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EL ARQUITECTO,  
DE LA TRADICIÓN AL SIGLO XXI

Tomo II

# EL ARQUITECTO, DE LA TRADICIÓN AL SIGLO XXI

## Docencia e investigación en expresión gráfica arquitectónica

### 16 Congreso Internacional de Expresión Gráfica Arquitectónica

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Ernesto Echeverría Valiente  
y Enrique Castaño Perea



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## Tomo I

### INNOVACIÓN DOCENTE (INVESTIGACIÓN SOBRE EXPERIENCIAS DOCENTES APLICADAS EN EGA)

Diseñar el proyecto .....	3
<i>Montserrat Bigas Vidal; Lluís Bravo Farré; Joan Mercadé Brulles; Gloria Font Baste; Li Yuan Quan</i>	
Hacia una nueva geometría descriptiva. Un Proyecto de Innovación Docente para la carrera de Arquitectura.....	9
<i>Antonio Álvaro Tordesillas; Noelia Galván Desvaux; Marta Alonso Rodríguez</i>	
SDR - SISTEMAS DE REPRESENTACIÓN. Un espacio para la construcción del conocimiento.....	17
<i>Leandro Madrazo</i>	
El montaje de imágenes fotográficas con un mismo punto de vista como ejercicio clave de síntesis infográfica de los procesos de aprendizaje en la EGA actual.....	27
<i>Ramón Maestre López-Salazar; Pablo Jeremías Juan Gutiérrez</i>	
La didattica del disegno nella lettura della città: l' <i>Aurum</i> di Michelucci.....	37
<i>Caterina Palestini</i>	
Expresiones, representaciones e interpretaciones del espacio público, desde la discapacidad intelectual, en la docencia de Arquitectura .....	47
<i>Ángel B. Comeras Serrano</i>	
Estrategias docentes para el proceso de trabajo BIM .....	55
<i>Luis Agustín Hernández; Angélica Fernández-Morales; Miguel Sancho Mir</i>	
Il laboratorio della rappresentazione nel XXI secolo: dallo studio della geometria alla stampa 3D. Ottica e dispositivi metodologici innovativi e coordinati per una didattica sperimentale ....	65
<i>Rita Valenti; Sebastiano Giuliano; Emanuela Paternò</i>	
La maqueta como estrategia docente para la ideación arquitectónica. Contenedores configurales.....	75
<i>Jorge Domingo Gresa; Carlos L. Marcos Alba</i>	
Transferencia de técnicas avanzadas de cine en EGA .....	85
<i>Federico Luis del Blanco García; Ismael García Ríos</i>	
De la abstracción al diseño .....	93
<i>Rodolfo Mejías Cubero</i>	
Del Atelier al Personal Trainer App .....	101
<i>Fernando Lancho Alvarado</i>	

Un nuevo ámbito de estudio: los videojuegos ingresan en la universidad .....	109
<i>Eduardo Roig; Nieves Mestre</i>	
Lúdica en Fase Creativa.....	117
<i>Jessica López Sánchez; Mónica Gómez Zepeda</i>	
Multi-sensory experience in the creative design of the project: how to materialize them in spatial language.....	125
<i>Amélia Panet Barros; Isabel Medero Rocha</i>	
Mirada(s), proceso e intención. Apropiación de un lugar. Una experiencia docente en el río Guadaira .....	135
<i>Mercedes Pérez del Prado</i>	
Enseñando a pensar con las manos. Una experiencia docente en el uso de la maqueta para la modelización arquitectónica.....	143
<i>Manuel Giménez Ribera; Jorge Llopis Verdú; Ana Torres Barchino; Juan Serra Lluch</i>	
Investigación en torno al audiovisual en los aprendizajes de la configuración y la comunicación arquitectónica .....	153
<i>Angelique Trachana</i>	
Experiencias con Color en los Espacios Arquitectónicos .....	163
<i>Juan Serra Lluch; Ana Torres Barchino; Irene de la Torre Fornés; Ángela García Codoñer</i>	
El uso del e-portafolio como herramienta gráfica de la arquitectura .....	171
<i>Carmen Escoda Pastor</i>	
Encuentros en la BLOGosfera. El recurso del BLOG de grupo en la enseñanza de DAI en la ETSAM .....	181
<i>Alvaro Moreno Marquina</i>	
Las MOOCs-grafías. Posibilidades del aprendizaje gráfico online .....	189
<i>Jorge García Fernández; Juan José Fernández Martín; Jesús San José Alonso</i>	
ABP. Aprendizaje Basado en Problemas. Aplicación transversal a las asignaturas gráficas de primer curso del Grado en Estudios en Arquitectura .....	197
<i>Ignacio Cabodevilla-Artieda; Taciana Laredo Torres; Aurelio Vallespín Muniesa</i>	
Discretizzazione di superfici complesse: dalla ricerca alla didattica tra teoria e prassi.....	207
<i>Emanuela Lanzara; Mara Capone; Amleto Picerno Ceraso</i>	
Expresión gráfica arquitectónica no dibujada: una aproximación digital.....	217
<i>Pau Sola-Morales; Josep Maria Toldrà; Josep Maria Puche; Josep Maria Macias; Ivan Fernández Pino</i>	
Una lista de ejercicios desmedidos para dibujar .....	225
<i>Miguel Guzmán Pastor; Ana González Uriel</i>	

