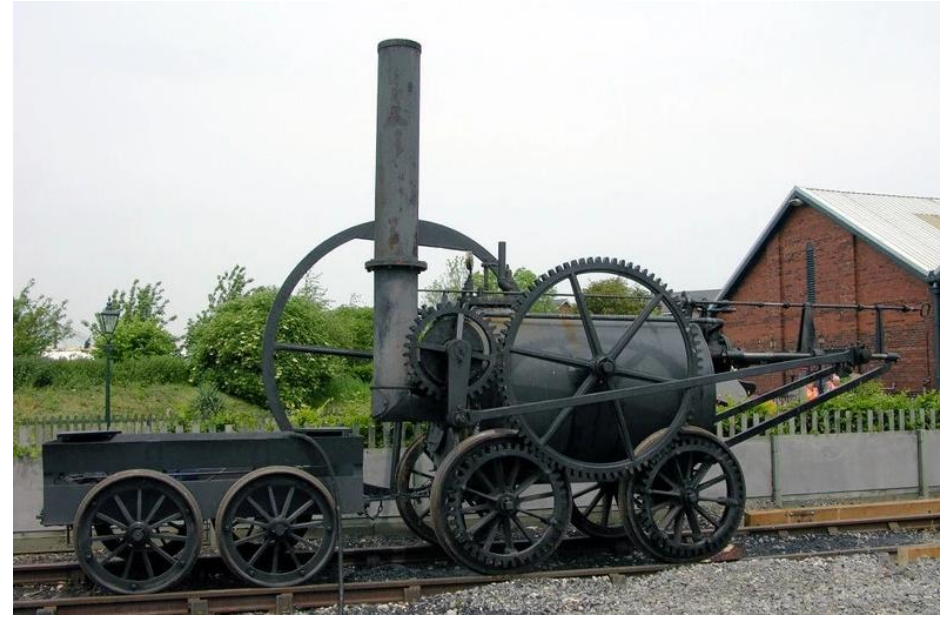
It's just not steam locomotive engineering knowledge!!!

You need to respect, acknowledge and learn from the past

They did it a particular way for a reason

- It was not necessarily '*we have always done it that way*'

Does not preclude 21st century methods, but always think back





The steam locomotive: a complex machine

A steam engine is a complex machine

HOW MANY PARTS?

Narrow Gauge

- Circa 1270 parts
- 6780 physical parts
 - No electrics ***NOT*** dual braked
- 22 tons



By Mean as custard - Own work, CC BY-SA 4.0,
<https://commons.wikimedia.org/w/index.php?curid=70291690>

A steam engine is a complex machine

HOW MANY PARTS?

Mainline Pacific

- 3920 Part numbers
 - Excluding electrics and airbrakes
- 14527 physical parts
- 104 tons



Complex machine

Mainline Pacific

- 3920 Part numbers
 - Excluding electrics and airbrakes
- 14527 physical parts
- 104 tons
- £5 million

Narrow Gauge

- Circa 1270 parts
- 6780 physical parts
 - No electrics not dual braked
- 22 tons
- £650,000

