**Locomotive Design**

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Until the 1930s locomotives were designed by engineers. They developed a design language that gave them

national characteristics. Railway enthusiasts are quick to spot the national style of a steam locomotive.

Locomotive design is a case study in engineering aesthetic; most are highly styled, even those that make a

feature of seemingly not being. The railway locomotive had been first developed in the UK and it was here the

most overtly “designed” locomotives were made. By the late nineteenth century UK locomotives were notably

devoid of external pipework and mechanical components, their bodywork was an exercise in concealment and

even rivets were countersunk and concealed to give flat surfaces for equally considered liveries. A particularly

good example of this aesthetic was Samuel Johnson’s “spinner” (1896), built by the Midland Railway. Here the

locomotive had no moving parts visible save for the wheels. At this time there were over 100 private railway

companies in the UK, each vying for attention, which kept such design viable. Paradoxically UK locomotives

were held up as examples of “form following function” by early modernists, when in fact their functionality

and particularly their maintenance were often compromised by their formal design.

The first locomotives to have input from external designers were those that were “streamlined” in

1930s America, in particular by Raymond Loewy and Henry Dreyfus. Such design was usually little more than a

shroud covering an existent locomotive that added weight and therefore inefficiency, such as Loewy’s

Pennsylvania K4 (1938), but it captured the public imagination and served its purpose in terms of revitalizing

the image of the railroads. In most other countries streamlining was carried out by locomotive engineers at the

behest of railway managers. Almost universally it was removed after 1939 to assist maintenance. Steam

locomotive design largely reverted to in-house engineers and by the early 1960s had come to an end, replaced

by diesel and electric traction.

Whereas a steam locomotive’s key components define its silhouette, a diesel or electric is essentially a

weatherproof box within which mechanical components are arranged. Electric traction’s origins date back to

the latter-nineteenth century and early examples used similar chassis designs to steam with driving wheels and

connecting rods, and with bodywork constructed in the manner of steam locomotive tenders (riveted steel

with strap-work), although “steeple cab” and “tunnel” type locos had a defined style. This was developed by

the Pennsylvania Railroad in the streamlined GG1 which was the first to receive attention from external design

consultants, namely Donald Dohner and Raymond Loewy.

Many American diesels for passenger haulage had prominent noses with the cab windows, resembling

cockpits of aircraft, above. This was influential elsewhere. Stylistic influence from aeronautical and automotive

design became progressively more commonplace after the Second World War.

Since 1960, the move to multiple unit style train-sets for prestigious express passenger services has

diminished the status of the locomotive as a free-standing entity, but those that have been “designed” by an

outside agency often stand out. The Italian Settebello (1952), styled externally and furnished by Giulio

Minoletti, was an early example. In terms of speed and technology, the Japanese Shinkansen or Bullet Train

(1964) represented a paradigm shift. The initial examples copied the shape of jet aircraft fuselages, but

subsequent wind tunnel testing demonstrated that cone-shaped ends were better for trains and so variations

have been used on other significant European high-speed trains. These include the French TGV (1972) styled

by Jacques Cooper and the German ICE (1985) by Alexander Neumeister. In Italy, the Eurostar Italia (1992) and

Frecciarossa (2000) are two of many styled by Pininfarina. In the USA, Amtrak’s north-east corridor routes are

operated by the Acela (2000) by Brent Oppenheimer, Robert Hauter, and IDEO. By comparison, Britain’s diesel

High-Speed Train, or “Inter-City 125” (1972), styled externally by Kenneth Grange, may be less spectacular in

terms of speed, appearance, and cost yet it has nonetheless proven to be long-lasting, enduringly popular,

adaptable—and profitable.

An important factor in understanding railway design since 1960 is corporate identity, to which all

elements of railway infrastructure, including locomotives, comply. Of these, that for British Rail developed by

DRU (1964) with graphics by Jock Kinneir and Margaret Calvert and a “double-arrow” logo by Gerald Barney

was emulated by several state-owned railways in Europe, including Nederlandse Spoorwegen in the

Netherlands and Danske Statsbaner in Denmark. On the latter, the architect Jens Nielsen coordinated all

aspects of locomotive design, achieving a very high level of aesthetic cohesion.

**References and further reading**

Ross, David. 2004. *"The Willing Servant": A History of the Steam Locomotive*. Stroud: Tempus