09	La tesis doctoral, “Enric Miralles, el dibujo de la imaginación”. Investigación para el proceso creativo a través de la expresión gráfica .....	235
	<i>Salvador Gilabert Sanz; Hugo Barros Costa; Pedro Molina-Siles; Javier Cortina Maruenda</i>	
17	El blog como herramienta de docencia e investigación sobre el dibujo .....	243
	<i>Hugo Barros Costa; Salvador Gilabert Sanz; Pedro Molina-Siles; Javier Cortina Maruenda</i>	
25	Instalaciones, manchas, dibujos, estructuras, patrones, mapas y naturaleza. (Metodología, Innovación y Autocrítica).....	251
	<i>Ángela Ruiz Plaza; Luis García Gil</i>	
35	Nuove interazioni tra Fondamenti della Geometria descrittiva e modellazione tridimensionale per il Design.....	259
	<i>Marco Vitali</i>	
43	Acciones prácticas en la ciudad: diseños para un entorno.....	267
	<i>Ana Torres Barchino; Juan Serra Lluch; Aitziber Irisarri López; Anna Delcampo Carda</i>	
53	La técnica del Puzzle en Expresión Gráfica Arquitectónica. Ejemplos en EGA 3 .....	275
	<i>Taciana Laredo Torres; Ignacio Cabodevilla-Artieda; Ricardo Santonja Jiménez</i>	
63	El dibujo y las matemáticas. Una docencia integrada.....	283
	<i>Alberto Lastra Sedano; Manuel de Miguel Sánchez; Enrique Castaño Perea; Ernesto Echeverría Valiente</i>	
71	Dibujos singulares: un ejercicio motivador .....	291
	<i>Aitor Goitia Cruz</i>	
81	Imágenes del territorio y del paisaje: cartografía y dibujos de la Sierra de Guadarrama .....	297
	<i>Pilar Chías Navarro</i>	
89	<b>DIBUJO Y ENSEÑANZA</b> <b>(INVESTIGACIÓN SOBRE CONCEPTOS GENERALES DE EDUCACIÓN Y ENSEÑANZA EN EGA)</b>	
97	Nuevo procedimiento para la enseñanza del dibujo manual en el primer año del Grado en Estudios de Arquitectura de la ETSAB.....	307
	<i>Joaquim Lloveras i Montserrat; Judit Taberna Torres</i>	
107	Los talleres de verano sobre Expresión Gráfica. Experiencia práctica.....	317
	<i>Sonia Izquierdo Esteban</i>	
117	Los Congresos de Expresión Gráfica Arquitectónica en España: 30 años, 16 ediciones, 1.413 artículos.....	325
	<i>Fernando Linares García</i>	
125	Poner a dormir el dibujo .....	335
	<i>Irma Arribas Pérez</i>	

La influencia estética de la fotografía en la representación de la arquitectura ..... <i>Amparo Bernal López-Sanvicente</i>	343
Rilievo, modello e comunicazione multimediale: dalla didattica alla ricerca ..... <i>Manuela Incerti; Stefania Iurilli</i>	351
L'analisi grafica tra didattica e ricerca. Mario Ridolfi Unbuilt ..... <i>Francesco Maggio; Vincenza Garofalo</i>	361
Enseñar a ver ..... <i>Clara Maestre Galindo</i>	371
La enseñanza de la Geometría Descriptiva en la era digital ..... <i>Juan J. Cisneros-Vivó y Pedro M. Cabezos-Bernal</i>	377
Graphical Analysis 2.0: Digital Representation for Understanding and Communication of Architecture ..... <i>Stefano Brusaporci</i>	385
Ciudad-fábrica belga (Lucien Kroll) y casa-taller japonesa (Atelier Bow-Wow): experimentando competencias transversales en Arquitectura..... <i>José Carrasco Hortal; Antonio Abellán Alarcón; Jorge Bermejo Pascual</i>	395
O (des)propósito das maquetas brancas..... <i>João Miguel Couto Duarte</i>	403
Sobre la enseñanza del dibujo como diagrama o como código, como espejo o como mapa y su vinculación con el hemisferio derecho o izquierdo del cerebro..... <i>Aurelio Vallespín Muniesa; Noelia Cervero Sánchez; Victoria González Gómez</i>	409
Plan Bolonia y web 2.0. Sistema de gestión y evaluación continua de la producción gráfica de los dibujantes aprendices utilizando herramientas libremente disponibles..... <i>Iván Pajares Sánchez</i>	415
Disegno di casa Ottolenghi di Carlo Scarpa ..... <i>Alfonso Ippolito; Cristiana Bartolomei; Carlo Bianchini</i>	423
El croquis como aproximación a la observación de los actos humanos en la formación inicial de la arquitectura..... <i>Rodrigo Lagos Vergara; Jorge Harris Jorquera; Claudio Araneda Gutiérrez</i>	431
Del Lenguaje Gráfico al tridimensional en la docencia y práctica de la arquitectura. Análisis, Representación y Composición ..... <i>Marta Úbeda Blanco; Daniel Villalobos Alonso; Sara Pérez Barreiro</i>	437
Del Viejo al Nuevo Mundo. Experiencias docentes de Geometría en Perú..... <i>Ana C. Lavilla Iribarren</i>	445
De la mente al papel. Nuevas técnicas aplicadas al dibujo de arquitectura..... <i>Marta Alonso Rodríguez; Noelia Galván Desvaux; Antonio Álvaro Tordesillas</i>	453

