KLEIN

1979

MOST FREQUENTLY ASKED QUESTIONS

Q: *What is the finish on the Klein and how will it hold up?*
A: The Klein is finished in DuPont Imron polyurethane enamel. It is very durable and resistant to abrasion and scratches. DuPont Rain Dance car wax is recommended to maintain the best finish and appearance.

Q: *Will there be corrosion problems if the underlying alloy becomes exposed?*
A: No. Klein 816 aluminum-magnesium alloy is highly corrosion resistant. It will not be affected by water, salt or road dirt and should never rust or pit.

Q: *Does the large diameter tubing present component fitting problems?*
A: No. Down tube shift levers, water bottle mounts, top tube brake cable clips and derailler cable tunnels are direct mounted to the frame. Campagnolo and Dura-Ace front deraillers, which were intended for a 1.125" seat tube are easily fitted to the 1.25" seat tube by expanding them over the seat tube and using the supplied mounting bolt. A frame fit pump is available.

Q: *Is the Klein Team Super suitable for time trialing as well as road racing?*
A: Yes. Although the Team Super was designed primarily for road racing and criterium type events, its light weight, smooth ride and exceptional laterial rigidity allow it to excel in all three.

Q: *Is there toe clip to front tire clearance?*
A: No. Toe clip to front tire overlap is generally accepted in professional racing frames. It makes possible a more nearly balanced weight distribution and better handling.

Q: *Why are the bottom bracket heights slightly greater on the larger size frames?*
A: To accommodate slightly longer cranks which are often used by tall riders.

Q: *What do I do if my frame requires warranty service?*
A: First, contact Klein Bicycle Corporation. You are responsible for shipping charges. We will repair or replace the frame at our option if it is determined that the frame is defective in material or workmanship.

Q: *How do I perform maintenance on the bottom bracket assembly?*
A: Maintenance is not required. It should provide good service for a minimum of ten years.

Q: *What do I do if the bottom bracket bearings need replacement?*
A: Bottom bracket bearings can be replaced by Klein Bicycle Corporation if ever required or by any shop with a good arbor press. The bearings are standard electric motor bearings. They are pressed in flush with the housing and are retained with Locktite 601.

Q: *Does the Klein Team Super make a good touring frame?*
A: The Team Super was designed for racing. It is not well suited for the baggage racks, fenders, etc., commonly used for extended touring. Its comfortable ride and good handling do, however, make an excellent day touring/recreational frame for the cyclist who prefers racing geometry and will use only narrow tires.

Q: *Can I bend the rear triangle outward to fit a six speed rear hub?*
A: The rear triangle width is 120-121 mm for hubs of that size only. This is the typical range for standard five speed hubs. Do not attempt to alter the rear triangle width.

Q: *Can I braze or weld items to my Klein?*
A: It is not recommended. Welding or brazing to this alloy requires elaborate equipment. Either procedure will reduce the yield and fatigue strength unless the frame is re-heat-treated.

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FRAME STIFFNESS TESTING

SUMMARY OF DEFLECTION DATA

Size, make type, material		Weight in lbs. of bare frame	Bottom bracket torsional deflection in inches	Bottom bracket torsional stiffness	Rear bending deflection in inches	Rear bending stiffness
55 cm road,	Colnago Super Columbus Superlight	4.12	.084	97%	.038	87%
58 cm road,	Frejus Reynolds 531 db.	4.60	.078	104%	.032	104%
55 cm road,	Mercian Reynolds 531 db.	4.52	.080	102%	.033	100%
55 cm track,	P. Schroeder Reynolds 531 db.	4.47	.083	98%	.031	107%
55 cm road,	Raleigh Professional Reynolds 531 db.	4.54	.080	102%	.034	97%
53 cm road,	R.E.W. Reynolds Reynolds 531 db.	4.16	.076	107%	.036	92%
61 cm road,	Witcomb Custom Reynolds 531 db.	4.33	.089	91%	.028	118%
Average of the above seven steel frames		4.39	.0814	100%	.0331	100%
58 cm road,	Teledyne Titan Titanium	2.92	.107	76%	.040	83%
58 cm road,	Alan Aluminum	3.31	.122	67%	.046	72%
57 cm road,	Composite Sports 1.9kg Graphite/Aluminum	3.42	.089	91%	.049	68%
58 cm road,	Graphite U.S.A. Graphite	2.76	.095	86%	.047	71%
57 cm road,	Klein Al-Mg/Boron	3.28	.045	181%	.018	184%
56 cm track,	Klein Al-Mg/Boron	3.02	.038	214%	.017	195%

Notes: 1. Stiffnesses are relative to the average of the above seven steel frames.
2. Accuracy of tests is plus or minus 5%.
Tests performed at MIT under the supervision of Shawn Buckley, Professor of Mechanical Engineering.

