tech talk

Finally ... a roll bar for an NC!

■ Words: Robert Hart #184 ■ Photos: Robert Hart & Brown Davis Automotive

CAMS 'Type 2 Half Safety Cage' with Removable Backstays for the Mazda MX-5 NC

Recently a 'half cage' designed and constructed by Brown Davis Automotive was installed in my 2008 NC soft top.

The installed cage is intended to be compliant with Federation Internationale de'l Automobile (FIA) ROPS design and construction standards. CAMS is the National Sporting Authority (ASN) for motor sport in Australia, delegated this responsibility by the FIA.

Typically this "half cage" would be appropriate for use in CAMS-sanctioned motor sport events where a "Type 2 Half Safety Cage" *(refer General Requirements for Cars and Drivers - CAMS Schedule J: Section 13 "Safety Cage Structures – Specifications – Open Sports Cars")* is acceptable, whilst also being suitable for use on a public road.

This cage retains the flexibility to lower the soft top (with the backstay members removed). It also features substantial tubular members, increased elevation of the main roll hoop (greater rollover head clearance), improved rearward vision, replication of all ancillary tapings (for speakers etc ...), and twin mountings for race harness eyelets for both driver and passenger. As such it represents an excellent and possibly unique solution for the NC owner who wishes to improve their safety in relation to a rollover event while competing in 'club-level' motor sport.

Design Brief and Discovery:

During the MX-5 Club motor sport annual meeting last May an item of general business was tabled relating to the removal of the soft top in the "Standard NC" class. The crux of the discussion related to the requirement imposed by the current class rules for the original equipment soft top to remain in the vehicle in its "factory" location. In complying with this requirement the possibility of fitting a ROPS (rollover protection system) suitable for low-level motor sport is precluded, as the backstays required for a compliant cage directly interfere with the soft top in its retracted position. Thus an investigation into a suitable solution was initiated.

The brief: "a road usable FIA/CAMS-compliant ROPS that allows the soft top to be operated" seemed straightforward enough; however, on investigation it became apparent that a suitable off-the-shelf solution is not available. Various reasons for this situation exist:

1. The standard factory rollbar is a substantial affair which is heavily integrated into the structure of the MX-5 NC. It attaches to the NC structure at six discrete points, while also providing pickup points for the seat belt upper pivots, central speakers and transverse plastic bulkhead with cubbies, fuel release etc ...

   The structure itself consists of a pair of vertical tubular members which form the uprights of the main roll hoop. These uprights pass through a transverse box section cross member before being formed into a 180° bend which terminates at the same transverse cross member behind the drivers and passengers heads respectively. Because of this structural integration, significantly greater effort is required to engineer and produce a half cage solution for the MX-5 NC relative to earlier model MX-5s.
2. Typically the tubing type or diameters (ID and OD) employed in the commercially-available half cage solutions produced in the USA, UK and Germany do not comply with FIA/CAMS mandatory requirements.
3. The diagonal cross-brace for the main hoop employed in the commercially available half cage solutions does not extend to the floor of the vehicle as per FIA/CAMS requirements; rather it typically extends only to the transverse box-section cross member which runs at shoulder height between the seatbelt mounting points aligned with the B-pillar.
4. The main hoop typically does not have backstays due to the aforementioned interference with the soft top in the retracted position. The option for a 'Petty Bar' that runs forward from the centre of the main roll hoop to extend into the passenger footwell does exist as a possibility that would address this issue; however the petty bar has the twin disadvantages of putting a roll cage member close to the driver's head (potentially causing injury in the event of an accident) as well as precluding the use of the passenger's seat. Furthermore it cannot be legally used on a public road, as no part of the roll structure may extend forward of the 'B-pillar' according to advice provided to CAMS by VicRoads Standards in May of 2012. Note that there are some exceptions to VicRoads' advice which relate to frequency of use on a public road system. In addition, VicRoads' advice does not apply retrospectively to those vehicles fitted with a ROPS which was previously installed in compliance with the requirements of Victorian Standards Information 28 (VSI28).

Realisation:

After discussing the design brief with a number of fabricators, Brown Davis Automotive were approved to undertake a conceptual study.

Brown Davis Automotive rapidly came to the conclusion that the most practicable means of meeting the design brief would be to make a half cage that replicated the original equipment cage with all its factory mounting points and ancillary equipment attachment points, whilst also incorporating a diagonal brace on the main hoop, removable backstays and materials of the correct type, dimensions and angles to comply with FIA/CAMS mandates.

In this regard Brown Davis was well equipped to provide a solution to the difficult challenge of engineering the removable backstay elements, as they had previously certified a system of precision tube joiners to a unique CAMS-registered design tested to be as strong as the original tubing materials. These tube joiners provide a very elegant solution for separating the backstays from the roll hoop simply via the use of only four cap screws. With the backstays removed the soft top can be lowered just as it would normally. It is anticipated that the majority of owners might use the cage with the backstays removed on the road, attaching them only for a track outing. In my own car I have chosen to leave them in at present, however as the warmer weather comes upon us I will remove them to enjoy the pleasures of open top motoring. The structure you see pictured is the result.

My thanks are offered to David Brown (Managing Director) and Kevin Sharp (Engineer) at Brown Davis Automotive for agreeing to develop this cage and for giving freely of their time to discuss and work through our requirements. Brown Davis had the exclusive use of my MX-5 for three weeks and gave up a space in their workshop over that period without complaint in order to develop their solution.

This cage is being offered to MX-5 Club members for $1,395, powdercoated satin black, and with all the necessary CAMS paperwork. This in my opinion represents excellent value for a sophisticated and complete solution.

Brown Davis Automotive [(03) 9762 8722] has expressed a desire to continue to develop the cage based on Club member feedback. ■