343	Principios y estrategias para adaptar la formación actual en expresión gráfica arquitectónica en torno a las tecnologías digitales y redes sociales .....	461
	<i>Francisco Martín San Cristóbal</i>	
351	La serpiente viajera. La escultura del museo experimental Eco de México visita Barcelona .....	467
	<i>Héctor Mendoza Ramírez</i>	
361	La experiencia creativa. Reflexiones sobre un nuevo modelo de enseñanza en el ámbito de la Ideación Gráfica Arquitectónica .....	473
371	<i>Javier Fco. Raposo Grau; Mariasun Salgado de la Rosa; Belén Butragueño Díaz-Guerra</i>	
377	La Representación de la Iluminación Natural en el Proyecto de Arquitectura: de la abstracción gráfica a la simulación computarizada .....	483
	<i>Edgar Alonso Meneses Bedoya; Javier Monedero Isorna</i>	
385	Disegno tradizionale e “nuovo Disegno”: riflessioni sul ruolo della Rappresentazione .....	491
	<i>Carlo Inglese; Luca James Senatore</i>	
395	Videografía, fotogrametría y redes. Un camino para explorar y... ¿perderse?.....	499
	<i>Juan José Fernández Martín; Jesús San José Alonso; Jorge García Fernández</i>	
403	El uso del BIM y del SIG en la investigación y la enseñanza de la Arquitectura.....	507
	<i>Francisco Pinto Puerto; Roque Angulo Fornos; Manuel Castellano Román; José Antonio Alba Dorado y Patricia Ferreira Lopes</i>	
409	Tecnologías creativas para la representación en arquitectura. El diseño paramétrico en las aulas ..	515
	<i>Gustavo Nocito Marasco; Andrés de Mesa Gisbert; Joaquín Regot Marimon</i>	
415	“El discurso de los mil trabajos”: Las seducciones de la Historia y las políticas del exceso .....	523
	<i>María Álvarez García; Carlos Naya Villaverde; Inmaculada Jiménez Caballero; María Villanueva Fernández; Luis Manuel Fernández Salido; Víctor Larripa Artieda</i>	
423	Lettura, analisi e conoscenza dello spazio urbano. Il caso studio delle chiese di San Rocco e San Girolamo all’Augusteo in Roma .....	531
	<i>Maria Grazia Cianci; Sara Colaceci</i>	
431	Estrategias de implantación de enseñanza BIM en los estudios de arquitectura .....	539
	<i>Esther Maldonado Plaza</i>	
437	Urban sketching. Il disegno dal vero come strumento per la lettura dell’architettura e dei contesti urbani .....	547
	<i>Vincenzo Bagnolo</i>	
445	Di-segno urbano e lettura delle componenti di paesaggio. La rappresentazione del Castello di Cagliari.....	555
	<i>Andrea Pirinu</i>	
453	Sul disegno dal vero: dalla tradizione alla contemporaneità .....	565
	<i>Emanuela Chiavoni</i>	

Estrategias gráficas para una nueva arquitectura en Suecia: Asplund y el diseño de la exposición de las Artes Industriales de 1930 .....	571
<i>Víctor A. Lafuente Sánchez; Daniel López Bragado</i>	
El arquitecto del futuro según Rem Koolhaas. Claves de su necesaria adaptación y conclusiones pedagógicas .....	577
<i>Jorge Losada Quintas; Lola Rodríguez Díaz</i>	
La teoría de la notación aplicada al dibujo arquitectónico: De Nelson Goodman al proyecto zero ..	585
<i>Ángel Allepuz Pedreño</i>	
L'insegnamento del disegno nei percorsi di studio in graphic design .....	593
<i>Stefano Chiarenza</i>	
Pedro Muguruza (1893-1952): alumno y profesor de la Escuela de Arquitectura de Madrid.....	601
<i>Carlota Bustos Juez</i>	
El componente lúdico de la maqueta de arquitectura. Notas para una explicación de su pervivencia en el tiempo.....	609
<i>Eduardo Carazo Lefort</i>	
Innovación y rutinas: qué fue del arquitecto autor y su formación gráfica.....	617
<i>Juan M. Otxotorena</i>	
Percezione, disegno, conoscenza .....	623
<i>Lia Maria Papa; Giuseppe Antuono; Francesco Pepe</i>	
Paul Klee. Principios sobre la naturaleza del color. Teoría y práctica.....	633
<i>José de Coca Leicher</i>	

