WWR-Indian Manufacturing Perspective

WELDMESH MANUFACTURER'S ASSOCIATION

http://www.weldedmesh.com

OVERVIEW

The Weldmesh Manufacturer's Association(WMA) is an umbrella Organisation of about 35 member manufacturers spread across India , who have been meeting & collaborating on matters of mutual Interest since 1986. Different members are focussed on one or more of the diverse application areas of Welded Wire mesh namely-

- Concrete Reinforcement –
  - WWR for Structural Slabs/Walls or Pavements / Slabs on Grade
  - Lighter Crack Prevention Meshes for Plastering / Guniting
- Gabions & Earth Retaining
- Fencing Panels , Partitions , Barriers
- Poultry & Animal Enclosures/Cages
- Fine Meshes for Filters/Sieves

While the usage of WWR in India is still a very small fraction of its potential, About 18 manufacturer members are capable and have experience of project supplies of WWR to varying degrees of size capacity and quantities.

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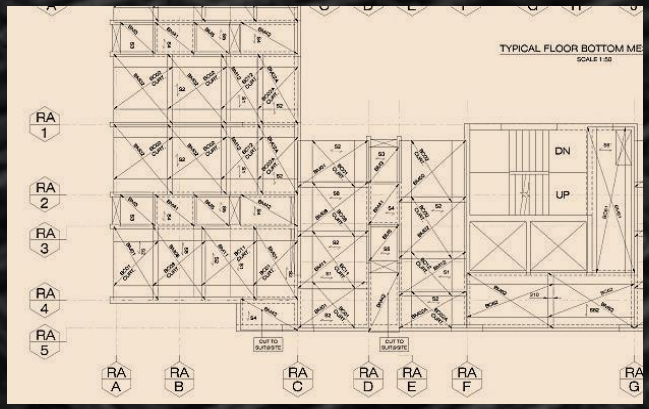
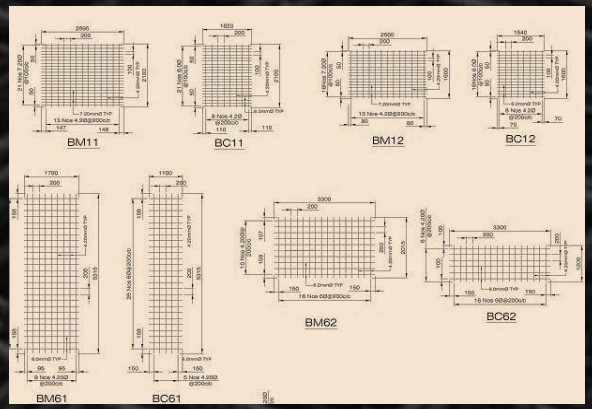
PROCESS

1) PLANNING STAGE –

- Interaction with Designer & Detailing Agency to check & finalize

a) Mesh Placement Drawings & b) Mesh Fabrication Shop details





Along with Optimization of variety of Meshes as per Manufacturers Capacity and finalizing overall BOQ of item-wise quantities with Spreadsheets of Item-wise Dimensional parameters. It is crucial to have sufficient lead time before placement time to allow systematic manufacture planning

Mesh Sheet Tag	Sheet Width	Sheet Length	Sheet Nos/Panel	Panels/ floor	Sheets / Floor	X Direction Steel (Main)							Y Direction Steel (Dist.)							Weight / Sheet	Total Weight / Floor
						Dia	Nos	Length	C/c	End-1 Projection	End-2 Projection	Weight of X Steel	Dia	Nos	Length	C/c	End-1 Projection	End-2 Projection	Weight of Y Steel		
TOP MESH																					
TM01	1300	3900	2	4	8	8.0	21	1300	150	80	500	10.8	6.0	5	3900	180	450	450	4.3	15.10	120.8
TM02	2050	1300	1	4	4	6.0	5	2050	180	200	200	2.3	6.0	16	1300	110	80	500	4.6	6.89	27.6
TM02A	4100	1200	1	4	4	6.0	5	4100	180	220	470	4.6	6.0	32	1200	110	30	450	8.5	13.07	52.3
TM03	2350	5255	1	8	8	6.0	40	2350	110	460	460	20.9	6.0	14	5255	110	482	483	16.3	37.19	297.5
TM03B	3265	2250	2	4	8	6.0	13	3265	110	450	65	9.4	6.0	26	2250	110	465	465	13.0	22.41	179.2
TM04	2150	2200	1	4	4	6.0	13	2150	180	250	250	6.2	6.0	16	2200	110	20	20	7.8	14.02	56.1
TM04A	2150	1450	1	4	4	6.0	6	2150	180	235	485	2.9	6.0	14	1450	110	75	475	4.5	7.37	29.5
TM05	2400	2315	2	4	8	10.0	13	2400	150	30	30	19.2	6.0	14	2315	180	65	450	7.2	26.43	211.4

