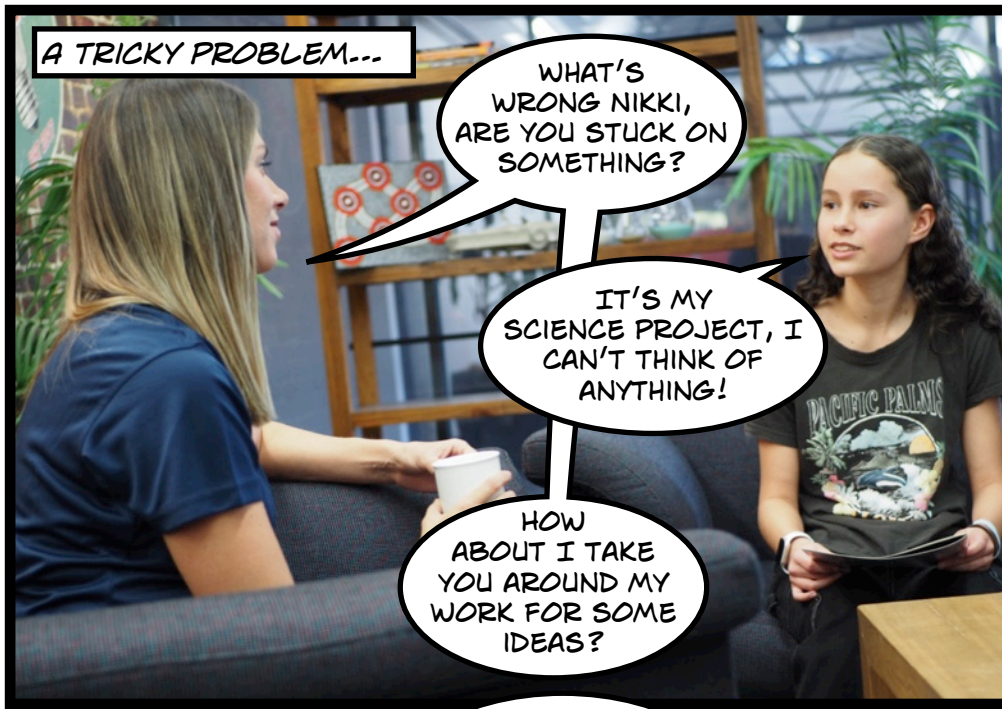


# A VISIT TO THE PORT KEMBLA STEELWORKS







A TRICKY PROBLEM...

WHAT'S WRONG NIKKI, ARE YOU STUCK ON SOMETHING?

IT'S MY SCIENCE PROJECT, I CAN'T THINK OF ANYTHING!

HOW ABOUT I TAKE YOU AROUND MY WORK FOR SOME IDEAS?



YEAH, THE STEELWORKS, THAT SOUNDS COOL!



MAKING STEEL IS ALL ABOUT SCIENCE AND EVERYWHERE YOU LOOK, SOMETHING IS MADE OF STEEL!

YOU CAN FIND STEEL IN BUILDINGS, CARS, AROUND THE HOUSE, IN YOUR CLASSROOM. MOST EVERYTHING IS EITHER MADE OF STEEL, OR MADE BY STEEL TOOLS AND MACHINERY



I HADN'T REALLY NOTICED

A VISIT NEEDS TO BE DONE SAFELY - SO YOU'LL NEED THIS PROTECTIVE EQUIPMENT



YOU'RE NOT GOING TO LOSE ME IN THIS BRIGHT JACKET :)

I DIDN'T REALISE IT WAS SO BIG!

THE PORT KEMBLA STEELWORKS IS 760 HECTARES IN SIZE - BIG ENOUGH TO HAVE FOUR PUBLIC RAILWAY STATIONS!



I'M READY!!!





AT PORT KEMBLA, WE NEED TO MAKE IRON BEFORE WE MAKE STEEL

AND THERE ARE TWO MAIN INGREDIENTS

IRON ORE

COAL

WHERE DOES IT ALL COME FROM?

