NEWS LETTER

IES COLLEGE OF ENGINEERING

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ME

Engineering

Mechanical

Mechanical Engineering is vital for a wide range of activities that include design, development, manufacture, management, and control of engineering systems, subsystems and their components. Mechanical Engineers are an essential part of industries like manufacturing, automobile, aerospace, materials, chemical, and pharmaceutical sectors. In the fields of computer aided design and manufacturing, robotics, bio engineering, environmental engineering, wind and solar energy utilization and space exploration.

The vision of the department is to mould the students with all inputs necessary to become a successful mechanical engineer with core competency and professional specialization. The department was started in 2007 and comprises of well qualified, experienced faculty and technical staff and has well established Labs and Library. Our Alumni are presently working in many eminent companies of national and international repute. Association of royal mechanical engineers was formed in the IES college of Engineering to promote the technical ideas, knowledge and skills, we are sure that we have succeeded in the tremendous change brought to the association to improve the activities in students as well as to maintain unity among them. We thank our beloved general secretary, Principal and our HOD for their wishes to make our FLAME Success.

When people think of mechanical engineering, they usually think about mathematics, science, technology, new products, and economic growth. Unfortunately, they do not realize the importance of writing in engineering. Mechanical engineers utilize writing daily to communicate design ideas, create manufacturing instructions, report test results, verify project progress, create user manuals, and disseminate information.

DEPARTMENT VISION

To nurture the development of competent mechanical engineers with an emphasis on applying the concepts and principles in core engineering to real world contexts.

DEPARTMENT MISSION

M1. To provide quality education in mechanical engineering along with a deep sense of professional ethics.

M2. To possess commitment and character for the betterment of the society.

M3. To encourage students and faculty to be life-long learners.

M4. To apply mechanical engineering skills and knowledge to make eco-friendly innovations on the latest trends.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1:- Ability to solve complex engineering problems in design, manufacturing and thermal engineering to meet the needs of the industries and society.

PSO2:- Inculcate curiosity in interdisciplinary learning to develop innovative and entrepreneurship capacity.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Develop mechanical engineering professionals who are able to solve complex real world challenges, manage social problems and business challenges.

PEO2: The graduates of mechanical engineering program will acquire higher education and emerge successful.

PEO3: The graduates adopt ethics and exhibit their effective skills in communication leadership qualities and social responsibility

E*very professional aims at achieving excellence in their professional career to widen the horizons of their knowledge and must be equipped to encounter the global challenges boldly. Let there be a forum to share this plethora of knowledge hidden in Nature which can lead to the overall development of the budding professionals.*

I congratulate the Association of Royal Mechanical Engineers for bringing out this wonderful bundle of ideas.

Mr. SARVAN P P

HOD - Mechanical Engineering

I *am happy to note that the Faculty of Mechanical Engineering is conducting the department association anniversary on 012/11/ 2018 and also launching a newsletter.*

I wish that the association will help the students benefitting out of the activities to achieve their ambition and goal to become professional Mechanical Engineers

.I wish the association a great success and also the newsletter FLAME for its continue success and contribution to the area of Mechanical Engineering.

Mr. THAMEEM MUHAMMED R S

Assistant Professor - Mechanical Engineering

It *gives me immense pleasure and happiness to note that our Mechanical Engineering students Association are bringing out the Newsletter. I am sure that the staff and students who are associated with this endeavor have put in lot of effort to see that the newsletter becomes a reality*

I am sure that the newsletter will help to supplement the theoretical knowledge gained from the text books, and keep the students well informed about the Latest developments in technology. Such activities will also go a long way in inculcating team spirit among the students and enhance their motivation levels