## Tomo II

### DIBUJO Y ARQUITECTURA

#### (INVESTIGACIÓN SOBRE TEMAS DE DIBUJO RELACIONADOS CON LA PRÁCTICA ARQUITECTÓNICA ACTUAL)

- Evolución de la cartografía y la georreferenciación ..... 643  
*Francisco Maza Vázquez*
- Realidad Virtual como herramienta para la valoración emocional de entornos arquitectónicos... 651  
*Juan López-Tarruella Maldonado; Juan Luis Higuera Trujillo; Susana Iñarra Abad;  
M.ª Carmen Llinares Millán; Jaime Guixeres Provinciales; Mariano Alcañiz Raya*
- Plataforma gráfica integrada para el control de los procesos de restauración de áreas frágiles  
suburbanas. El vertedero de la Vall d'en Joan ..... 659  
*Li Yuan Quan; Lluís Bravo Farré; Montserrat Bigas Vidal; Joan Mercadé Brulles; Gloria Font Baste*
- Herman Hertzberger: del Concurso para el Ayuntamiento de Amsterdam al Edificio de Oficinas  
"Centraal Beheer" ..... 667  
*Julio Grijalba Bengoetxea; Rebeca Merino del Río*
- Il metalinguaggio grafico dell'ultimo viaggiatore: lo studio di Carl Ludwig Franck sulle Ville  
Tuscolane ..... 675  
*Claudio Baldoni; Rodolfo Maria Strollo*
- El plano y la partitura: el dibujo analítico de los elementos de la arquitectura y de la música ... 683  
*Antonio Armesto; Josep Llorca*
- Pesquisa de um Brasil: impressões de viagem em Lucio Costa ..... 691  
*Gabriela Farsoni Villa; Joubert José Lancha*
- El estudio del patrimonio arquitectónico a partir de la metodología HBIM. Un caso medieval .... 697  
*Jorge Luis García Valdecabres; María Concepción López González; Isabel Jordán Palomar*
- Procesos de análisis ambiental y diseño algorítmico. Una experiencia docente ..... 705  
*Camilo Andrés Cifuentes Quin*
- Diagramas de Partido Arquitetônico nos Concursos Nacionais Estudantis de Arquitetura ..... 715  
*Tácia Daniele Scharff*
- Steven Holl: del espacio articulado al espacio cromático..... 723  
*M. Teresa Díez Blanco*
- Re-drawing architecture for exploring the design. From research to teaching and vice versa.... 731  
*Roberta Spallone*

Atlas y discurso gráfico. 50 Años de estrategias. Mapa interactivo.....	739
<i>Alberto Grijalba Bengoetxea; Carolina Heisig Carretero</i>	
Generative education: thinking by modeling/modeling by thinking .....	747
<i>Fabio Bianconi; Marco Filippucci</i>	
La experiencia interactiva en entornos virtuales como herramienta de proyecto.....	755
<i>Mónica Val Fiel; José Luis Higón Calvet</i>	
Pensamiento gráfico y procesos digitales. Tres casos de materialidad digital construida (COCOON/Colombia, BANCAPAR/Chile, SSFS/Argentina).....	763
<i>Mauro Chiarella; Andrés Martín-Pastor; Nicolás Saez</i>	
Revisión del Soporte Gráfico Tecnológico desde las Revistas EGA .....	771
<i>Elsa M.ª Gutiérrez Labory; Enrique Solana Suárez</i>	
Dibujar el Columbia. Paradigma Gráfico para la Arquitectura en el Siglo XXI.....	777
<i>Enrique Solana Suárez; Elsa Gutiérrez Labory</i>	
Rappresentazione e coscienza critica per la formazione della figura di progettista .....	785
<i>Maria Linda Falcidieno</i>	
El 3D <i>printing</i> como herramienta tecnológica orientada a la arquitectura .....	793
<i>Pedro Molina-Siles; Francisco Javier Cortina Maruenda; Hugo Barros Costa; Salvador Gilabert Sanz</i>	
Dalla progettazione integrale al BIM.....	799
<i>Giovanna A. Massari</i>	
Tres etapas históricas en la confección gráfica de la documentación de un proyecto. BIM: encuentros en la tercera fase del siglo XXI.....	809
<i>Iñigo León Cascante; Fernando Mora; Juan Pedro Otaduy; Maialen Sagarna</i>	
Dibujar sin dibujar .....	817
<i>María Josefa Agudo-Martínez</i>	
Barcelona and Antalya. Cartographic Analysis of two Mediterranean cities .....	823
<i>Antonio Millán-Gómez; Zeynep Birgonul</i>	
Trazar la forma-lugar. Tres casos que desvelan la arquitectura como entretejido entre sociabilidad y territorio.....	831
<i>Susana Velasco Sánchez</i>	
Lo spazio tra poesia e progetto .....	839
<i>Rosario Marrocco</i>	
Light control in Mediterranean architecture. Interdisciplinary design experiences between didactics and investigation.....	845
<i>Pierpaolo D'Agostino; Mariateresa Giammetti</i>	