IRON ORE COMES MOSTLY FROM WESTERN AUSTRALIA ON SHIPS

COAL COMES BY TRAIN FROM NEARBY TO THE STEELWORKS

ONCE WE HAVE ALL THE INGREDIENTS TO MAKE IRON, WE PUT THEM INTO A BLAST FURNACE

THE BLAST FURNACE IS AS HIGH AS A 30 STOREY BUILDING

WHOA!

IT'S A GIANT STEEL BOTTLE LINED WITH SPECIAL BRICKS TO WITHSTAND THE HIGH TEMPERATURES


IRON ORE IS IRON COMBINED WITH OXYGEN, AND COAL IS AN IMPORTANT SOURCE OF CARBON

A BLAST OF HOT AIR CREATES THE CHEMICAL REACTION THAT SEPARATES THE OXYGEN FROM THE IRON

$$\text{IRON OXIDE} + \text{CARBON} = \text{IRON} + \text{CARBON OXIDE (GAS)}$$







THIS IS WHERE THE HOT AIR IS BLASTED INTO THE FURNACE

EVERY SO OFTEN A TAP-HOLE IS OPENED TO DRAIN LIQUID IRON OUT

OK, BUT I THOUGHT USING CARBON IS BAD???

YES - AT THE MOMENT WE NEED CARBON, BUT WE ARE TRYING HARD TO USE LESS AND LESS ALL THE TIME

HERE'S AN EXAMPLE...

THE FIRST STEP IN THE STEELMAKING PROCESS IS TO ADD SCRAP STEEL

NOW THAT WE HAVE IRON, WE NEED TO TURN THIS INTO STEEL - WHICH IS MUCH "TOUGHER" - STRONGER AND HARDER TO BREAK

I'D LIKE TO SEE THAT!

THE SCRAP STEEL IS ADDED TO THE STEEL FURNACE - WE'RE RECYCLING MORE THAN WE EVER HAVE BEFORE, SO THAT MEANS LESS CARBON

STEEL IS ACTUALLY AN ALLOY OF IRON AND CARBON, ALONG WITH THE ADDITION OF A NUMBER OF OTHER ELEMENTS

THIS NEXT STAGE IS CALLED BASIC OXYGEN STEELMAKING

THEN WE ADD LIQUID IRON FROM THE BLAST FURNACE

WOW, LIKE A VOLCANO!

WE DON'T LIGHT A FIRE IN THIS FURNACE - THE CHEMICAL REACTION CREATES HEAT AND THE PROCESS GETS HOTTER AND HOTTER





THE OXYGEN PROCESS TAKES ABOUT 15 MINUTES TO GET THE CHEMISTRY JUST RIGHT FOR 300 TONNES OF STEEL

THE BASIC OXYGEN FURNACE PROCESS BLOWS OXYGEN ONTO THE LIQUID AT TWICE THE SPEED OF SOUND - THIS REFINES THE AMOUNT OF CARBON IN THE MIXTURE



WHAT HAPPENS NEXT??

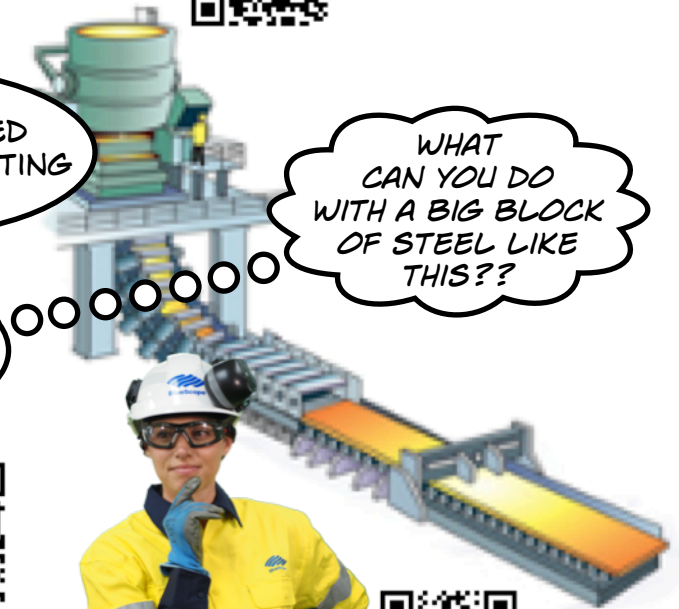


THE LIQUID STEEL IS CAST INTO A SOLID SHAPE - CALLED A SLAB

IN A WATER-COOLED CONTINUOUS CASTING MACHINE

I CAN FEEL HOW HOT IT IS FROM HERE - WOW!!!