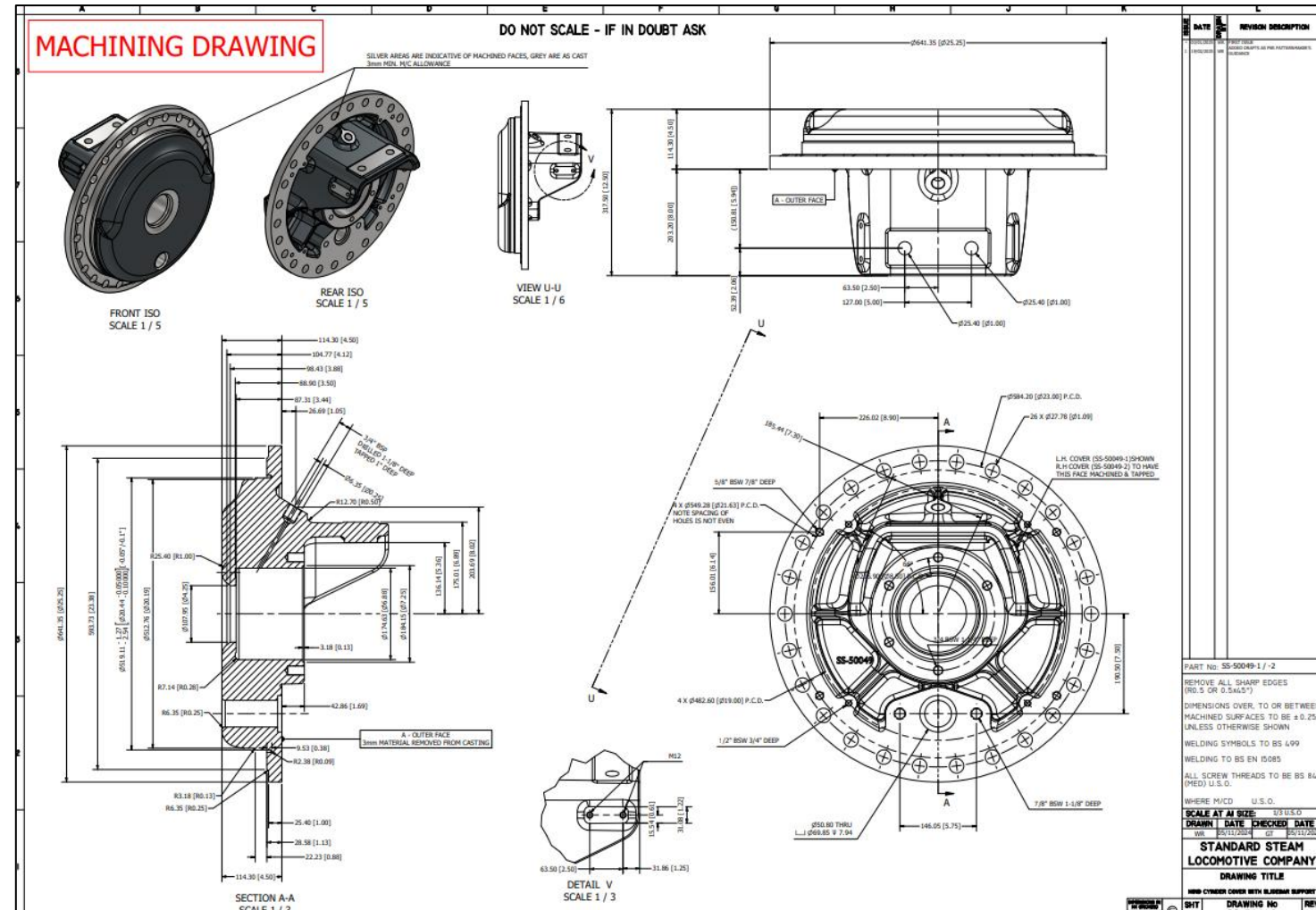


By Mean as custard - Own work, CC BY-SA 4.0
https://commons.wikimedia.org/w/index.php?title=Southern_762&file=Southern_762.jpg