- Interaction with Client & Contractors for scheduling of stage wise supply batches and financing of Raw Material procurements.-
- Supplies can be on **Outright Sale basis** or on **Contractual/ Jobwork basis with Raw Material procured by Builder/Contractor** .

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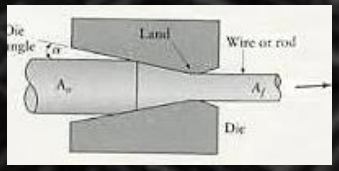
PROCESS

2) RAW MATERIALS PROCUREMENT & WIRE PRODUCTION-

Depending upon Design the reinforcement wires/bars may be a) Cold Drawn Plain Wires (IS:432-II) or b) Cold Rolled Ribbed / Deformed Wires or c) Hot Rolled TMT Bars.

While a few modern installations can process (c) i.e TMT bars, Almost all of Indian WWR manufacture happens with (a) or (b) . These require initial Raw Material MS Wire Rods of SAE-1008/1010/1015 or 1018 grades (with %C between 0.8 to 0.18%) . Prime Quality Wire Rods are sourced in India from M/s Tata Steels ; M/s RINL –Vishakapatnam Steel Plant ; M/s JSW ; M/s SAIL ; with initial diameters in range of 6.50mm to 14mm dia and received along with MTC of Physical & Chemical properties. After Mechanical De-scaling, Cold-working of Approx 30-45% Cross-sectional Area reduction is imparted over multiple passes via either

Cold Drawing Plain Round
(Pulling through Tungsten Carbide Round Dies)



or

Cold Rolling Ribbed / Deformed
(Pulling through Triplex sets of Tungsten Carbide Rolls

to increase the Yield Strength from approx . 360 Mpa to about 540 MPa.
Tensile Tests on finished wire are performed in-house or from attached 3rd Party Labs to check UTS, 0.2% Proof Strength & Elongation at regular intervals of generally 1 sample/10MT.

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PROCESS

2) WIRE STRAIGHTENING & CUTTING :

Depending upon Diameters used either both Long Wires & Cross Wires or only Cross Wires (with Long wires upto 8mm dia pulled off Continuous Coils) are Straightened & Cut to Exact lengths +/- 2mm as per Final Mesh Sheet Length & Width and for quantities as required for each production batch. Straightening & Cutting machine line generally employ combination of 5 or 7 Roll straightening along with Rotary Arbor (Spinner) to achieve very good straightness (within 5mm offset in 3000mm) suitable for further process during Multi-spot welding transport. Cut off /shearing is by Flywheel backed Mechanical /Pneumatic trigger on Set Length guage. There is no change in Physical / Chemical properties of the Wire in this operation.

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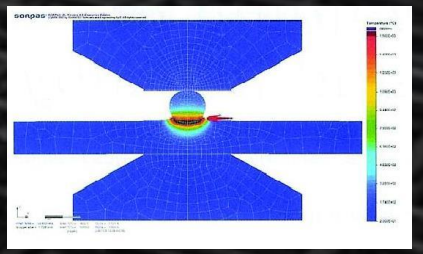
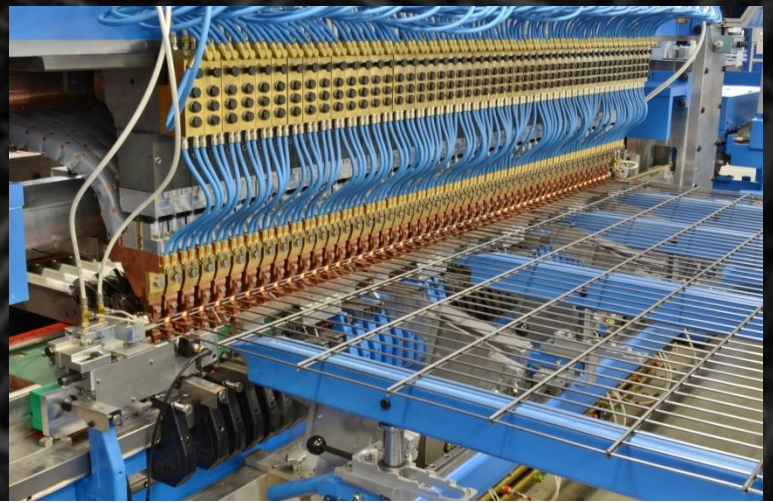
PROCESS