TESTING PROCEDURES

While it is possible to measure the stiffness of a bicycle frame in many different modes and by many different procedures it is not easy to relate these tests to the actual riding functions of the frame. Quantities such as handling and smoothness are tested subjectively. We know of no test instrument that will measure these. The efficiency of power transmission is more amenable to analysis. Steel bicycle frames behave like linear springs when deflected. As the frame is distorted, work is stored in it. If the frame is resisted as it returns to an unloaded condition, work is done on the resistive force (the rider's legs). If the return is not resisted, and the frame is allowed to snap back freely, the work is lost as heat. The largest power train deflections arise in sprinting and hill climbing situations. The two main types of movement are: 1) Twisting of the frame between the head tube and bottom bracket caused by the torque exerted through the handlebars and cranks during hard pedalling. 2) Sideways deflection of the bottom bracket caused by the off-center force applied during hard pedalling.

The bicycle frame does not deflect significantly in the following modes: 1) The bottom bracket moving toward or away from the rear cog. 2) The head tube moving toward or away from the bottom bracket. 3) The bottom bracket twisting toward or away from the rear cog in the plane of the chainstays. The frame very rigidly resists movements in these directions. It is relatively easy to twist a light tube, difficult to bend it, and very difficult to stretch or compress it. The three modes in which there are no significant deflections require tubing to stretch or compress. The two modes in which there are significant deflections require only bending and/or twisting of the tubes.

The Bottom Bracket Torsion Test is accomplished as follows: The frame is positioned horizontally on a test bed. A ¾" threaded rod is fastened into the head tube. The rod is clamped firmly to the test bed at both ends of the head tube. The torsion testing lever is bolted rigidly into the bottom bracket shell and projects opposite to the seat tube. The bottom bracket rests firmly on the test bed (it remains free to twist). Deflection measurements are taken with a 0.001 inch dial indicator from a premarked position on the torsion testing lever 30 inches from the center of the bottom bracket. Weights are hung on the torsion testing lever at a premarked position 30.5 inches from the center of the bottom bracket. Measurements are taken with four different lever preloads, each time measuring the deflection caused by adding a 3 lb. weight. Preloading takes up any residual play in the system. The four preloads (weights in addition to the weight of the bar) are: 1) 0 lbs., 2) 5 lbs., 3) 10 lbs., 4) 15 lbs. The four measurements are compared against one another to assure accuracy. The least sensitive to operator error is the 15 lb. preload which is used as the result. The testing is performed on a steel test bed weighing several tons. This insures its rigidity. The torsion testing lever deflects 0.020 inches with a 3 lb. added load when the clamp is fixed to a rigid structure. Thus the amount 0.020 inch is subtracted from the 15 lb. preload deflection measurement (on all bottom bracket torsion frame tests) as a correction factor to determine how much the bottom bracket alone deflected.

The Rear Bending Stiffness Test is accomplished as follows: The frame is positioned horizontally on a test bed. A ¾" threaded rod is fastened into the head tube. The rod is clamped firmly to the test bed at both ends of the head tube. The bottom bracket rests firmly on the test bed. A solid dummy rear axle is clamped into the rear dropouts. In the case of adjustable type dropouts, the axle is positioned such as to make the wheelbase as short as possible. Deflection measurements are taken from the top of the solid dummy rear axle with a 0.001 inch dial indicator. Weights are hung from the bottom of the solid dummy rear axle. Measurements are taken with four different lever preloads, each time measuring the deflection caused by adding a 3 lb. weight. The four preloads (weights in addition to the weight of the solid dummy rear axle) are: 1) 0 lbs., 2) 5 lbs., 3) 10 lbs., 4) 15 lbs. The four measurements are compared against one another to assure accuracy. The least sensitive to operator error is the 15 lb. preload which is used as the result. The testing is performed on a steel test bed weighing several tons.

DISCUSSION.

The rigidity of the test bed is of great importance. A two inch thick solid wood table top with clamping fixtures bolted to it solidly is not nearly rigid enough to give accurate or meaningful test results.

The seat clamp is not anchored during our tests. While normal riding puts some of the power train torque through the seat, a hard sprint or hill climb usually finds the rider not utilizing the seat.

The Bottom Bracket Torsion Test measures in a straight forward manner the type of twisting movement that results in power loss.

The Rear Bending Stiffness Test measures the out of plane deflection that results in power loss in a less direct manner. The direct method would be to clamp the head tube and clamp the solid dummy rear axle rigidly to the test bed. Weight would be applied to the bottom bracket and deflection could be measured. The Rear Bending Stiffness Test amplifies the amount of deflection (it is a more sensitive test) and is easier to set up and accomplish. The actual forces the frame sees are the same. The results can be correlated exactly to the results of the direct test.