



Fleche

a sailing craft for family fun

Entry for Concept Boat 2005

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Description

"Boating for All"






The Flèche is a recreational sailing craft designed to allow family members to sail together. It is a hybrid between sailboard and racing skiff. The Flèche is light, car-toppable (no need for a trailer), can be kit-built to reduce cost, is forgiving to sail, and yet will be capable of high performance in skilled hands. It has stylish good-looks that will appeal to the young – the arrow-shape suggests speed. The innovative rig can take on different configurations according to need, and folds away readily when not in use.

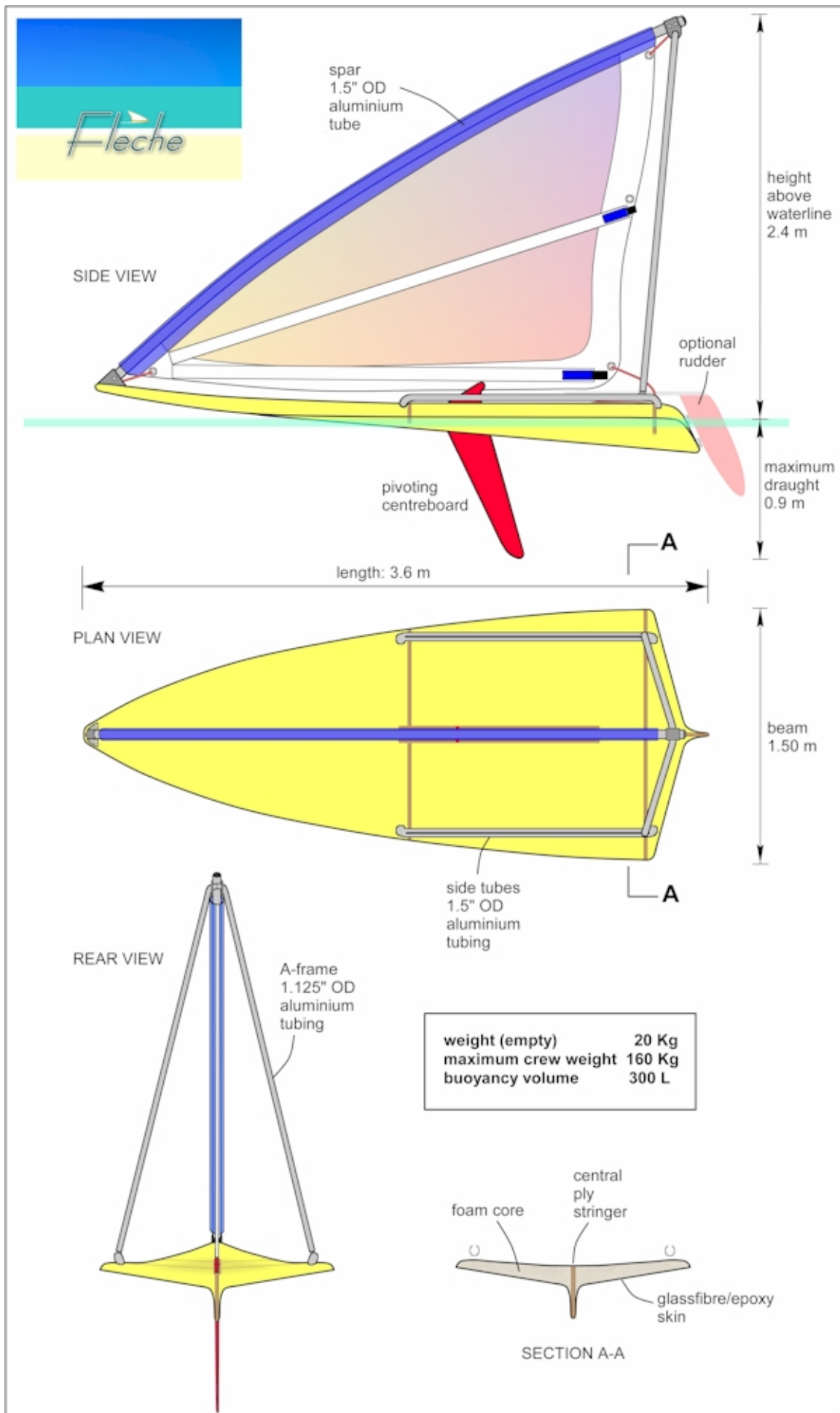
The Flèche has sufficient buoyancy to carry two adults, or a parent with child(ren) and dog! It has a wide, uncluttered deck that is gently hollowed, with side tubes for handholds and security. The underwater shape is a shallow V with a midline, downwards-directed ridge in place of a fin. This well-trying shape gives low drag, good directional stability, structural stiffness, and reduced impact risk in shallow waters.