Mr. SHILLIN K S

Assistant Professor - Mechanical Engineering

COACH BASICS

AKSHAY R NAIR, S7

ICF design coaches are conventional railway coaches used on Indian Railways carrying maximum passenger traffic in India. The substructure of the coach is called a trolley or a bogie. These coaches were developed by ICF (Integral Coach Factory), India in collaboration with the Swiss Car & Elevator Manufacturing Co.,Schlieren, Switzerland. The design is also called the Schlieren design based on the location of the Swiss company. The brake cylinder in the present coaches sits on the bogie. Hence they are also known as (BMBC) Bogie Mounted Brake Cylinder Coaches.The present variant of coaches have helical coil springs are used in both the primary and the secondary stages. Some Hybrid ICF design coaches are also in service. These coaches have a typical ICF Bogie; however the helical springs in the secondary suspension have been replaced by Air Springs.

i. BogieFrame: ICF coaches use 16.25t bogies which is an all welded lightweight construction. Axles are located on the bogie by telescopic dash pot and axle guide assemblies. Helical coil springs are used in both the primary and the secondary stages. The axle guide device provides viscous damping across primary springs while hydraulic dampers are provided across the secondary stage. Dampers are protected against misalignment by resilient fittings. Isolation of vibration is effected by rubber pads in primary (also Hytrel) and secondary suspension. Deflection due to the tare weight is almost equally divided between axles and bolsters springs. Weight of coach body is transferred to its bogie by side bearers pitched 1600mm apart. No vertical weight transfer is affected through bogie pivot and pivot acts merely as a centre of rotation and serves to transmit tractive/braking forces only. The bogie frame of the 16 t bogie is a fabricated structure made up of copper bearing steel plates, channels and angles welded to form the main frame of the bogie frame. The frame is divided into three main sections. The first and the third section are mirror images of each other. Various types of brackets are welded to the main frame for supporting components. Repaired bogie frame shall not have any welded joints at axle guide location.

ii. Bogie Bolster: The body bolster is a box type fabricated member made up of channels and welded to the body of the coach. It is a free-floating member. The body bolster transfers the dead weight of the coach body to the bogie frame. There are two types of bolsters in an ICF bogie, body bolster andthe bogie bolster. The body bolster is welded to the coach body whereas the bogie bolster is a free floating member which takes the entire load of the coach through the body bolster.

iii. Center Pivot Arrangement: The centerpivot pin joins the body with the bogie and transmits the tractive and braking forces on the bogies. It does not transmit any vertical load. It is equipped with rubber silent block bushes which tend to centralize the bogies with respect to the body and, to some extent control and damp the angular oscillations of the bogies. A center pivot pin is bolted to the body bolster. The center pivot pin runs down vertically through the center of the bogie bolster through the center pivot. It allows for rotation of the bogie when the coach is moving on the curves. A silent block, which is cylindrical metal rubber bonded structure, is placed in the central hole of the bogie bolster through which the center pivot pin passes. It provides the cushioning effect.

iv. Wheel Set Assembly: The wheel set assembly consists of two pairs of wheels and axle. The wheels may be cast wheels or forged wheels. These wheels and axles are machined in the various railway Workshops in the wheels shops and pressed together.

v. Primary & Secondary Suspension: The primary suspension in a ICF Bogie is through a dashpot arrangement. The dashpot arrangement consists of a cylinder (lower spring seat) and the piston (axle box guide). Axle box springs are placed on the lower spring seat placed on the axle box wing of the axle box housing assembly. A rubber or a Hytrel washer is placed below the lower spring seat for cushioning effect. The axle box guide is welded to the bogie frame. The axle box guide acts as a piston. A homopolymer acetyl washer is placed on the lowerend of the axle box guide. The end portion of the axle box guide is covered with a guide cap, which has holes in it. A sealing ring is placed near the washerand performs the function of a piston ring. The axle box guide moves in the lower spring seat filled with dashpot oil. This arrangement provides the dampening effect during the running of the coach. The secondary suspension arrangement of the ICF bogies is through bolster springs. The bogie bolster is not bolted or welded anywhere to the bogie frame. It is attached to the bogie frame through the anchor link. The anchor link is a tubular structure with cylindrical housing on both the ends. The cylindrical housings have silent blocks placed in them. The anchor link is fixed to the bogie bolster and the bogie frame with the help of steel brackets welded to the bogie bolster and the bogie frame. Both the ends of the anchor link act as a hinge and allow movement of the bogie bolster when the coach is moving on a curved track.