739	<b>HISTORIA Y PATRIMONIO (INVESTIGACIÓN SOBRE HISTORIA DEL DIBUJO Y/O SOBRE EL DIBUJO APLICADO AL PATRIMONIO ARQUITECTÓNICO)</b>	
747	La Traza de un cimborrio gótico. Geometría y construcción del octógono en la traza gótica de Guarç (c. 1345-1380) .....	855
755	<i>Josep Lluís i Ginovart; Agustí Costa Jover; Sergio Coll Pla; Albert Samper Sosa</i>	
	Algunas precisiones sobre el dibujo de arquitectura en los años de entreguerras .....	863
	<i>Carlos Montes Serrano; Isaac Mendoza Rodríguez</i>	
763	La documentación gráfica como fuente de investigación del patrimonio arquitectónico.....	869
	<i>Antonio Miguel Trallero Sanz</i>	
771	Il disegno di progetto: tra tradizionalismo e rinnovamento. Gli elaborati del gruppo Aschieri relativi al Concorso per il Quartiere dell'Artigianato in Roma del 1926 .....	877
777	<i>Fabio Lanfranchi</i>	
	Representación gráfica participativa con bases de datos de acceso limitado.....	885
785	<i>Juan Saumell Lladó</i>	
	<i>Baukunst</i> . Apuntes de Goethe para un tratado de arquitectura .....	893
793	<i>Juan Caldusch Cervera; Alberto Rubio Garrido</i>	
799	Horacio Baliero: La modernidad desde el margen. Colegio Mayor Argentino Nuestra Señora de Luján en Madrid - 1964 .....	901
	<i>María Soledad Bustamante</i>	
809	Barbara Sokołowska Brukalski. Analisi grafica della Casa a Niegolewskiego Street.....	909
	<i>Starlight Vattano</i>	
817	Análisis gráfico de los pilares tardogóticos de Hernán Ruiz "el Viejo" .....	919
	<i>Pilar Gimena Córdoba</i>	
823	Una medaglia tra due città .....	927
	<i>Claudio Baldoni; Rodolfo Maria Strollo</i>	
	El dibujo en la investigación arquitectónica: Dibujando en Paestum.....	935
	<i>Juan Manuel Báez Mezquita</i>	
831	Análisis del plano en el estudio de la ciudad histórica. Trasvases metodológicos entre arquitectura y arqueología .....	943
839	<i>Mercedes Díaz Garrido</i>	
845	Tradurre: dal disegno d'archivio alla rappresentazione 3D. Il caso studio della casa natale di Gabriele d'Annunzio a Pescara.....	953
	<i>Pasquale Tunzi</i>	
	"Recreaciones virtuales de la Granada desaparecida". Investigar, representar y divulgar la arquitectura del pasado con herramientas del siglo XXI .....	959
	<i>Concepción Rodríguez Moreno</i>	

Sviluppo, valorizzazione e riuso del patrimonio architettonico e urbano: una ex caserma per l'Università .....	96
<i>Antonella Salucci</i>	
Fotogrammetria digitale aerea e laser scanning terrestre per ipotesi ricostruttive di fronti perduti dell'edilizia monumentale: il caso di Villa Mondragone.....	97
<i>Saverio D'Auria; Giuseppe Sini; Rodolfo Maria Strollo</i>	
Las primeras vistas de Málaga en el XVI: fuentes gráficas para la investigación.....	98
<i>Antonio Gámiz Gordo; Luis Ruiz Padrón</i>	
Análisis gráfico del entorno paisajístico del Sanatorio de San Francisco de Borja de Fontilles ...	99
<i>José Luis Higón Calvet; Jorge Llopis Verdú; Javier Pérez Igualada; Pedro Cabezas Bernal; Jorge Martínez Piqueras; Ignacio Cabodevilla-Artieda</i>	
Photo-collage e retorica di regime. Piero Bottoni e il progetto per la piazza delle Forze armate all'EUR di Roma.....	100
<i>Fabio Colonnese</i>	
Estudio gráfico sobre el empleo de algunas superficies de traslación en las propuestas de Andrés y de Alonso de Vandelvira. Evaluación formal y ejecutiva de la bóveda de Murcia y del ochavo de La Guardia.....	101
<i>Antonio Estepa Rubio; Jesús Estepa Rubio</i>	
Una mirada forense sobre las ruinas de la Iglesia de Santa María de Cazorla. Propuesta de reconstrucción virtual.....	102
<i>Jesús Estepa Rubio; Antonio Estepa Rubio</i>	
Manuel Gomes da Costa, un universo en bocetos .....	103
<i>Miriam Lousame Gutiérrez</i>	
Reconstrucción gráfica de los edificios históricos del Sanatorio de San Francisco de Borja de Fontilles.....	104
<i>Jorge Llopis Verdú; Francisco Hidalgo Delgado; Jorge Martínez Piqueras; Rafael Marín Tolosa; Eduard Baviera Llopez</i>	
Un progetto non realizzato: il Gran Cimitero di Giuseppe Damiani Almeyda. Dai disegni di archivio alla ricostruzione tridimensionale.....	105
<i>Avella Fabrizio</i>	
El Dibujo: método y conclusión en la Investigación en Arquitectura .....	106
<i>Ángel Martínez Díaz; María José Muñoz de Pablo</i>	
Trazas de cortes de piedra en un tramo de la Capilla Real del antiguo convento de Santo Domingo de Valencia. Dibujo y construcción.....	106
<i>Pablo Navarro Camallonga</i>	
El anfiteatro romano de Tarragona: cinco siglos dibujando y aún insatisfechos .....	107
<i>Josep Maria Toldrà; Josep Maria Macias; Josep Maria Puche; Pau Sola-Morales</i>	