The unique sailing rig consists of a sloping spar attached to the hull in front and to an A-frame at the back. This arrangement provides maximum stability and reliability in use, and allows for different configurations. For example, the spar can be lowered by sliding the feet of the A-frame forwards in the guides provided by the side tubes. This can be done when using the sail in a reefed form in high winds, or when folding the rig for transport. The sail is double-skinned so that it can be reefed in a simple yet effective way, and also opened out like a spinnaker for downwind sailing. The large centreboard and efficient rig design allow a good upwind performance. The Flèche could be developed as a racing class.







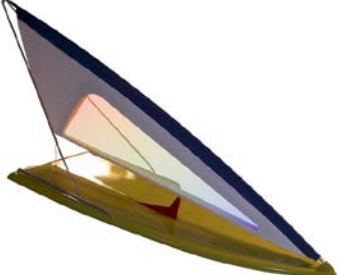



Due to its width and buoyancy, the Flèche provides a stable platform for boarding and for crew movements when sailing. Course-changes can be achieved by weight-shifting and changes in sheeting of the sail, but an optional rudder may be readily fitted for those who prefer to steer with one.

The Flèche design addresses the following Judges' criteria:

-  it is of low or moderate budget
-  it is suitable for group activities
-  it can be built from a kit
-  it will appeal to participation by young people
-  it can provide a new racing concept



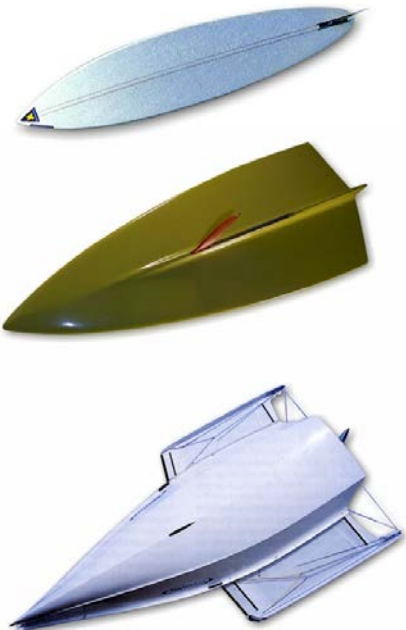
Rig configurations

	<p> normal configuration</p>
	<p> down wind configuration – the two leaves of the sail are opened out to form a large, spinnaker-like sail</p>
	<p> reefed configuration – the bottom half of each sail has been folded inwards and upwards and tucked away between the upper parts of the sail. This halves the sail area and raises the sail foot away from the deck – ideal for pottering around with the family. The main sheet is taken from the eyelets half way up the trailing edge, at the ends of the middle batten</p>
	<p> high-wind configuration - the sail has been reefed and the spars lowered to a more streamlined position by sliding the feet of the A-frame further forwards and locking them in position</p>
	<p> folded configuration – the feet of the A-frame struts have been moved forward to allow the spar and sail to be stowed on deck for transport and storage</p>

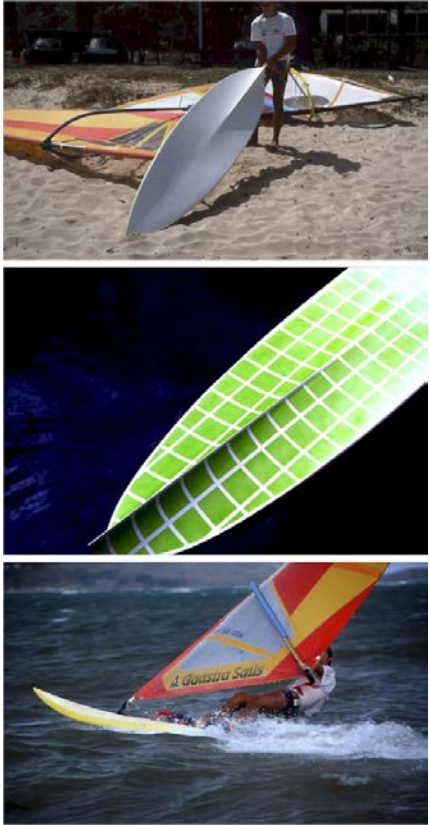


Design rationale

The hull

	<ul style="list-style-type: none">the hullform of the Flèche is midway between that of a sailboard (above) and a high-performance skiff (below)the Flèche is bigger than a standard sailboard to give enough buoyancy to carry up to 2 adultsit is constructed in the same way as a sailboardand light enough for one person to carry
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The underwater shape