3) MULTI-SPOT WELDING & PITCH CONTROL :



The Main Operation of Mesh Welding happens on a Multi-Spot Welding Line comprising of the Long & Cross Wire Pitch Control & Transport Mechanisms and the Multiple Resistance Welding Guns . Most Indian manufactures use Indian make welders while few use Chinese or higher end European make machines.

Spot Welding is fusing (not foreign filler metal) of the Cross Wire into the Long Wire between Copper Electrodes by Passing Heavy Current at Low Voltage (Approx. 11000 Amps for 12 to 12mm dia Welding at about 6- 10 Volts) under Heavy Force (Approx. 8kN for 12-12dia) for a short duration (Approx 20 cycles or 0.4 sec for 12-12 dia) . Most Indian Manufacturers use Transformers at Mains Frequency (50Hz) with timing & Phase Angle Current control by Synchronous Thyristor (Fast acting Semi-conductor switches) Controllers . Few modern facilities also employ Inverter controlled or DC source current controls.
The Welding Force Application is either by Spring Loaded Holders driven down Mechanical Cam driven Beam or by Individual Pneumatic / Hydraulic Pressure Guns for each or pair of Electrodes.



Pitch Control of Long Wires is generally Bolt set fixed for one batch and needs Electrodes resetting for each batch of Long Wire pitch sets. Some New Installations have Robotic type Moving Electrode guns controlled by PLC for quick change over of Long Wire Pitch sets.

Pitch Control of Cross Wires is by a Setting Adjustable Mechanical Cam Motion or By Online Variable Stepper/Servo Motor driven Motion.

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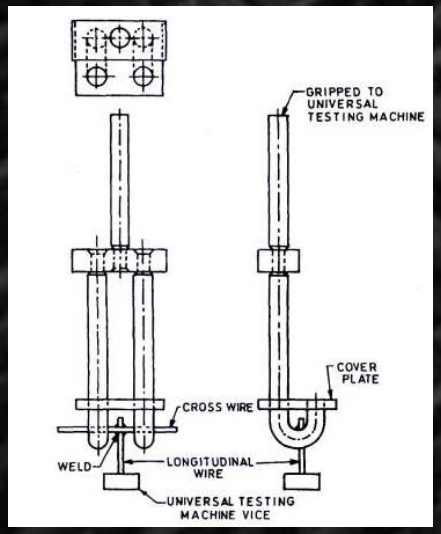
PROCESS - 4) SPECIFICATIONS & GENERAL QUALITY CONTROL :

Specification No:	Country	Specification Title	Parameter	Value
IS:1566 & IS:432(Pt.II)	Indian	Hard-drawn Steel Wire Fabric for Concrete Reinforcement & Hard-drawn steel wire for concrete reinforcement: Part 2	UTS	570 Mpa Min.
			Yield – 0.2% Proof Strength	480 Mpa Min.
			Elongation on 8 Times Dia GL	7.5% Min.
			Weld Shear Strength	Min 25% of UTS
BS:4483 & BS:4482	British	Steel fabric for the reinforcement of concrete & Steel wire for the reinforcement of concrete products	UTS	1.05 times Yield Stregth
			Yield – 0.2% Proof Strength	500 MPa
			Total Elongation at Peak force on 5D GL	2.5%
			Weld Shear Strength	Min. 25% of Yield Strength of Thicker Dia
ASTM A185 & A82	**USA**	Steel Welded Wire Fabric Plain For Reinforcment & **Steel Wire, Plain, for Concrete** Reinforcement - Grade 60 & Grade 80 (80000 Psi)	UTS Grade 80 / Grade 60	620 MPa Min / 515 Mpa
			Yield – 0.35% Proof Strength	550Mpa Min / 450 Mpa
			Reduction in Area (after Failure)	30% Min
			Weld Shear Strength	241 Mpa in Thicker Dia