969	La recuperación del color de la Rua Junqueira de Lisboa ..... 1089 <i>Ángela García Codoñer; Isabel Braz de Oliveira; Ana Torres Barchino; Juan Serra Lluch; Jorge Llopis Verdú</i>
979	Representación de la construcción de la modernidad valenciana. Series fotográficas de los Estudios Sanchís y Desfilis..... 1095 <i>F. Javier Cortina Maruenda; Pedro Molina-Siles; Hugo Barros Costa; Salvador Gilabert Sanz</i>
989	Intervenciones arquitectónicas de Rafael Manzano en el Real Alcázar de Sevilla. 1966-1988 .... 1101 <i>Julia Manzano Pérez de Guzmán; Pedro Barrero Ortega; Rafael Manzano Martos</i>
997	Decisión, croquis, laser y dron. Sistema de documentación de torres campanario en la provincia de Burgos..... 1111 <i>José Ignacio Sánchez Ribera; Juan José Fernández Martín; Jesús San José Alonso</i>
007	Ética y estética: el rol de las primeras ilustraciones en el Libro de las Antigüedades de Serlio.... 1119 <i>Gonzalo Muñoz Vera</i>
015	La arquitectura y el lugar: experiencias docentes e investigadoras en la E.T.S.A. de la Universidad de Granada ..... 1127 <i>Antonio García Bueno; Karina Medina Granados</i>
023	Drones para el levantamiento arquitectónico. Aplicación para la documentación de las torres del litoral valenciano..... 1137 <i>Pablo Rodríguez-Navarro; Teresa Gil Piqueras; Giorgio Verdiani</i>
033	Nuevas técnicas de levantamiento en la documentación gráfica del patrimonio: los restos de las murallas de Santo Domingo de la Calzada ..... 1145 <i>Licinia Aliberti; Pedro Iglesias Picazo</i>
043	Las fuentes gráficas para el estudio y restauración de la Casa Consistorial de Sevilla ..... 1153 <i>Antonio J. Albardonedo Freire; María Dolores Robador González</i>
053	La expresión gráfica de la planificación urbana en el siglo XX ..... 1161 <i>Laura Rives Navarro</i>
061	Dibujos para las Relaciones Geográficas del Nuevo Mundo. Análisis de la información registrada..... 1169 <i>Adela Acitores Suz</i>
069	La reforma de la enseñanza del dibujo en l'École d'Art de La Chaux-de-Fonds 1903-1914..... 1179 <i>Inmaculada Jiménez Caballero; María Alvarez Barredo</i>
079	Revisitando <i>Civitates Orbis Terrarum</i> . El espectáculo del espacio urbano..... 1187 <i>Felipe Lazo-Mella</i>
	Dibujos de la Guastavino Company: innovación y promoción ..... 1197 <i>Manuel de Miguel Sánchez; María Paz Llorente Zurdo; Vanessa Antigüedad García</i>

Dibujos de arquitectura popular: una reivindicación para la modernización de la arquitectura española.....	1205
<i>Pedro Miguel Jiménez Vicario; Manuel Alejandro Ródenas López; Amanda Cirera Tortosa</i>	
La figura del arquitecto docente en la segunda mitad del siglo XVIII en Valencia.....	1213
<i>Consuelo Vidal García; Marina Sender Contell; Marta Pérez de los Cobos Cassinello; Pablo Navarro Esteve</i>	
Decoro e traccia grafica nelle ceramiche dalla tradizione alla Contemporaneità .....	1223
<i>Anna Marotta</i>	
La Villa Farnesina a Roma. Contributi alla sua storia .....	1231
<i>Cesare Cundari; Giovanni Maria Bagordo; Gian Carlo Cundari; Maria Rosaria Cundari</i>	
La tridimensionalità dell'Architettura e la sua Rappresentazione: un ponte sospeso tra le interpretazioni dei trattatisti italiani del XVI secolo e le metodologie di elaborazione della contemporaneità .....	1241
<i>Giuseppa Novello; Massimiliano Lo Turco</i>	
Métodos geométricos para el trazado de los perfiles de los nervios de bóvedas de crucería. La Capilla de la Lonja de Valencia .....	1251
<i>Esther Capilla Tamborero</i>	

## Re-drawing architecture for exploring the design. From research to teaching and vice versa

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**Abstract:** Re-draw architectures as heuristic practice aims to explore the motives, the conception, and the formal and technologic choices, understand the relationship with the original and current context, the transformations, from concept to realization and during the life.

In the research the practice of re-drawing, is involving the author along with a group of Master's candidates, with the contribution of historical disciplines, on case studies relating to Twentieth century demolished, altered or 'on paper' architectures.

In the teaching, a version of this activity, adapted to the students' training in the Laboratory of Drawing and Survey, has been proposed, also with input from some lectures by architectural design professors.

**Keywords:** Drawing and Design. Research. Teaching.

### Introduction

"... for designing a building you need a wealth of ideas, conceptual structural and formal, which has to be acquired by other architects, ancient and modern (...) And there is no chance to get a 'language system', in architecture, if you do not analyze drawings and photographs of the chosen subject, draw everything, proper trace (...) After all it is a reversed path, than the design" (Quaroni [1987] 1995, 17).

Re-drawing architecture is an activity of cognitive, interpretative and creative meaning that have involved, since the last century, scholars, teachers and students of Architecture in Italy.

The manual activity to which Quaroni above refers, offers some advantages, especially from a pedagogical

point of view, allowing students to face the scale drawing, assess the level of detail of the different drawings and replay by choosing lines, thickness and graphics, between the standards ones, but also to offer personal interpretations gleaned from different tools and techniques of representation.