Recognise its complexity

GETTING THE PARTS

- All have to be sourced
 - Drawings
 - Enquiries
 - Orders



Recognise its complexity

GETTING THEM

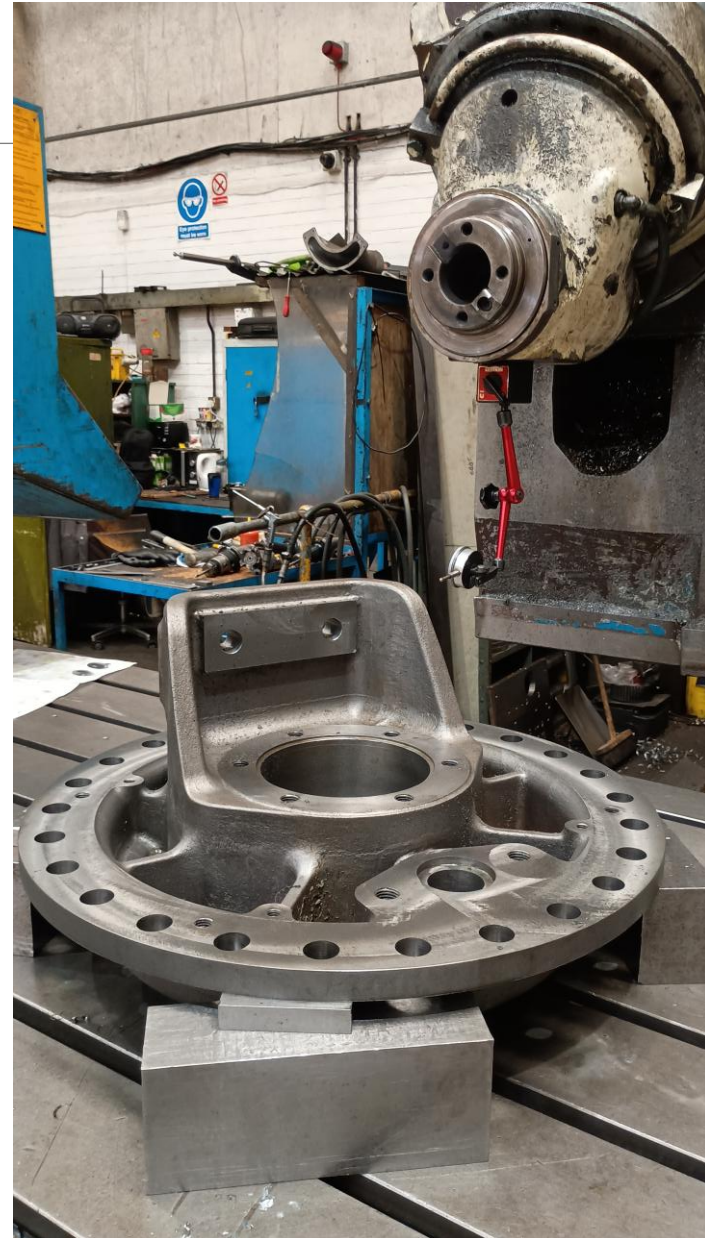
- All have to be sourced
 - Drawings
 - Enquiries
 - Orders
 - Made



Recognise its complexity

GETTING THEM

- All have to be sourced
 - Drawings
 - Enquiries
 - Orders
 - Made



Recognise its complexity

GETTING THEM

- All have to be sourced
 - Drawings
 - Enquiries
 - Orders
 - Made
 - Checked
 - Stored
 - And not lost or damaged!
 - Fitted