Weld Shear Test

QC / Testing Protocol (Tested In-house / External Approved Lab) :

a) Chemical Properties : % C/P/S/Mn/Si – As per Raw Material Supplier's TC & Confirmed every 50MT/ Purchase Batch lot.

b) Physical Properties :

1) UTS, Yield ,% Elongation , Re-bend Test– Tested every 10MT / Manufacture Batch lot upon Wire Production

2) UTS, Yield ,% Elongation – Tested every 6000 sqm/ 10MT / Mesh Welding Batch lot.

c) Weld Shear Test : Every 6000 sqm / 10 MT / Mesh Welding Batch.

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MEMBER MANUFACTURERS with WWR Capability on record:

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Sr No	Company Name	Postal Address/Web Address	WWR Processing Welder Dtls.	Project Supply Details	Project Supply Details
1	**M/s BOKARIA REINFORCING CO. PVT.LTD** **Contact Person:-**Pradeep Bokaria **Contact No:-**98400-84747 **Email:**info@bokariamesh.com ; bokariagroup@gmail.com	12 Vepery Hill Road Near Nehru Stadium Chennai,Tamil Nadu-600003 www.bokariamesh.com	No of Welders:-5 (3.6mtrs, 2 mtrs, 1.5mtrs. 1.5 mtrs and 1.2 mtrs) Wire thickne range - Thickness from 1mm to 12mm as of date Mesh opening range - 15mm to 250 mm as of Production TPA - With an average of 6mm dia x 150mm - approx 6000 TPA		
2	**Azra Group: Econova Steels** **Contact Person:-**Nissar Ahmed / Zakir Ahmed **Contact No:-**98440-27775 **Email:**azrapoultry@gmail.com; nissar1@yahoo.com; econovasteel@gmail.com	BUILDING NO-1, MILLER TANK BUND ROAD, Bengaluru - 560052, Karnataka, India . www.econovasteel.com	No of Welders:-4 (1000 MT/Month) Widhts:- 3x1.8m ; 1 x 2.4m 8.0mm dia Wire:- Plain ,Ribbed -Cold Worked	Low cost Housing projects inc Police housing many formats - single storey, G+1 to G+4 Completed : with MFE Aluminium Formwork	Currently : (using Tunnel Formwork) G + 25 x 6 towers G + 21 x 9 towers
3	**M/s SURANA WIRES (P) LTD** **Contact Person:-**Ramesh Surana **Contact No:-**99491-35500 **Email:-info@suranawiremesh.com**	P/16, IDA, NACHARAM HYDERABAD-500076, Andra Pradesh Telagana www.suranawiremesh.com	No of Welders:-11(10mmx10mm to 300mmx3 Widhts:-:2, 2.4mtr Max Dia:-6, 8mm Wire:-Hard Drawn Plain/Cold Rolled Ribbed	Project/Client -Jain Housing and Cor Tonnage supplied-50MT Project/Client -M+W India Tonnage supplied-50MT	Project/Client -Jain Promoters Tonnage supplied-11MT Project/Client -Sai Deepa Rock Drills Tonnage supplied-10MT
4	**M/s NBC WELDMESH PVT.LTD** **Contact Person:-**Sanjay Chauraria **Contact No:-**94440-59990 **Email-** nbcweldmesh@gmail.com	33, Nainiappa Naicken Street, 2nd Floor,Chennai,Tamil Nadu-600003 www.nbcweldmesh.com	No of Welders with Widhts:-1.6 Mtr, 3.15 Mtr Max Dia:-25 Mm. Type of Wire:-Plain Hard Drawn / Cold Rolled Ribbed / Hot Rolled TMT - All Types.	Project/Client - Sunworth No of Bldgs & No of Storeys- 28 & 12 Flo Tonnage supplied-1600 Tons No of Mesh Varieties-45 varities	Project/Client - KG WorldWide No of Bldgs & No of Storeys-50 & 4 Floors Tonnage supplied-1000 Tons No of Mesh Varieties-25 varities
		Project/Client - Mantri Serenity No of Bldgs & No of Storeys- 5 & 28 Tonnage supplied-1300 Tons No of Mesh Varieties-more than 45 Varieties	Project/Client - Indotech No of Bldgs & No of Storeys-- Tonnage supplied-600 Tons	Project/Client - NettApp No of Bldgs & No of Storeys- 25 & Tonnage supplied-300 Tons	Project/Client - Ramanujam IT Park No of Bldgs & No of Storeys- 2&15 Floors Tonnage supplied-800 Tons
5	**M/S. INDIAN REINFORCING COMPANY (Weldedmesh) PRIVATE LTD.** **Contact Person:-**Ramakrishnan Raja / Rengaswamy Raja **Contact No:-**98400-49139 **Email-**ircweldedmesh2000@yahoo.co.in	6,Mount Poonamallee Road,Nandambakkam , Chennai-600 089 ,Tamilnadu	No of Welders: 1 - 2.13m wide Max Dia:- 8.0mm Type of Wire:-Plain Hard Drawn	supplying 150 x 150 x 5 x 5mm - 50mtr x 2.1 mtr Rolls	