vi. Brake System: The typical brake levers being the ¯Z‖ lever, floating lever and the connecting lever. Theses levers are used to connect the brake beam with the piston of the brake cylinder. The location of the brake cylinders decides whether the bogie shall be a BMBC Bogie or a non BMBC Bogie. ICF bogie uses two types of brake beams, 13 ton and 16 ton. Both of the brake beams are fabricated structures. The brake beam is made from steel pipes and welded at the ends. The brake beam has a typical isosceles triangle shape. The two ends of the brake beam have a provision for fixing a brake head. The brake head in turn receives the brake block. The material of the brake block is non asbestos, and non-metallic in nature. Two types of brake heads are used. ICF brake head and the IGP brake head. A brakehead is a fabricated structure made up of steel plates welded together. Brake blocks are also of two types. ICF brake head uses the ¯L‖ type brake block and the ¯K‖ type brake block is used on the IGP type brake head. ¯L‖ & ¯K‖ types are so called since the shape of the brake blocks resembles the corresponding English alphabet letter. The third end of the brake beam has a bracket for connecting the ¯Z‖ & the floating lever. These levers are connected to the main frame of the bogie with the help of steel brackets which are welded to the bogie frame. In an ICF BMBC Bogie, the brake cylinder is mounted on the bogie frame itself. It isnearer to the brake beam, the brake application time is reduced. Moreover, a small brake cylinder is adequate for braking purpose. This also reduces the overall weight of the ICF bogie apart from the advantage of quick brake application.

vii. Buffer Height adjustment: The wheel diameter (tread) reduces due to brake application as the brake blocks rub against the wheel tread. Over a period of time, the wheel diameter reduces up to 819 mm. 819mm is the condemnationdiameter for the wheels. This diameter is also not sacrosanct and is changed depending upon the supply position of the wheels. The maximum variation in the wheels on the same axle is permitted up to 0.5 mm, between two wheels of the same bogie up to 5 mm and among the four wheel sets of the same coach up to 13 mm. The diameter of a new wheel is 915 mm. In order to adjust for the difference in the wheel tread, a packing is placed under the flange of the lower spring seat. Traditionally, 13mm, 26mm, 38mm, 48 mm packing rings are used. The correct buffer height is obtained by measuring the height of the bolster top surface from the rail level. In case the buffer height is still not obtained even after placement of the packing ring, then compensation rings are to be inserted below the axle box spring ensuring that the bogie frame height.

viii. Roller bearing assembly: Roller bearings are used on the ICF bogies. These bearings are press fitted on the axle journal by heating the bearings at a temperature of 80 to 100 degree centigrade in an induction furnace. Before fitting the roller bearing, an axle collar is press fitted. The collar ensures that the bearing does not move towards the center of the axle. After pressing the collar, a rear cover for the axle box is fitted. The rear cover has two main grooves. In one of the grooves, a nitrile rubber sealing ring is placed. The sealing ring ensures that the grease in the axle box housing does not seep out during the running of the wheels. A woolen felt ring is placed in another groove. After the rear cover, a retaining ring is placed. The retaining ring is made of steel and is a press fit. The retaining ring ensures that the rear cover assembly is secured tightly between the axle collar and the retaining ring and stays at one place. The roller bearing is pressed after the retraining ring. Earlier, the collar and the bearings were heated in an oil bath. The axle box housing, which is a steel casting, is then placed on the axle. The bearing is housed in the axle box housing. Axle box grease is filled in the axle box housing. Each axle box housing is filled with approximately 2.5 Kg. of grease. The front cover for the axle box is placed on a housing which closes the axle box. The front cover is bolted by using torque wrench.