WHAT CAN YOU DO WITH A BIG BLOCK OF STEEL LIKE THIS??

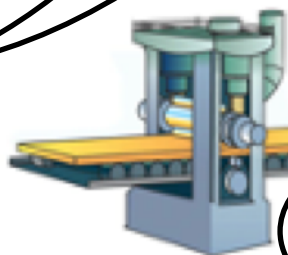


WE ROLL THE SLABS DOWN INTO DIFFERENT THICKNESSES IN PLATE AND STRIP ROLLING MILLS

THIS RED-HOT "COIL BOX" IS USED TO CONTROL TEMPERATURE

AMAZING!!!

THE ATOMS IN STEEL ARRANGE THEMSELVES IN DIFFERENT PATTERNS AT DIFFERENT TEMPERATURES - SO TEMPERATURE IS EXTREMELY IMPORTANT





WE NOW DO LOTS OF DIFFERENT PROCESSING, LIKE ADDING METALLIC AND PAINT COATINGS TO PROTECT THE STEEL

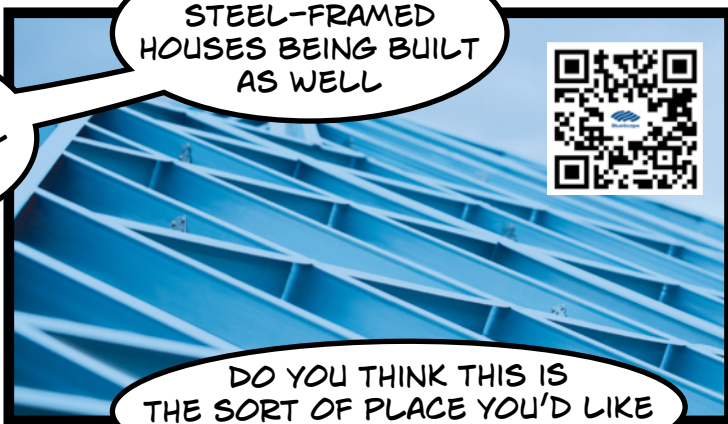
A ZINC, OR ZINC-ALUMINIUM METAL COATING ON STEEL WILL SACRIFICE ITSELF FIRST BEFORE THE STEEL STARTS TO CORRODE - THIS IS CALLED GALVANIZING!



YEAH - I'VE SEEN THE COLORBOND® STEEL ADS ON TV - IT LOOKS GREAT!



I'VE SEEN STEEL-FRAMED HOUSES BEING BUILT AS WELL



DO YOU THINK THIS IS THE SORT OF PLACE YOU'D LIKE TO WORK AT?



