

S.C.O.A.-P. WHEEL CENTRES



In recent years a good deal of attention has been given to the design of cast steel wheel centres in order to try and produce a wheel appreciably stronger than the usual oval spoked type. Unfortunately however, until lately, the modified forms of spoked wheel have always involved an increase in weight without eliminating the weakness at the junction of spoke and rim.

Various forms of disc wheel have also been evolved, but although stronger than the spoked wheel, they are heavier and more costly to produce.

One of the Australian railways however, was recently ascertaining the possibility of producing a satisfactory spoked wheel which would be both stronger and lighter than the normal pattern, and during their investigations they approached the Steel Company of Australia Pty. Ltd., of Coburg, Melbourne. This Company, who are Vulcan's agents in Australia and specialise in railway products, produced a patented design of wheel known as the S.C.O.A.-P., the latter initial representing Mr. F. C. Paynter, who was originally responsible for the idea.

The S.C.O.A.-P. wheel is essentially of the spoked form, but the conventional type of solid spoke has been abandoned in favour of one of U section, and the usual type of rim has been replaced by one of channel section. The result of these changes is that whilst the accessibility of the spoked wheel has been retained, a much stronger wheel has been produced with a weight reduction of some 3-5%.

The U spoke is appreciably stronger both as a column and as a beam for resisting vertical or lateral shocks and the channel rim provides greatly improved support for the tyre between the spokes.

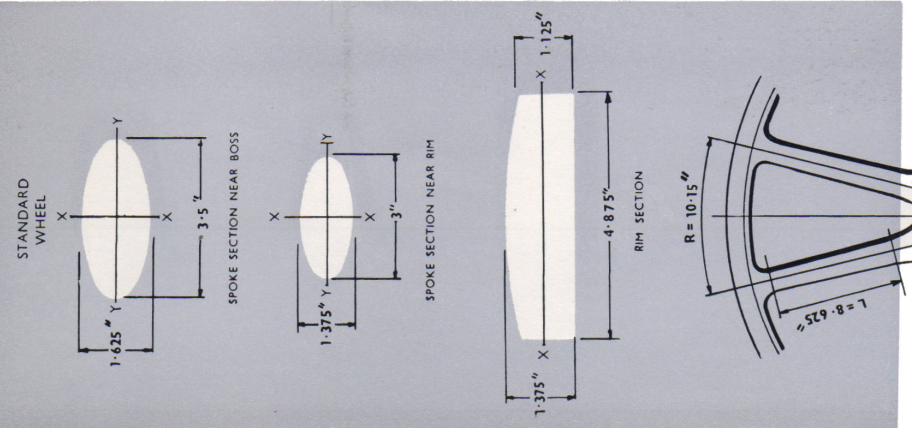
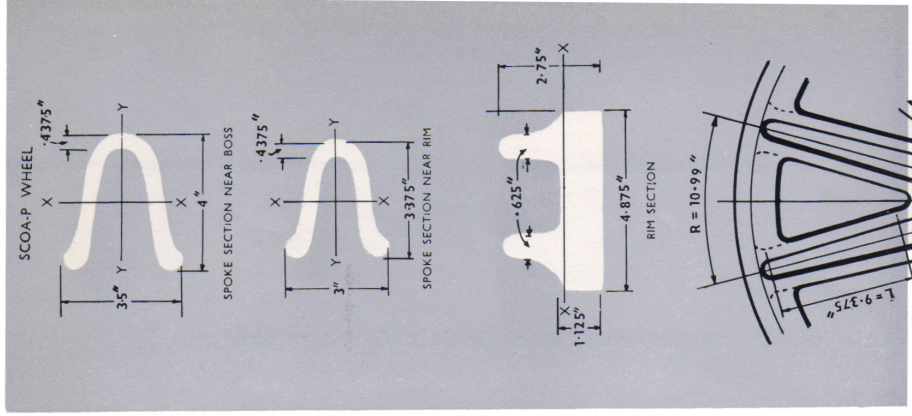
The new wheel achieved immediate success and the Steel Company of Australia asked The Vulcan Foundry to act as designers of this type of wheel for locomotives and rolling stock built in Great Britain, and Continental and other countries. At the same time a manufacturing licence was granted to Messrs. K. & L. Steelfounders of Letchworth, Hertfordshire, who in turn have appointed manufacturing licensees in other countries.



View of typical S.C.O.A.-P. wheel centre showing various sections

VULCAN LOCOMOTIVES

A TYPICAL COMPARISON BETWEEN A STANDARD DESIGN AND A S.C.O.A.-P. WHEEL CENTRE OF 3' 6" DIAMETER



Cross-Sectional Area of Spokes and Rim	STANDARD WHEEL	S.C.O.A.-P. WHEEL	COMPARISON
Area of spoke section near boss	4.45 sq. in.	4.19 sq. in.	6.2% less
Area of spoke section near rim	3.28 sq. in.	3.42 sq. in.	4.3% more
Area of rim section	6.35 sq. in.	7.76 sq. in.	6.5% more

Sectional Moduli of Spokes and Rim	STANDARD WHEEL	S.C.O.A.-P. WHEEL	COMPARISON
Spoke near boss	Axis X-X	1.97	36.5% stronger
Spoke near rim	Axis Y-Y	0.86	187% stronger
Spoke near rim	Axis X-X	1.25	41.5% stronger
Spoke near rim	Axis Y-Y	0.54	187% stronger
Rim	Axis X-X	1.25	84% stronger

Stress in Spokes

$\frac{WL}{NZ}$ where
 W = Rail load (tons)
 L = Length of spoke (in.)
 N = Number of spokes
 Z = Average section modulus Boss + Rim (in.³)

Axis X-X	5.16	4.38	17.8% stronger
Axis Y-Y	12.8	4.86	164% stronger

Stress in Rims

$\frac{WR}{Z}$ where
 W = Rail load (tons)
 R = Length of section of rim (in.)
 Z = Section modulus of rim about Axis X-X

Axis X-X	101.5	59.6	70% stronger
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Calculated Weight of Wheel Centres

Finish machined (leading and trailing)	868 lb.	840 lb.	3.3% lighter
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Patent No. Great Britain 640551—Patents throughout the World



The following are the advantages of the S.C.O.A.-P. type wheel:-

Over Orthodox Spoked Type

- (1) Lighter in weight for equal strength.
- (2) Stronger for equal weight.
- (3) Channel rim is more resistant to deflection between spokes thus reducing tendency to loose tyres.
- (4) Spoke design ideally suited to resist lateral and radial thrust, also compressive shocks due to rail loads.
- (5) Saving in weight can be utilised to reduce axle loads or provide increased boiler capacity, etc. (6) Lighter weight reduces dead weight on rail.
- (7) Usually the cost of S.C.O.A.-P wheels is no greater than that of the orthodox type- sometimes it is slightly higher but not in proportion to the advantages gained.
- (8) The danger of undiscovered cavities at junctions of rim and spokes, prevalent in normal wheel centres, is completely eliminated.

Over Disc or Plate Type

- (1) Much lighter in weight with great strength.
- (2) Saving in weight (see 5 above).
- (3) Less dead weight (see 6 above).
- (4) Very much cheaper.
- (5) More accessible for maintenance, lubrication, etc.

Destruction tests carried out on. S.C.O.A.-P. wheel centres amply reinforce the claims made for this design.

Thousands of these wheels have been supplied and are in operation on locomotives in Queensland, Tasmania, Victoria, Gold Coast, India, Spain, New Zealand, and Persia and many more are on order, and railway authorities all over the world are showing great interest in this technical improvement.