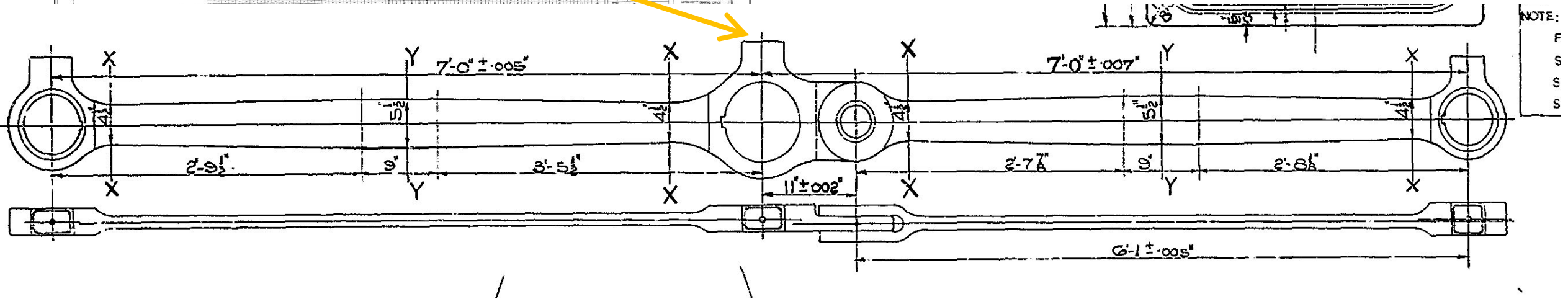
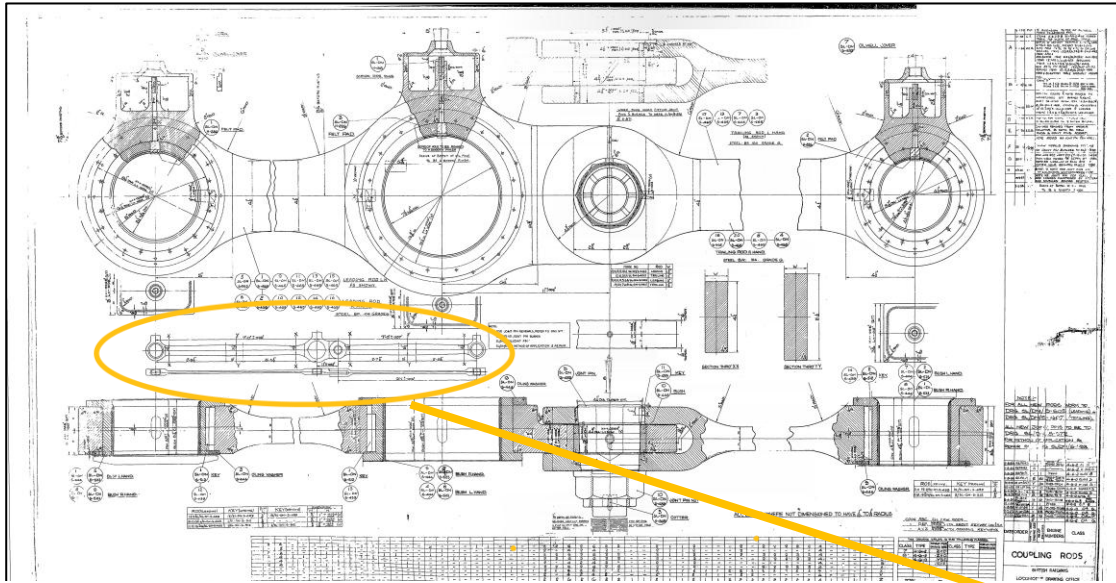
Rinse and repeat
@ 3000 times