Conversely the digital tools offer the possibility of a more rapid three-dimensional recomposition with respect to the traditional re-drawing, especially when modelling regards the interior and exterior, even allowing, depending on software chosen for the work, to derive the technical design drawings from the sections of the model.

In addition, the digital modelling enables to enter the fourth dimension, allowing original and new explorations of the created models and also to create physical models and prototypes of the object in question. The time dimension may also be useful for simulating different phases of construction and transformative as well as to decompose and recompose the analyzed artefacts.

The digital world offers then, even in this ambit, new and additional possibilities for analysis and interpretation, with the ability to generate synthesis models that collect the information gained and represent them in the form of two-dimensional technical drawings, 3D models, digital animations and prototypes digitally manufactured.

Depending on the different stages of the design under consideration that, in the research described below may range from those that remained on paper, those realized, altered or even demolished, vary the basic materials available to scholars: archival drawings and writings, plastic models, vintage photographs, contemporary reviews, historical surveys, with regard to the

initial life of the project, as well as urban / territorial maps and current surveys regarding today conditions of the building and the context in which it stands.

Also the re-drawing intents may be different, oriented also on the available sources: reconstruction can relate to the design drawn, or its different versions, or that built with the different transformations, but also the choice of the time when imagine the reconstruction, can vary depending on the different possible interpretations.

The possibilities above outlined have been personally explored in the research and the teaching and are applied in the case studies below developed.

*Re-draw to discover: the research*

In the research the practice of re-drawing is involving the author along with a group of degree candidates, and the contribution of Contemporary Architectural History scholars, on case studies relating to twentieth century architectures, demolished, altered or remaining on paper or on individual analyses of the work of some contemporary masters (Spallone 2015a, Spallone 2015b).

Kahn's unbuilt masterworks are the subject of a research involving the author with some bachelor candidates.

Among these, the U.S. Consulate in Luanda (1959-'62) and the full configuration of Salk Institute in San Diego, California (1959-'65), were modelled respectively by Marco Andrea Tancredi and Alessio Alberti.

The design of U.S. Consulate proposes the incorporation of unglazed, independent forms borrowed from the ruins of the ancient world, which Kahn saw during his stay in Rome, into a very modernist architecture.

In the building Kahn addresses the problems of climate by developing two design themes: the ruins wrapped around buildings and the separated roofs for the sun and the rain.

Tancredi chose to display the model, mainly in parallel projections, with the aim to highlight the correspondence between the two buildings, the internal distribution, the structural system and the performance of the vertical diaphragms (the ruins) and horizontal (double

roof) with respect to the climatic conditions. The roof plan of the whole shows correspondence in size, alignment and roof perforations to the sun and the rain; cut-aways and exploded isometrics show functional partitions and load-bearing supports; the setting of shadows shows the solar behaviour. The application of photorealistic materials and lighting to perspective scenes in which there are also daily life elements offers possible foreseeing of artefacts and spaces designed by Kahn.

The Salk Institute for Biological Studies along the Pacific, in the vision of the founder Jonas Salk, would have to be a place where artists and humanist could inform and inspire those working on the frontiers of science. The architectural complex designed by Kahn included the laboratories, the meeting house and the houses for the fellows, but only the first one was built.

The theme of ruins as devices to control glare appears also here as three-dimensional, complete forms that define and enclose space. Indeed, fully exterior and independent cylindrical ruins wrap around cubic inhabitable space, and cubic ruins wrap around cylindrical inhabited space.

Alberti in his thesis aimed to represent Kahn's project in its context as if it had been entirely built.

The relationship with an environment strongly characterized from the dry rocky slope overlooking the sea, the spatial articulation of the three architectural units and the careful choice of materials, are Kahn's design themes, which inform the choices of representing the model of the complex inserted in the environment as if it was a plastic model. The terrain has been shaped by extrusion of the contour lines giving the environment a degree of abstraction comparable to that of the artefacts. Even the colour attributed to all the natural elements through the application of a material that evokes the cork allows distinguishing them from the buildings clay rendered.

The final product of the representation is a 7 minutes video, which allows to dynamically exploring the three units thanks to fly and walk through. Only a few still images in photo-realistic rendering with fast fading effect can evoke a perceptual effect generated by materials and real lights.

Another study carried out by the author and Bruno jr., concerns the utilization of digital techniques of representation to adopt new strategies for the preservation

of the architectural heritage and its memory (Spallone, Bruno jr. 2013). The experience, conducted with some bachelor candidates, regards the application of computer technology for the virtual reconstruction of some minor architectures realized in Turin during the Thirties on charge of the Fascist Party, today deliberately lost due to their symbolic means. The reconstructive operations start with a precise analysis of the graphic documentation stored in archives, a research of the original pictures and a survey on the building materials utilized at that time. After this first step of data collection, the digital reconstructive process begins, regarding the building itself and the surrounding context. The interaction among different scientific disciplines, such as history of architecture, representation and also material technology will guarantee the experiment a higher scientific level.

One of the case studies analyzed, the Casa del Marinaretto, built in the Thirties and demolished without any consideration in the early sixties shows such original and interesting design solutions, that the preservation of its authentic memory and its valorisation seem justified.