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MEMBER MANUFACTURERS with WWR Capability on record:

Sr No	Company Name	Postal Address/Web Address	WWR Processing Welder Dtls.	Project Supply Details	Project Supply Details	Project Supply Details
6	**M/S. WELD FUSE PVT. LTD.** **Contact person**:-Chakradhar Rao **Contact No**:-98490-12030 **Email**:-chakra@chakraindia.com	11-7-144/3, HUDA Complex,Saroor Nagar,Dist:Rangareddy Hyderabad,Andhra Pradesh- www.chakraindia.com	No of Welders:-6(1500 MT/Month) Widhts:- 4x1.8m ; 2 x 2.4m 8.0mm dia Wire:- Plain ,Ribbed -Cold Worked			
7	**Devi wires** **Contact Person:-**Balaji Venkatesh **Contact No:-**096450-98162 **Email-** deviwires@gmail.com	Alappuzha,Kerala	5 Welders - 6000 MT/month Max Dia - 8.0 mm Plain Hard Drawn / Ribbed Wire			
8	**M/S. SRV WELDMESH MFG. CORPORATION** **Contact person:-**Vijay Dodeja **Contact No:-**98207-45158 **Email:-** vijayldodeja@gmail.com; sales@weldedwiremesh.in	S.No: 513,Opp.Oswal Park, Pokhran Road No.2,Thane,Maharashtra-400601 www.weldedwiremesh.in	No of Welders:- 3 Widhts:- 2.6m, 2.4m , 3.2m Max Dia:- 12mm dia Wire:- Cold Drawn Plain/ Cold Rolled Ribbed	Project/Client - Omkar-**VGS Goregaon** G+32 - 1 tower, G+24 storeyed - 3 Towers Tonnage supplied-880 Tons No of Mesh Varieties-100 Types	Project/Client - B G Shirke Const.Tech Pvt Ltd Sites @ Sanpada,Panvel, Ghansoli,Millenium Towers-Sanpada-All Navi Mumbai; Tirupati 205 Bldgs of G+2/3 , 12 Towers of G+14 ,Tonnage supplied-2548 Tons	Project/Client - K Raheja Const Inorbit Malls @ Vashi Navi Mumbai & Cyberabad 2 Malls - Composite Steel Beam + RCC Slabs- 225 MT
9	**Quality Systems** **Contact Person:-**Harshad Thakkar / Jairaj Thakkar **Contact No:-**9324222495 **Email:-**sales@qualitysystemsindia.com	*Manor – Wada road,Village: Hamarapur,Behind Office of Gram Panchayat,Palghar Dist.* www.qualitysystemsindia.co	No of Welders:-2 Widhts:-2000 mm , 3200mm Max Dia - 8.0 mm , 12.0mm			
10	**A1 FENCE PRODUCTS PVT LIMITED** **Contact Person:-**Vivek / Saurabh Gupta **Contact No:-**022 28457540 / 28457252 **Email-**Vivek@a1fenceproducts.com;	21 ABC , Raju Industrial Estate , Penkar Pada , Dahisar (East) . Thane 401104 Mumbai www.a-1fenceproducts.com	No of Welders:-3 (350 MT/Month) Widhts:-2500 mm ; 2x 2500mm Max Dia - upto 8 mm dia PLAIN HARD DRAWN WIRE			
11	**SYSTEMATIC INDUSTRIES PRIVATE LIMITE** **Contact Person:-**SIDHARTH AGRAWAL **Contact No:-**022-41383900 **Email-** sidharth@systematicltd.com	418, Nirmal Corporate Center, Beside Nirmal Lifestyle Mall, L.B.S. Marg, Mulund (West), Mumbai-400080 www.systematicltd.com	No of Welders:-3 (450-500 mt / Month) Widhts:-2500 Max Dia:-8mm	Project/Client:-Reliance , Sterlite, vedanta Location : Gujarat and Mumbai		