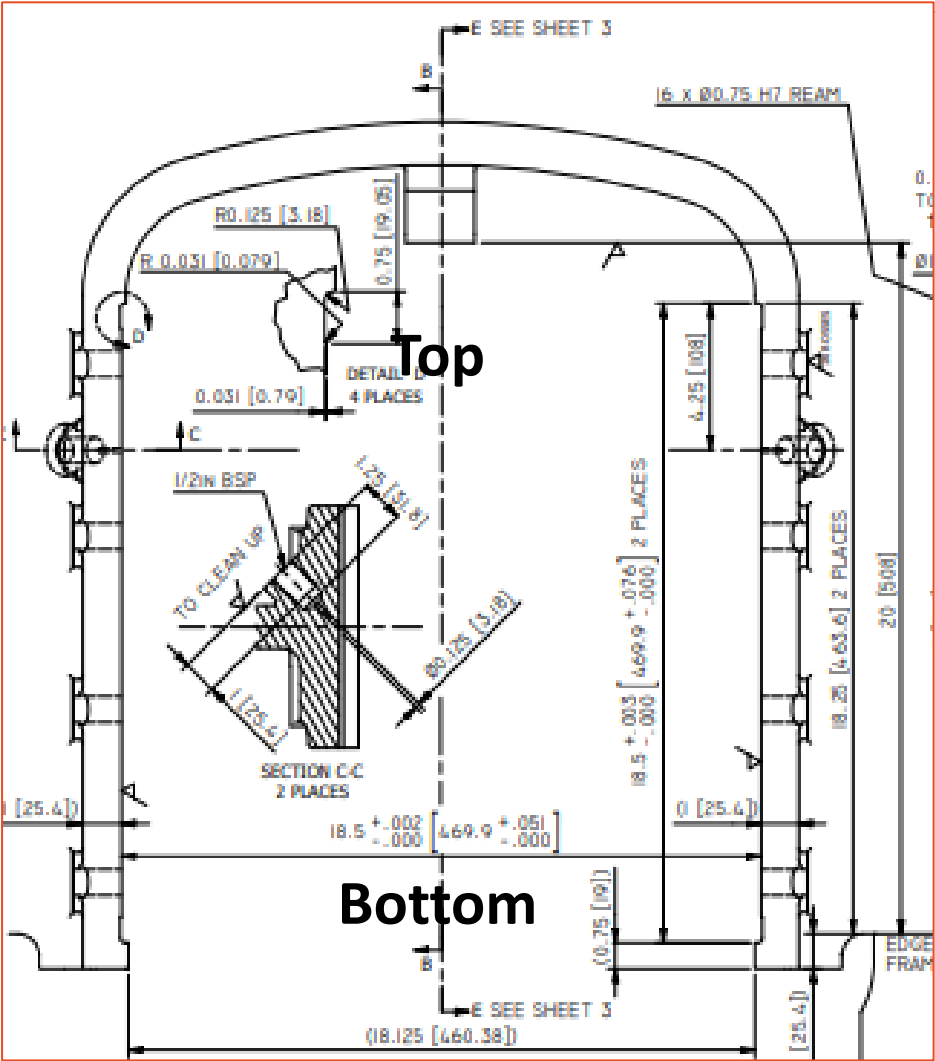
‘The steam locomotive: a machine of precision’

K. J. COOK, O.B.E., M.I.Mech.E., M.I.Loco.E. (Hon. Member and Past President)
Chief Mechanical and Electrical Engineer, British Railways—E. & N.E. Region, Doncaster
I Loc E Presidential Address - September 1955.

Precision engineering on a large scale



Precision engineering on a large scale



Actual Dimensions Measured by FARO Arm Drawing 18.5 -0.000/+0.002"			
Wheel	Outside	Inside	
LL	18.497	18.499	RL
LD	18.500	18.501	RD
LT	18.497	18.497	RT

- Measurements made by FARO Arm
- To be checked for final alignment when cylinders fitted
 - Parallelism across frames
 - Squareness to cylinder centreline

‘The problem of being a one off’

The problem of a one off

- You are not coming back for repeat business
 - Building a batch of 10 gives you better negotiating power than just 1
- The 10th will be better than the 1st
 - More practice
- If you scrap a part, you do not have a spare
 - Delays build, while new part is made

Things go wrong!