HYDRAULIC BRAKE

RAMEES RISVAN , S5

The existing braking mechanisms are based on friction and need to apply a considerable force power to perform the braking operation, the hydraulic force is needed manually through a brake pedal or mechanically through hydraulic pump, these kind of brake are called improperly hydraulic brake, in fact it is a friction brake performed hydraulically,

The friction braking system convert the kinetic energy of the masse in motion into thermal energy, where the brake pads generate a frictional force which oppose the rotation of the spinning rotor, the energy absorbed by friction is transformed into a lot of wasted heat dissipated in the air.

This invention is a hydraulic brake that convert the kinetic energy of the masse in motion into hydraulic pressure, it does not need the application of considerable power to perform the braking operation, just the easy displacement of the equilibrated axe of control, which do not consume considerable energy, will perform the braking operation for a complete stop or a smooth deceleration depending on the speed of displacement and the position of the axe of control.

And hence this invention deserves correctly the name of hydraulic brake.

The invention consists of four eccentric crossed hydraulic cylinders which contain four piston that can translate in the crossed four cylinder pushing a constant volume of hydraulic fluid during rotation, each piston is related, in his upper side, to a concentric pushing piston, the volume of the hydraulic fluid in each cylinder increase and decrease each 90 degrees, so all the pistons have an equal displacement during rotation, according to small hydraulic stroke (few millimeters) .

When the axe of operation is displaced axially and close simultaneously all the four hydraulic cylinder which avoid any decrease in volume of the hydraulic fluid in each opposite two cylinder in both directions, the mechanism is stopped.

FUEL NOZZLE THAT SUPPLIES FUEL INTO COMBUSTION CHAMBER OF INTERNAL COMBUSTION ENGINE IN THE SHAPE OF CONTINUOUS CIRCLE CONE

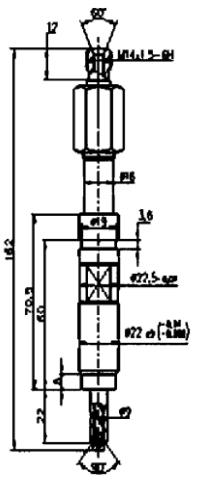
EBY JOHNSON , S3

Brief:

To diminish the diameter of atomized fuel drops and disperse fuel drops as evenly as possible along a combustion chamber, we came up with the usage of a valve fuel injector, which supplies Diesel or gasoline into a combustion chamber in the shape of continuous circle cone with an exposure angle of 50o – 180o. The cone fuel nozzle capitalizes Homogenous Chamber Combustion Ignition (HCCI) process in internal combustion engine.

Full Description:

To diminish the diameter of atomized fuel drops and disperse fuel drops as evenly as possible along a combustion chamber, we came up with the usage of a valve fuel injector, which supplies Diesel or gasoline into a combustion chamber in the shape of continuous circle cone with an exposure angle of 50o – 180o. There is a gap between a valve and an injector housing; fuel enters a combustion chamber through this gap; its size is about 20 – 50 micron. During the process of fuel injection, an injector valve also vibrates and that leads to substantial fractioning of fuel. The cone fuel nozzle capitalizes Homogenous Chamber Combustion Ignition (HCCI) process in internal combustion engine (both engines – Diesel and Spark Ignition) by means of wide and equally dispersing the fuel throughout the entire combustion chamber. In modern diesel engines the fuel supply into a combustion chamber is performed throughout multi-hole fuel injector. The shape of fuel stream, number of holes and their diameter impact the quality of combustion process as well as contents of harmful substances within exhaust gases. While developing cone fuel injector designs usually the following tasks are set to be resolved:



Cone Fuel Nozzle FD-22

- diminish diameter of atomized fuel drops,
- disperse fuel drops as equally as possible along a combustion chamber,
- within one cycle fuel supply to break it down into many injections (sub-injections); usually up to 20 sub-injections for a cycle

Decreasing jet holes of a fuel injector and their quality production can resolve by diminish diameter of fuel holes. However, dramatic diminishing of their diameter is impossible due to technological obstacles related to the holes fabrication process.