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MEMBER MANUFACTURERS with WWR Capability on record

Sr No	Company Name	Postal Address/Web Address	WWR Processing Welder Dtls.	Project Supply Details	Project Supply Details	Project Supply Details
12	**D.U.N.S.** **Contact Person:-**Nainesh Soni **Contact No:-**98791-48505 **Email-** naineshsoni@gurukripawires.com	17, 18, GIDC,Petlad, Anand, Gujarat 3884 www.gurukrupawirenetting.co	No of Welders with width:-1 Max Dia:-6mm Type of Wire:-Plain Hard Drawn / Cold Rolled Ribbed / Hot Rolled TMT , : PLAIN	Project/Client - IVRCL DAHEJ No of Bldgs & No of Storeys- Tonnage supplied-40 TONS No of Mesh Varieties-25 varities		
13	**M/s MAHALAXMI UDYOG** **Contact Person:-**MAHESHBHAI PATEL **Contact No:-**02762-224358, 9978939539, 9825339539 **Email-** techweldindustries@live.com	Office :356, GIDC Phase-II ,DEDIYASAN,MEHSANA www.techweldindustries.com	No of Welders:-3 Widhts:- 2x 2.0m,1x 2.5m Max Dia:-1.8MM TO 6MM Wire:- LOW CARBON M.S. , G.I.	**Production Capacity:**-200Tons per month SUPPLY IN MAINLY CANAL LINING C.C. WORKS IN GUJARAT, SUPPLY IN GRANTING WORKS IN PIPE LINE PROJECTS		
14	**M/s M M INDUSTRIES** **Contact Person:-**Mahendra Mukim **Contact No:-**94252-07171 **Email:-**mmweldmesh@gmail.com	Sanjay Gandhi Chowk,Station Road, Raipur,Chattisgarh-492001 www.mmweldmesh.com	No of Welders:-3 (500 mt / Month) Widhts:-2500 Max Dia:-6mm	L&T , GMR Infrastructure, HCPL,Jindal Power & Steels		
15	**H.D.Wires Pvt.Ltd.** **Contact Person:-**Dheeraj/ Himanshu Dev **Contact No:-**+91 731 4211199/9893049705 **Email-** himanshudev@hdwires.com	17-20, Sector E, Sanwer Road Industrial Area, Indore, M.P. - 452015	No of Welders:-3 (1200 MT/Month) Widhts:-2000 mm ; 2x 2500mm Max Dia - upto 8 mm dia PLAIN HARD DRAWN WIRE / COLD ROLLED RIBBED			
16	**Kedia Hardware Pvt Limited** **Contact Person:-**Bipin Kedia **Contact No:-**9007002372 **Email-** kedia.bipin@gmail.com	147 N.H. Road 3rd Floor Room No. 54 -55 Kolkatta-1 www.shankarwiremesh.com	No of Welders:-7 (600 MT/Month) Widhts:-2000 mm Max Dia - upto 16 mm dia	NEF Railways Tunnel Lining		
17	**TOTARAM WELDMESH INDUSTRIES** **Contact Person:-**Anubhav/ Aditya Gupta **Contact No:-**9818085008 /9891353569 **Email-** totaram_weldmesh@yahoo.com	49/47, SITE-4, SAHAIBABAD INDUSTRIAL AREA, GHAZIABAD, (U.P)	No of Welders:-2 (600 MT/Month) Widhts:-2000 mm ; 2500mm Max Dia - upto 16 mm dia PLAIN HARD DRAWN WIRE / COLD ROLLED RIBBED / TMT	GMR-Delhi Airport Jaypee- Tehri Dam L & T		

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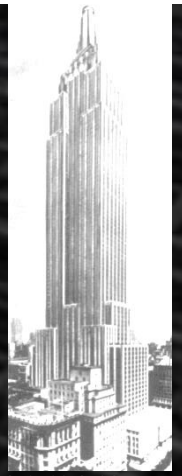
FAQ / Misconceptions / Clarifications in Indian Context:



1. Q- Is WWR some new & untested /unreliable methodology?

A – WWR is a 110 year old concept with history of usage since 1905. Some of the most iconic buidlings in US – Empire State Building , Rockefeller Centre , J F K International Airport and thousands of kilometres of US Interstate Highways are reinforced with WWR. It is even covered as a Reinforcement option in IS:456 (Cl. 5.6C) – Reinforced Concrete Specification ever since 1964 version.