	<ul style="list-style-type: none">the underside is V-shaped and characterised by a tapering midline ridgethe ridge replaces the more usual underwater finI developed this distinctive underwater shape originally for sailboardsthe design is known as DSC – deep spiral concavesthe shape manages waterflow under the craft with minimal drag, facilitating early planing and at the same time giving directional stabilitythe central ridge gives structural stiffness to the craft, and is less vulnerable than a fin to damage in shallow waters
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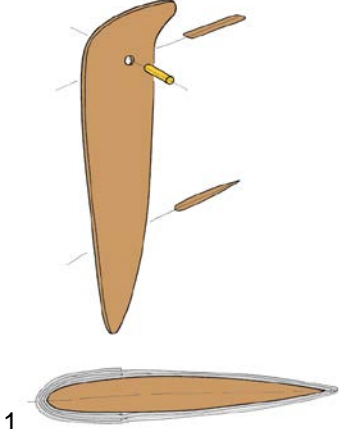



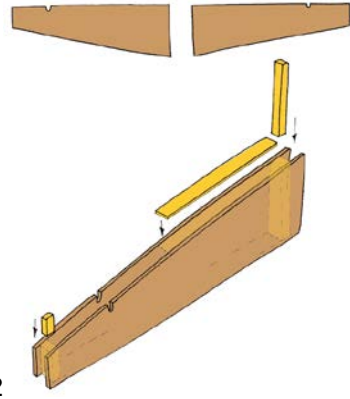



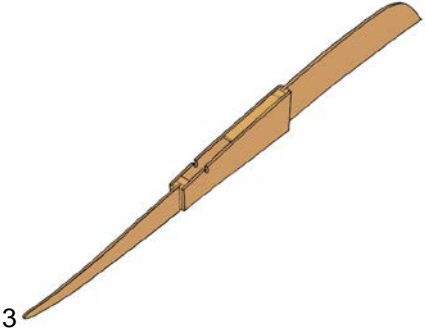

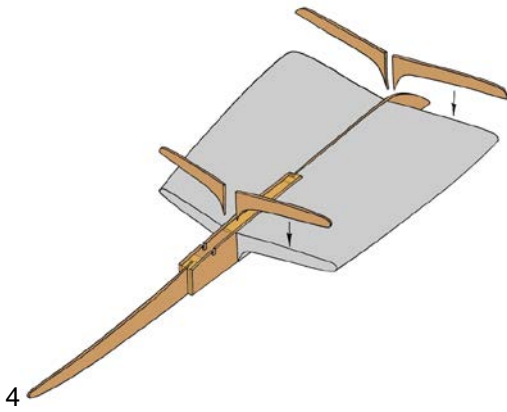


Design rationale (continued)