Disperse fuel drops is resolved by selection of the most suitable combustion chamber and determination of the fuel stream direction in such a way that equal dispersion of fuel is provided among the entire combustion chamber. The number of holes can't be increased indefinitely because of technological complexities.

The newly developed nozzle of valve type supplies engine (both Diesel and spark ignition) with fuel directly into a combustion chamber. Fuel takes the shape of continuous circle cone with an exposure angle of 50o – 180o. There is a gap between a valve and an injector housing. Fuel enters a combustion chamber through this gap; its size is about 20 – 50 micron. During the process of fuel injection, an injector valve also vibrates and that leads to the substantial fractioning of fuel.

ROBOTIC BIRDS

LAL KRISHNA , S5

A robotic bird created in conjunction with U.S. Army could be developed into an unsuspecting future war agent.

The Robo-Raven's manoeuvres are so realistic that other birds are fooled into thinking it is one of them. Its ability to hide in plain sight and light weight could prove valuable in military operations, claim Army Research Laboratory researchers. It weighs just 9.7 grams and has a wingspan of 34.3 cm.

Using two actuators for the wings required a bigger battery and an on-board micro controller, which initially made Robo-Raven too heavy to fly. To reduce the weight, engineers turned to advanced manufacturing processes such as 3D printing and laser cutting.

The system now weighs just 9.7 grams and has a wing span of 34.3cm. It can carry a payload of almost six grams.

The system is much quieter than the helicopter or propeller and can get much closer to an adversary without revealing its presence.

‗We use hollow stiffeners to provide a stiff and light-weight structure, and our wing spars have been arranged in a fan pattern to create the desired airfoil shape during the flapping motions,' said Gerdes.

‗At any time, we can transition between these behaviours with total control over the wings.'

Robo-Raven's aerobatics could someday prove vital in stealth reconnaissance and surveillance missions.

Its potential has been recognised by the U.S Army who is funding research into small and micro scale unmanned aerial systems that could allow Robo-Raven to fly autonomously.

Currently Robo-Raven cannot fly with sensors due to a very restricted payload, but advanced research is expected to improve their understanding of how a soldier could use it.

The team at Maryland University are also working on developing solar cell wings so that the Robo-Raven can land and charge before resuming a mission.

The project builds on work by Dr SK Gupta, a professor in mechanical engineering at Maryland University, who began working on flapping-wing robotic birds nearly a decade ago.

Gupta first successfully demonstrated a flapping-wing bird in 2007. This bird used one motor to flap both wings together in simple motions.

By 2010 the design had evolved over four successive models. The final bird in the series was able to carry a tiny video camera, could be launched from a ground robot, and could fly in winds up to 10 mph.

‗Robotic birds are expected to offer advances in many different applications such as agriculture, surveillance, and environmental monitoring,' said Gupta.

‗Robo-Raven is just the beginning. Many exciting developments lie ahead. The exotic bird that you might spot in your next trip to Hawaii might actually be a robot.'

MECHATRONICS

SHARATH SUREASH, S5

Mechatronics is a design process that includes a combination of mechanical engineering, electrical engineering, control engineering and computer engineering. Mechatronics is a multidisciplinary field of engineering, that is to say, it rejects splitting engineering into separate disciplines. Originally, mechatronics just included the combination of mechanics and electronics, hence the word is a combination of mechanics and electronics; however, as technical systems have become more and more complex the word has been ―updated‖ during recent years to include more technical areas.