2.Q- Then Why has it not been in much use in India all these years ?

A- Reasons of low usage till date are pretty similar to why RMC usage in India was delayed by more than 60 or more years. They include:

1. Easy availability of Cheap construction labour before.

Now- This is changing very fast. Not only labour cost is rising at very fast pace , its more & more difficult to get labour for site work of bar cutting, bending,lifting, binding wire tying etc

2. Relatively poor priority of early execution of projects due to relatively lower capital costs before.

Now- Skyrocketing cost of Real Estate is putting pressure on developers to cut down development time. Steel Placement time reduction from a typical 3 days to only 4 hrs per floor can save almost 60 days or typically 25% of construction time of a 24 storied tower. Further, now usage of modern formwork like Tunnel forms or Myvan Aluminium shuttering and using manually assembled rebars is like an car being driven by bullocks.

3. High rate of VAT / Sales tax –typically 12 to 15% on Welded Wire Mesh vis a vis 4-5% on Rebars manually assembled before, the difference being a major cost disadvantage.

Now- Almost all states currently charge VAT @ 5-6% which is on par with rebars . This status is expected to be further continued uniformly across India under forthcoming GST.

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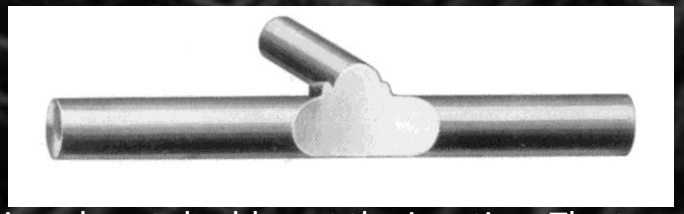
FAQ / Misconceptions / Clarifications in Indian Context:

3. Q- How can mesh reinforcement of thin 5 or 6 or 7mm be strong enough to take RCC load. They look so thin and weak ? How can the spacing of the mesh be small at 75 – 100 mm ? How will the steel bond to concrete ?

A - IS 456 does not specify any minimum rebar dia for slabs or walls. Finally it is the total cross-sectional area per running metre that determines the tensile strength of the Composite RCC .Because manual rebar tying requires effort , tendency was to use larger diameters at larger spacings so as to reduce no of joints. Welded Wire Reinforcment is produced by machine multi-spot welding and so can handle more no of thinner Wires at closer spacings. 75mm spacing or higher is enough to provide flow of Concrete aggregates (typically 20-25mmsize) and ensure sufficient bonding . *Closer spacings provide a more homogeneous and quicker stress transfer to concrete with much smaller crack widths. Usage of Thinner wires offers significant steel savings of 30-50% in thin members with light loading detailed with Minimum steel mostly for Shrinkage / cracking criteria*.

4. Q- During Spot welding , the cross-section of the wire / bar reduces at the junction? How can Mesh take the full stress of the loads with reduced cross-section ?



A – That would be true only if the Weld gets broken. Actually the cross-section almost doubles at the junction. The two intersecting wires get fused (liquefy) into each other forming the weld nugget which has much larger cross-section than the original wire. Hence during a tensile test with a cross-wire weld in between, generally failure occurs some distance away from the junction and not at the junction itself. Further , IS-1566 actually specifies tensile test specimens of Welded Wire Mesh to include 1 or more cross-wire joints to bypass this doubt of any weakness due to weld.

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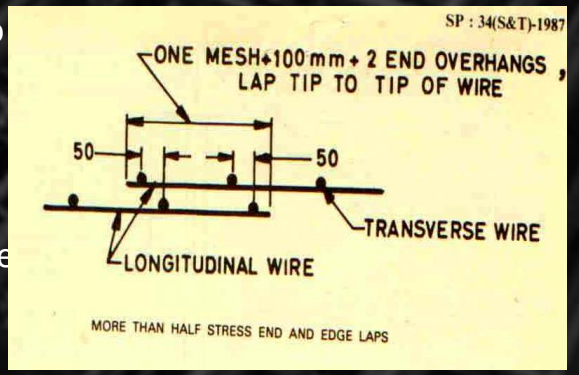
FAQ / Misconceptions / Clarifications in Indian Context:

5. Q- Welded Wire Reinforcement is difficult to design with and very cumbersome to use. How can the structural consultant convey sizes to the Manufacturer?