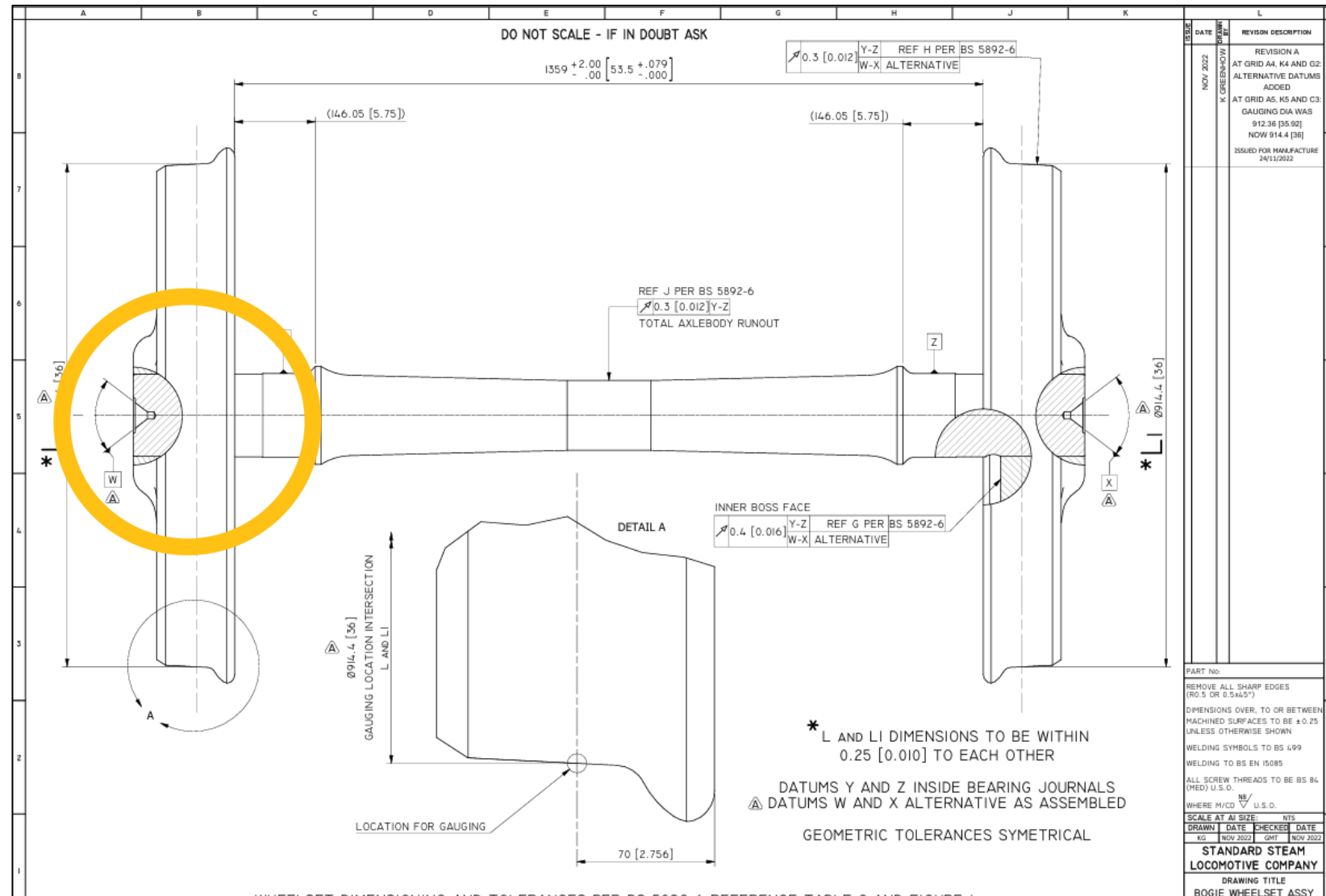
If you have a mating part

Make one before the other

Leave surplus material on one, so that you can adjust

Record it on a Non-Conformance Record

The cars you have will have some form of non-conformance on them



A black and white photograph of a steam locomotive, numbered 72010 and named 'THE MASTER CUTLER', in a workshop. The locomotive is the central focus, with its large wheels and boiler visible. The background shows a cluttered workshop with various tools, equipment, and structural elements. The text 'You need organization and processes' is overlaid in white, sans-serif font across the middle of the image.

You need organization and processes

You need
organisation

- Legal Structure
- Chair
- Management
- Team
 - Volunteers
 - Paid staff

Keep It Simple Stupid!

You need processes and records

All credit to those that have done it!!!