French standard NF E 01-010 gives the following definition: ―approach aiming at the synergistic integration of mechanics, electronics, control theory, and computer science within product design and manufacturing, in order to improve and/or optimize its functionality‖.

Many people treat ―mechatronics‖ as a modern buzzword synonymous with ―electromechanical engineering‖. However, other people draw a distinction between an ―electromechanical component‖ – does not include a computer; an electro-mechanical computer (such as the Z4) – does not include an electronic computer; vs. a ―mechatronic system‖ – a computer-controlled mechanical system, including both an electronic computer and electromechanical components.

MAGNETIC BEARING

MRIDHUL, S7

A magnetic bearing is a bearing that supports a load using magnetic levitation. Magnetic bearings support moving parts without physical contact. For instance, they are able to levitate a rotating shaft and permit relative motion with very low friction and no mechanical wear. Magnetic bearings support the highest speeds of all kinds of bearing and have no maximum relative speed.

Passive magnetic bearings (PMBs) use permanent magnets and, therefore, do not require any input power but are difficult to design due to the limitations described by Earnshaw's theorem. Techniques using diamagnetic materials are relatively undeveloped and strongly depend on material characteristics. As a result, most magnetic bearings are active magnetic bearings (AMB), using electromagnets which require continuous power input and an active control system to hold the load stable. In a combined design, permanent magnets are often used to carry the static load and the AMB is used when the levitated object deviates from its optimum position. Magnetic bearings typically require a back-up bearing in the case of power or control system failure.

Magnetic bearings are used in several industrial applications such as electrical power generation, petroleum refinement, machine tool operation and natural gas handling. They are also used in the Zippe-type centrifuge, for uranium enrichment and in turbomolecular pumps, where oil-lubricated bearings would be a source of contamination.

Fluid Mechanics is a Drag

HADI , S3

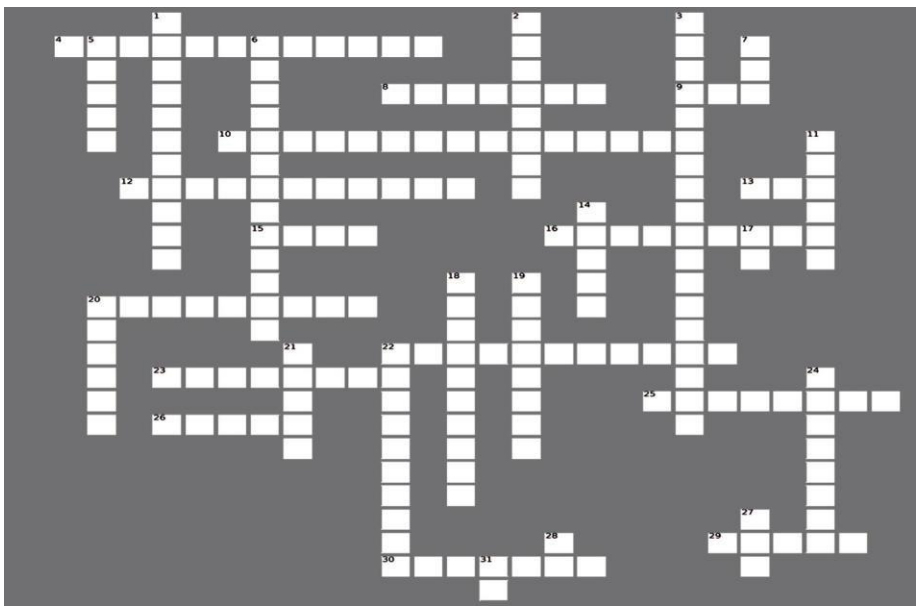
I would like to know,
Why a ten a.m. class on fluid flow?
Conservation of energy will even state,
A body not in motion will be late.
Oh the misery of an alarm's persistence,
When one must awake to a shower's flow resistance.
Bernoulli, Bernoulli, why "Hydrodynamics"?
More useful would be Opposite Gender Mechanics!
For when I explain the buoyant force of a sphere, My dinner date edges away further, not near. Oh, this boy is much more dense than Hg,
(That's okay; we pity those with a business degree!)
They will never know a floating body will be stable,
When the center of buoyancy is above the navel.
Or that Fluid Dynamics goes much beyond a pipe,
Density and velocity are not just hype.
When multiplied by Diameter and divided by mu,
We can understand that Reynolds' numbers are TRUE!
This class has had me thinking in many dimensions,