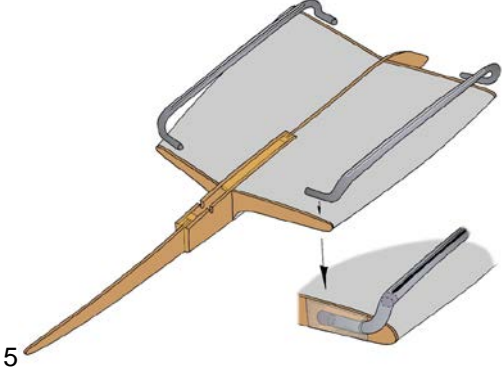



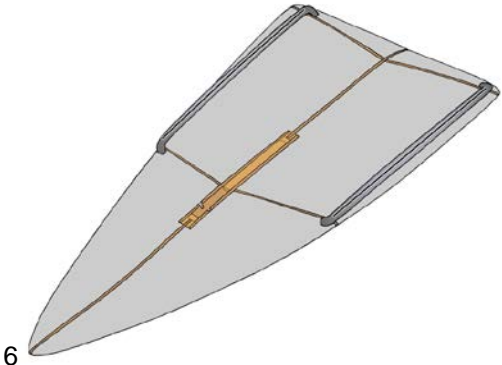


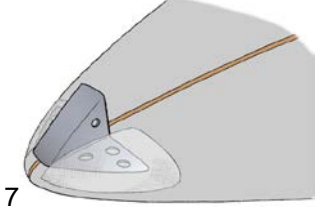

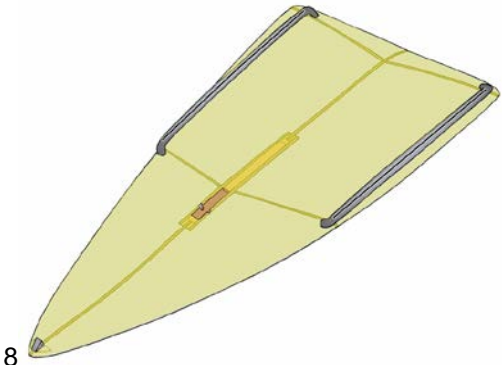


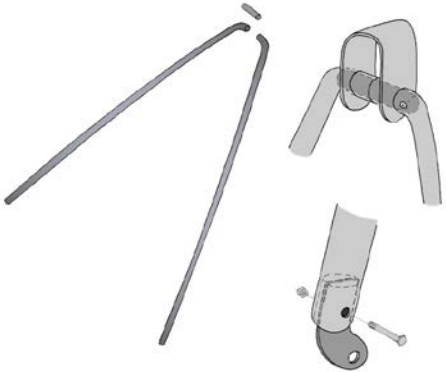



The rig




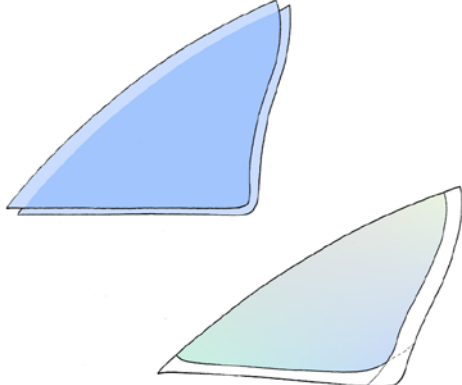


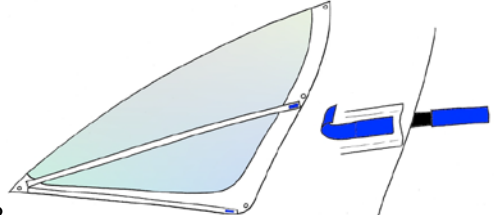


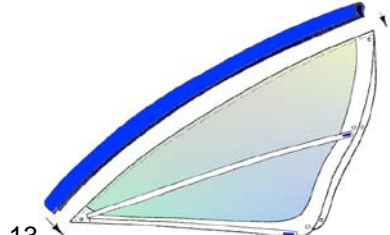


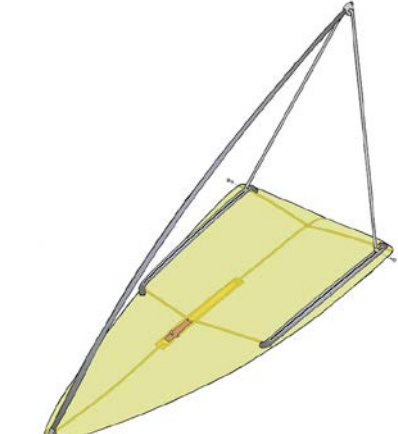






- the rig design takes its inspiration from the traditional Lateen rig, and also from the asymmetrical spinnaker
- instead of having a mast to support the spar, the spar is supported from the transom by a stable A-frame
- a test rig has been made for a dinghy
- the new rig has been tested on all the usual points of sail, from close-hauled for upwind work, to running down wind, and has been found to be effective
- the centre of effort of the sail is lower than for a conventional Bermuda-type rig, and therefore the heeling forces are less
- this makes for a forgiving, easy-to-use rig
- sail construction is straightforward since the panels are made flat – there is no need to build in 3-dimensional shape
- the pyramidal arrangement of the spar and A-frame makes for a very stable, light and strong support for the sail

