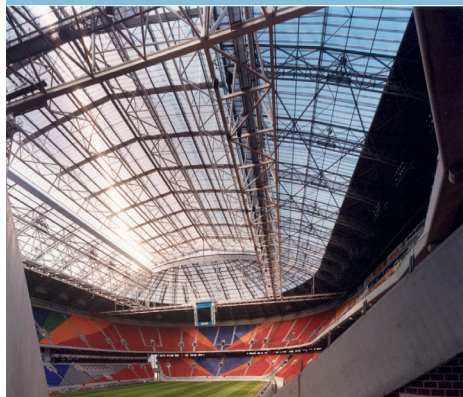


Learning curve

Building knowledge on retractable roofs

Ben Veenbrink and Henk van Raan for *Stadia* magazine

Amsterdam Arena installed Europe's first retractable roof – and its first seven years in service have provided valuable lessons for the stadium managers



When the 52,000-capacity Amsterdam Arena opened in 1996, it boasted Europe's first retractable-roof stadium, and was the world's second, after the Toronto Skydome. At that time, there was little expertise in the field to draw on – there was no information on rigging possibilities and different stadium configurations, nor was there anything on maintenance procedures, nor the means of gaining a return on what was a considerable investment. It was even rumoured that the opening of the roof and switching on the stadium floodlights at the same time would cause a power cut over south-east Amsterdam.

Based on the principle that the roof would always be open during football matches and

closed for concerts and other events only when it rained, the roof was designed to involve just 10-15 movements per year. In practice, however, 40 or more roof movements per year took place. As a consequence, operations and maintenance costs accumulated and after three years the roof machinery had to be replaced, requiring an additional and unbudgeted investment of €75,000 (US\$90,000).

The roof also affected the growing conditions for natural turf, as it led to a lack of direct sunlight and air circulation on the pitch, as well as too much moist air during certain seasons, which hindered the recovery of the turf after games. Re-turfing – a technique developed at the ArenA – proved an effective solution but, with up to three to four re-turfings required each year, this resulted in an additional expense of up to €110,000-150,000 (US\$130,000-180,000) each time. This was still cheaper, though, than investing in a sliding pitch system. With time, ArenA staff learned how to open and close the roof to expose or protect the pitch, depending on the weather, although this meant increasing the number of roof movements.

Coming clean

Cleaning of the translucent roof panels was also an issue that took time to fully appreciate. For years, cleaning of the 30,000m² roof had to be done manually, but for the past three years a special cleaning robot has been used, which has brought the cost down to some €110,000 over a three-year period. Now, after seven years, a maintenance system has been developed for the roof, helping to make it a unique selling point for the stadium.

The roof guarantees the comfort of the spectators during concerts, which means promoters increasingly opt for the ArenA as a venue for their stars. The rigging possibilities have also created new stadium configurations that allow variations in capacity, such as the amphitheatre setting. In this setting, the north end zone behind the goal is rigged with acoustic and fire-retardant theatre curtains to create a 10,000-12,000 capacity over two tiers, which is used for smaller concerts, indoor sports and family entertainment. The blackbox configuration, to be introduced next year, will

separate both end zones from the stadium bowl and create a theatre look by placing the stage opposite the main building (west stand), with all its hospitality facilities, or on the centre of the pitch so that the east stands can also be used. By moving the stage closer to the west stand and using its first tier only, the capacity can be varied between 15,000 and 30,000 people. The setting is designed for concerts, sports such as tennis, and corporate events.

Capital gains

With the market for 40,000-50,000-capacity concerts limited, these two configurations enable Amsterdam Arena to tap into new market segments ranging from 10,000-30,000 capacity and to offer an intimate, comfortable and dry atmosphere to its spectators. The number of concerts and other events staged in the ArenA has increased dramatically over the past two years, from 25 to some 35 last season, and with the introduction of the new blackbox configuration, that looks set to rise to around 60 non-sport (excluding football and American football) events in three years.

A change in the mind-set of the football industry has also been noted. Dutch national team coach Dick Advocaat has indicated recently that he would prefer to play in the ArenA, as it offers protection from rain and other adverse weather conditions.

New stadia have followed Amsterdam ArenA's example and opted for retractable roofs. However, the obvious advantages of increased comfort have to be measured against the costs incurred in terms of initial investment and subsequent maintenance. But this, in turn, means looking at increasing revenue by capitalising on the roof and exploiting its potential for developing new events.

A strong stadium concept and clear vision on usage of the building and a sound business plan, based on realistic market research, are essential during the initial phases of the stadium project in order to make the roof an investment success. ■

Ben Veenbrink is general manager of Amsterdam Arena Advisory. Henk van Raan is the Amsterdam Arena facility manager

Approx investment	€13.5m (US\$1.8m) for the entire roof
Opening/closing time	35 minutes
Total roof area	approx 30,000m ²
Roof opening size	107m by 71m
Size of each roof panel	118m by 40m
Weight of roof panels	2 x 520 tonnes
Material	translucent (68%) lexan (polycarbonate) panels
Power consumption	2 x 120kW
Rigging capacity	24 tonnes
Motors	16 electro engines of 15kW each
Preventive maintenance	€50,000 (US\$60,000) pa
Corrective maintenance	€12,000 pa
Cleaning costs	€110,000 per three years
Re-turfing cost per time	€110,000-150,000

Fact file: Amsterdam Arena roof