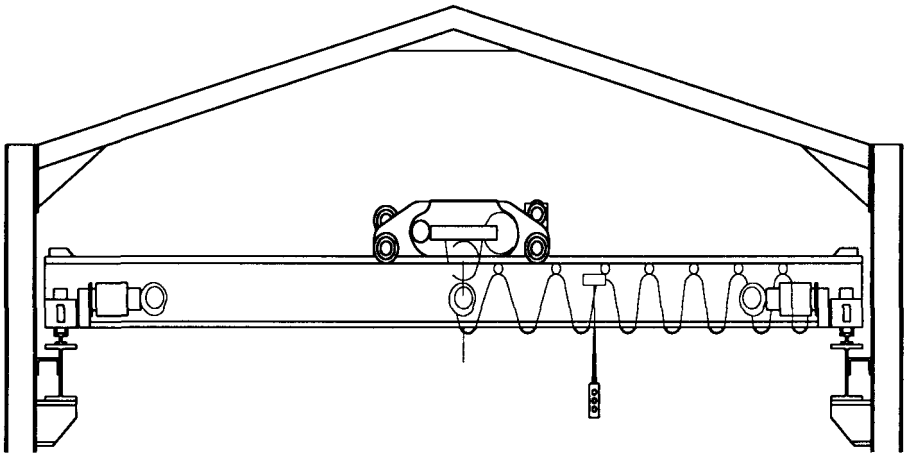

Figure 6.15 *Double girder pendant controlled crane for loading class Q2*

6.6.1 Crane classification

The appropriate British Standards (BS 466[82] and BS ,2573 [83]) classify cranes according to two criteria:

- Q1 to 4 4 according to the proportion of lifts which are close to the safe working load (SWL); a low proportion for Q1 cranes, a high proportion for Q 4 cranes
- U1 to U9 according to the frequency of use; U1 to U3 are used infrequently, U7 to U9 almost continuously.

Classes for some typical applications are given in Table 6.2, which is taken from BS 466. The class dictates the load factors to be used in design (reference should be made to the appropriate standard for more details), and the required design considerations. For example, according to BS 5950: Part 1 [85], crabbing of the trolley need only be considered for classes 4 3 and 44. This standard also recommends that for these two classes manufacturer's information is sought before calculating dynamic and impact loads. Less accurate design is acceptable for classes Q1 and Q2, which operate close to their SWL less frequently.

Table 6.2 *Typical classification for overhead travelling industrial type cranes*

Type and/or application	Class of utilisation	Class of loading
Cranes for power stations	U2 - U4	Q1
Light work shop duty (maintenance, repairs, assembly)	U2 - U4	Q1 - Q2
Light stores duty	U2 - U4	Q1 - Q2
Medium and heavy duty (workshop, warehouse)	U4 - U6	Q1 - Q3
Crane for grabbing work	U5 - U8	Q4
Ladle crane for foundry work	U4 - U5	Q3 - Q4
Magnet crane for stockyard work	U5 - U6	Q2 - Q3
Magnet crane for scrapyard work	U5 - U6	Q3 - Q4
Process crane	U6 - U7	Q2 - Q3
Shipyard crane	U5 - U6	Q2 - Q3

6.6.2 Girders

In addition to vertical loading, the crane girders need to be designed to resist horizontal loads. The designer may need to consider improving the lateral resistance of the girder top flange using a plate or even a channel section seated over the flange.

Although rail fixings usually permit adjustment of the rail relative to the girder, the adjustment of line which is provided by the rail fixing should not exceed the greater of ±6 mm, or half the web thickness, according to ENV 1090-l [88]. This limit is necessary to avoid introducing large eccentric loads into the girder. To accommodate any greater deviation, the structural designer should make provision for the position of the girders themselves to be adjustable.

6.6.3 Rails

Crane rails are available in standard section sizes [52]. The choice of rail section depends on the load to be carried and the wheel diameter. For light loads, steel bars are often used as 'rails'. Rails may be continuous, or detailed in lengths to suit simply supported girders.

Adjacent lengths of individual rails may be butted-up or scarfed (see Figure 6.16a & b). A scarfed detail reduces the change in slope of the rail as a wheel passes over the joint, allowing a smoother passage of the trolley. The rail joint should be offset from the adjacent joint in the girder.

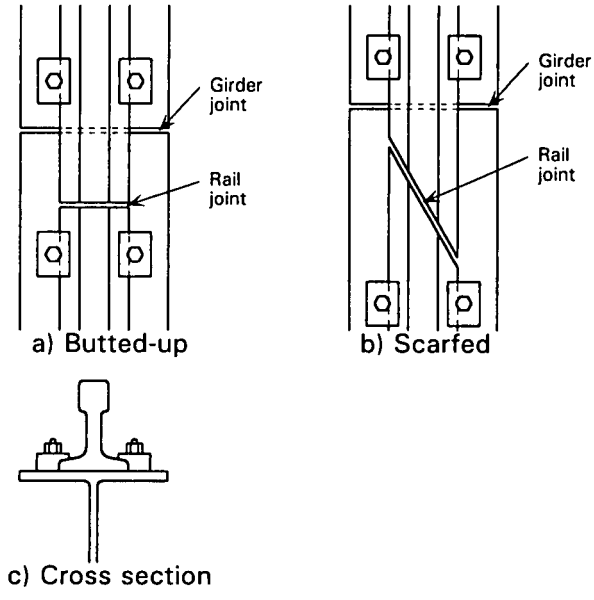

Figure 6.16 *Crane rail details*

Continuous rails may be formed by joining adjacent lengths using fish plates. Alternatively the rails may be welded, but depending on the type of steel this may require a special procedure.

Tolerances for crane rails are more onerous than those for steel building frames. A comprehensive set of geometrical and dimensional tolerances is given in Appendix F of BS 466 *Specification for Power Driven Overhead Travelling Cranes* [82]. The NSSS suggests an alternative tolerance on deviation from the true gauge (±10 mm), and on the step in running surface level at joints in the rails