WE NEED BRIGHT PEOPLE WITH NEW IDEAS TO BUILD OUR PROCESSES AND PRODUCTS FOR THE FUTURE



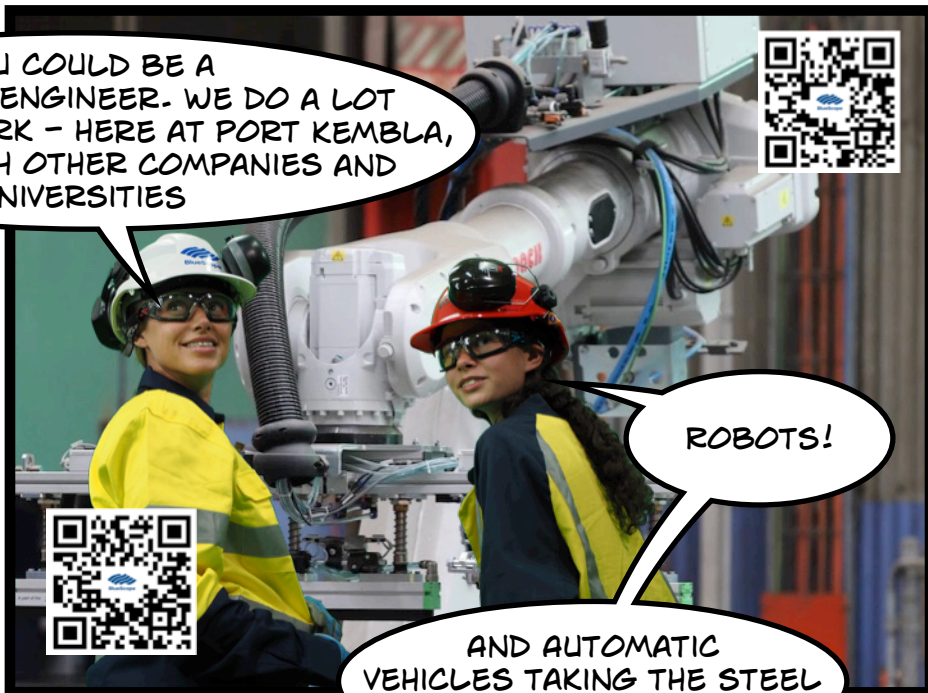
HERE'S AN EXAMPLE - RENEWABLE ENERGY NEEDS STEEL - TO BUILD WINDTOWERS AND THE FRAMES FOR SOLAR FARMS







YOU COULD BE A SCIENTIST OR ENGINEER. WE DO A LOT OF RESEARCH WORK - HERE AT PORT KEMBLA, BUT ALSO WITH OTHER COMPANIES AND UNIVERSITIES



ROBOTS!

AND AUTOMATIC VEHICLES TAKING THE STEEL COILS AROUND!



ALL THIS WORK IS DONE IN A SUSTAINABLE WAY TO KEEP OUR PEOPLE SAFE AND TO DO THE RIGHT THING BY OUR COMMUNITY

THE PORT KEMBLA STEELWORKS OPERATES ON THE TRADITIONAL LANDS OF THE WODI WODI PEOPLE OF THE DHARAWAL NATION

WE WERE THE FIRST STEEL PLANT IN THE ASIA/PACIFIC REGION TO GAIN THE GLOBAL "RESPONSIBLESTEEL" ACCREDITATION



I'M REALLY INTERESTED IN ROBOTICS - THANKS - I HAVE LOTS OF IDEAS FOR MY PROJECT NOW!





A WIND TOWER AND TURBINE IS TYPICALLY MADE OF 84-90% IRON AND STEEL PRODUCTS

A WOODEN FRAMED HOUSE MIGHT NEED THE WOOD FROM 20 TREES. THE SAME SIZED STEEL FRAME CAN BE MADE FROM 5 RECYCLED CARS

AND THAT STEEL FRAME WON'T BURN, WARP, SHRINK OR BE EATEN BY TERMITES!

GLOBALLY OVER 6 MILLION PEOPLE WORK FOR THE STEEL INDUSTRY

NEARLY 100% OF THE STEEL INDUSTRY'S CO-PRODUCTS, SUCH AS GASES AND SLAG CAN BE USED ELSEWHERE

WHEN LIQUID IRON IS CONVERTED TO STEEL IT REACHES TEMPERATURES UP TO 1,700°C, MUCH HOTTER THAN LAVA FROM A VOLCANO



OVER 75% OF THE CURRENT GRADES OF STEEL DID NOT EXIST 20 YEARS AGO

THERE ARE MORE THAN 3,500 DIFFERENT GRADES OF STEEL

ONCE IT IS USED, STEEL SHOULD NEVER GO INTO LANDFILL - WE NEED SCRAP STEEL TO MAKE NEW STEEL!

ON AVERAGE, NEW STEEL PRODUCTS CONTAIN 30% RECYCLED STEEL

YOU CAN RECYCLE STEEL INDEFINITELY - IT DOES NOT DEGRADE

STEEL IS THE WORLD'S MOST RECYCLED MATERIAL

I KNOW IT'S BEEN A LONG DAY, BUT LISTEN TO THIS...

LOL - BRAIN OVERLOAD, BUT MY PROJECT WILL BE EPIC!

SCAN HERE TO FIND OUT ABOUT TAKING A STEELWORKS TOUR YOURSELF!



...OR WATCH THE VIDEO