Making the kit version

 <p>1</p>	<ul style="list-style-type: none">  smooth the pre-shaped plywood centreboard to obtain a good hydrodynamic shape  coat the centreboard with two layers of glassfibre cloth impregnated with epoxy resin, wrapping the cloth around the leading edge for strength and wear resistance  drill a hole for the pivot peg and glue the peg in place
 <p>2</p>	<ul style="list-style-type: none">  coat the internal face of each side piece of the centreboard box with a layer of glassfibre cloth plus epoxy resin  when the resin has polymerised, make a test assembly of the centreboard box with the centreboard in place to ensure the correct tolerances – adjust the thickness of the end pieces until a snug fit is obtained, then glue together  add the top baffle plate of the centreboard box
 <p>3</p>	<ul style="list-style-type: none">  glue the front and rear portions of the midline stringer to the centreboard box, using packing strips as required
 <p>4</p>	<ul style="list-style-type: none">  glue the preshaped foam blocks to the midline stringer  glue the front and rear cross-stringers in place

 <p>5</p>	<ul style="list-style-type: none">  position the foam sealing rings at each end of the slot in the prebent, preslotted aluminium side tubes  glue the side tubes in place  reinforce the attachments with two layers of glassfibre and epoxy resin
 <p>6</p>	<ul style="list-style-type: none">  glue the remaining preshaped foam blocks in place  if you are planning to use different types of sailing rig on this craft, for example windsurfing rigs, fit the mast track or mast-foot reinforcing blocks at this stage
 <p>7</p>	<ul style="list-style-type: none">  glue the front spar mount in place, and reinforce with two layers of glassfibre cloth and epoxy resin
 <p>8</p>	<ul style="list-style-type: none">  smooth the hull carefully  apply the glassfibre cloth and epoxy resin to top and bottom surfaces, lapping the cloth layers around the edges for increased strength <p>*** If you are uncertain about your ability to carry out this stage, it may be worth having it done by a local expert, for example a surf board maker</p>
 <p>9</p>	<ul style="list-style-type: none">  assemble the spar-top bracket with the two prebent halves of the A-frame, joining them with the internal tube  pop-rivet the A-frame halves and internal tube together  add the lower end pieces of the A-frame, securing with a through-bolt



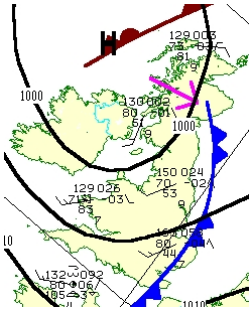


<p>10</p> 	<ul style="list-style-type: none">  insert the plastic end cap at the lower end of the spar, and drill a hole for the lower attachment bolt  insert the end cap at the top of the spar, and pop-rivet the spar to the spar-top bracket
<p>11</p> 	<ul style="list-style-type: none">  cut out two identical sail panels  add reinforcing material around the trailing edge and foot of each sail panel
<p>12</p> 	<ul style="list-style-type: none">  add batten pockets and velcro batten tensioners to each panel  add the 4 eyelets to each panel
<p>13</p> 	<ul style="list-style-type: none">  join the two sail panels together with double-sided tape along their leading edges  attach the leading edge sleeve for the spar to the joined sail panels
<p>14</p> 	<ul style="list-style-type: none">  assemble the spar and A-frame on the hull, and drill holes through the side tubes for the A-frame locking pins  ensure that the rig folds correctly, then undo the front spar attachment and slide the sail onto the spar  tie the sail in place at the top and bottom ends of the spar  add the battens and mainsheets, check the reefing system, and insert the centreboard – the craft is now ready to sail!



The name

Flèche – from Old French: arrow [noun-feminine] of Germanic origin
 (compare with **fletch** – the English equivalent, meaning the stabilising vane on an arrow)

Antecedents

	<p>Architecture</p> <p>Fleche - A projecting, arrow or V-shaped outwork in a fortification Fleche : a narrow openwork tower with a tall spire, sometimes constructed of wood or metal (from: A Glossary of the Medieval Church)</p>
	<p>Fencing</p> <p>Fleche - an offensive movement made with a series of running steps led by deliberately throwing one's self off-balance, instead of with a lunge or step forward. This is an all-out attack which can lead to collision with your opponent, vulnerability to counter attack and/or falling over</p>
	<p>Weather map</p> <p>The small fleches indicate the wind strength and direction. The wind direction is from the end of the line with the fleche to the other end of the small line. The wind strength is 10 knots per full fleche (a half fleche therefore being 5 knots)</p>
	<p>Poultry</p> <p>La Fleche – the Old Horned Breed takes its present name from the French town of La Flèche.</p>
	<p>Transport</p> <p>Golden Arrow - Flèche d'Or</p>