Buckingham Pi I won't even mention!
Two armed sprinklers and angles galore, Just thinking about them makes my head sore. Time to take some Tylenol and load up my bag, Fluid Mechanics can be such a Drag!

Density is something
We learned early in school,
Mass per volume,
It's so very cool.
Velocity is
How fast you can go.
It can be figured
With area and flow.
It's easily measured
With a ruler or tape
Just straight across
The diameter of the pipe.
Viscosity however
Is new and fun
It's one of the last
We're almost done.
Put this all together
With Buckingham Pi
Reynolds number is the answer
Thank you! Good-bye!

CROSS WORD

VISHNU, S7



Across

4 Hyundai's brand new RWD phenomenon! Made from 09' to present.
8 Audi's most famous car ever made from 80' to 91'.
9 Datsun's original ride, one that kind of started it all (for Datsun) made from 68' to 73'.
10 Pontiac's car, the one that made themfamous, but, the premium, top dollar car. Made from 67' to 69',
12 What Chevrolet set the fastest laptime ever on Nurburing race track. Made from 09' to present.
13 Acura's all-aluminum supercar. Made from 90' to05'
15 Nissan's predecessor for the 300ZX. Made 03' to 08'
16 Ford's most recognizable car and an American classic. Made from 64' to present.
20 Mitsubishi's most recognizable and successful car ever. Made from 92' to present.
22 Renault's amazing mid engine, rear-wheel drive masterpiece, made from 01' to 05'.
23 Lamborghini's most famous and imfamous ride? Made from 74' to 89'.
25 Lexus's all new 4 door sports car. 08' to present.
26 Jagaur's only true ¯Super car‖ they ever produced. Made from 91' to 94'.
29 Lister's 1993 Supercar with a Jaguar v-12 making 546 hp.
30 Mazda's beautiful and amazing rotary powered machine, Japanese-spec, made from 92' to 02'.

Down

1 One of Toyota's most famous RWD Drifters, made from 83' to 87'. (2 words)
2 Porsches last, great (original) sports car that was air cooled, made from 93' to 98'
3 Mercedes Benz amazing 670 hp twin turbo V12 monster! Made from 08' to present.
5 Bugatti's original supercar. Made from 91' to 95'.
6 The most recognizable and sought after Nissan in the world. Made from 98' to 02'.
7 This Ferrari was the worlds fastest production car from 87' to 92'.
11 Subaru's rally winning superchamp! Made from 92' to present.
14 Toyota's greatest achievement (still to this day) made from 79' to 02'.
17 Opel's 2 door sports coupe that shares platform with the Pontiac Solstice. Made from 06' to present.
18 Honda's most sought after J-Spec ride! Made from 97' to present.
19 Chevrolet's original ¯sports car‖ made from 53' to present.
20 Suzuki's twin engined rally monster!
21 Carrol Shelby and Ford's most recent and most powerful accomplishment. Made from 07' to present.
22 Dodge's 2 door behemoth that just had a reissue in 08'. Made from 70' to present.(but there was a lapse).
24 The Dodge that set the second quickest laptime ever of Nurburgring race track. Made from 08' to present.
27 Volkswagen's original badboy made from 74' to present.
28 BMW's 2 door masterpiece from its performance division. Made from 86' to present.
31 McLaren made this, ¯the fastest NA production car‖ from 92' to 98'.

Credits All the association students and staff members.