A- Welded Wire Reinforcement does need more planning and much more detailing than using rebars. With Rebars, structural consultant generally issue standard tabular schedules and all the rest is handled by the Site Bar-bender who does all the estimation , counting , length computations etc. With Welded Wire Reinforcement , the structural consultant or preferably a separate detailing agency needs to prepare detailed **a) Site Mesh Placement Plans and b) Mesh Manufacture/Fabrication shop drawings** for each type of sheet. Mesh sheet Width & lengths need to account for transport limitations and site placement difficulties , splice overlaps etc , and at the same time should try to achieve good amount of standardization for better production efficiencies by the manufacturer. However It is not rocket sceince and with the availability of modern CAD software it is also not cumbersome as such.

6. Q- What about so many Mesh Splices ? There shall be so much wastage with large splice lengths everywhere ?

A – Splices with Meshes are invariably there due to transport limitations. Typical trucks are 2.2m wide and 5.5m long and so Meshes need to be smaller than that for standard non-trailer transport in cities. However unlike plain rebars , Mesh splices do not need to be 43 times diameter in length (for M30 concrete) , but rather only 1 mesh pitch + 100mm . This is because Welded Mesh relies on the much stronger mechanical T-Action of cross-welds for bond to concrete rather than only peripheral surface bond. Embedment of 1 pitch means 2 cross-wire joints. Each cross-wire joint typically can withstand shear equal to 50% of the tensile strength of bar. The wastage due to WWR splices vis-à-vis Rebar Splices does not constitute a major loss since in any case re-bars also need splices at every 12m atleast. Loss in extra splices is about similar to the Savings achieved due to Binding wire material savings and other cut-ends scrap loss .



WWR-Indian Manufacturing Perspective

WELDMESH MANUFACTURER'S ASSOCIATION

http://www.weldedmesh.com

FAQ / Misconceptions / Clarifications in Indian Context:

7. Q- How do we place slab reinforcement in Mesh form ? Can we bend up alternate bars at quarter span ? How do we manage Slab – Beam junctions ?

A- The Practise of Alternate Bent –up bars is an old practise which is anyway used much less today with seperate Top & Bottom Meshes being preferred along with use of support chair. WWR is also implemented with separate top & Bottom mesh layers. Further for Steel Optimization , each bottom or top WWR Mesh can be in sets of 2 meshes tied together. 1 mesh comprising of minimum steel extending for full span length and the balance 2nd mesh to make up the required design steel area provided only over the required higher stress zone.

The issue of clashing of Slab Bottom meshes with Beam junctions does not arise in Tunnel Form or Myvan type shuttering which are generally Beamless framings or Slab-Wall framings. However in case of conventional Slab-Beam framings, Beam Top Bars for one edge can be kept loose tied & Shiftable before Slab mesh placement.

8. Q- How do we manage wastages and ensuring reliability of steel placement as per drawings ? We cannot change any spacings or do anything corrective at site ?

A – WWR is typically supplied in ready cut sized sheets with Fit & Forget methodlogy. **There is no question of wastages or leftovers at site.** Each sheet or bundle comes with **tags** showing the sheet type no and the same has to be placed into Slab / Wall as per **corresponding Tag No** in Mesh Placement drawing .. Overall truck weightment and just a record of usage into slabs/walls as per planning is enough to ensure full compliance without need for any regular supervision / checking at site. There is no need nor possibility for site changes, corrections , manipulations etc.

9. Q-Do we really save any time or is it just fancy complicated impractical ideas ?

A- Time saving is the main killer USP of WWR apart from reliability and reduction of effort. Without Time saving being achieved or being appreciated qualitatively and monetarily , WWR usage is worthless. Steel Placement times get cut down to a fraction from days to couple of hours at best. Tunnel form technologies in Turkey implement cycles of 24 hours per floor and 30 days for a 30 storeyed tower, mainly because WWR placement happens fast enough.