The Casa del Marinaretto was designed by Costantino Costantini close to the river Po, looking like a big 'urban anchored ship' of huge impact. In the sixties has been demolished to permit the building of some not valued architectures, cancelling the memory of a high quality architectural product with international inspiration. The work moves after the rigorous analysis of the original drawings preserved in the Turin archive and proposes the reconstruction of this building according to its original version as it was drawn by the architect for the first time, and so in a different manner respect to the built result. This process guarantees also the 3D perception, the authenticity of the materials and of the location into the urban context, using digital static and dynamic rendering systems. The 3D model of Costantini's project, inserted into the urban and natural context of our days, to simulate the perceptive effects that the building could express today if it was still standing, was made by Francesco Carota.

The model, realized using 3D computer graphics and animations programs, is the basis for the production of a video-clip that explores the relationship between the actual image of Turin and the Casa del Marinaretto and describes, with the synthetic language of the movie technique, the original shapes and the emotional reactions, the same as it was real.

Another line of research concerns several buildings of Carlo Mollino, whose archive of drawings is preserved in the library of Architecture at the Politecnico di Torino, and characterizes a series of theses, conducted in collaboration with Sergio Pace. The subjects, until now studied are the Turin Horse-Racing Society Building, demolished in 1960, two 'ideal houses' respectively published on the magazines *Domus* (1942), and *Stile* (1944), and the competition design for the Palazzo del Lavoro in Turin (1960), unrealized because not winning.

The Horse-Racing, an early and acclaimed work by Mollino was short-lived (from 1937 to 1960). Its demolition was connected with the wider process of urban transformation, which involved the area along the west bank of the river Po, triggered by the celebration of the Unification centenary of Italy.

The digital reconstruction of the building has been realized by Florida Canaj during her master thesis.

She also analyzed the relationships between the building and the context, less dense than the current, but strongly characterized by different buildings, reconstructed by means of archival city maps and design drawings.

The Horse-Racing has been reconstructed in detail, once identified those archive drawings that allowed the most faithful reproduction of reality, after filling in the missing information and resolving ambiguities and inconsistencies of the documents. In this sense, the re-drawing of the project takes on the meaning of a true re-design that requires a deep understanding of the artefact and poetics of the architect.

The modelling phase has been carried out by the technique of 'blueprint', arranging plans and elevations on orthogonal planes so as to foster the most appropriate control of the process.

The model has been lightened with sunlight while, about the materials, the opaque surfaces are rendered using clay and those transparent with glass. In this way the model maintains the proper level of abstraction and avoids generating the sense of fake that characterizes the photorealistic reconstructions. The choice to represent the perspective views of the model in black and white goes to the same aim, allowing also a comparison with the vintage photographs taken under the guidance of the same Mollino.

Further processing, which aims to compare the digital model renderings with the original photomontages, and to search the same view points and solar illumination conditions, has been lead to try a new photomontage of the model in the portrayed old context.

The Casa sulla collina (1943) and Casa sull'altura (1944) are two ideal houses by Carlo Mollino, digitally reconstructed by the master candidate Antonio Laudani.

The issue of 'ideal houses' animated the Italian architectural debate, during the period of forced inactivity due to the II World War, so that several architectural magazines became promoters of the initiative to request and publish projects of the contemporary top architects on this subject.

In both case studies, the publication of drawings was accompanied by Mollino's writings to the editors, which described the concept, his reasons and widens the speech stating his position with respect to contemporary architectural debate.

Carlo Mollino was an architect who combined the research of architectural quality to a strong knowledge and experience of building (Pace 2006, 120), because he had worked, from the beginning and for about twenty years, with his father Eugenio, an engineer, particularly productive especially in Turin area.

The relationship between the drawing and the constructive reality emerges also in Mollino's designs programmatically intended to remain on paper, of which also the technological details in large scale are graphically defined, the interior furnishings are designed as an integral part of the architecture and, even, the static schemes of some structural elements are traced.

The particularity of Mollino's *modus operandi*, which was expressed, for each project, through hundreds of drawings, led me to propose the student to use a parametric three-dimensional modeller like BIM, aimed to the three-dimensional reconstruction, in order to assess the three-dimensional consistency of the two-dimensional archival drawings, checking possible variants and obtaining sections from the 3D model, provided with the graphic standards of architectural technical drawing and settable at different scales, selected also in order to compare them to the sources.

The reconstruction was completed by a video and a plastic model digitally fabricated: a demountable material model, made with a small 3D printer which extrudes fibres of polylactic acid.

Through these operations, for the first time, the design is freed from the two-dimensional support, through the transformation in three-dimensional digital model (though always accessible through the two-dimensional space of the screen), achieves the fourth dimension by the production of the video that allows to visit, offering new views, and finally truth imbued in a three-dimensional material object.

In addition, through some Mollino's drawings, which place the Casa in collina in relationship to the centre of Turin, it was possible to hypothesize its location, imagined by the architect on Monte dei Cappuccini, near the XVII century church. The photo-montage of 3D model in the current environment highlights a shocking antagonistic relationship between the house and the church for the conquest of the hill-top.

An additional and different direction took the research that led Giulia Bertola, a bachelor candidate with undeniable artistic sensibility, who, starting from the personal interpretative drawings, realized with different techniques, of architects and designers such as Ettore Sottsass, Gaetano Pesce, Massimo Scolari, Alessandro Mendini, chose to dwell her analysis not on the 'visible' elements, but on the 'hidden' elements, linked to the thought of each designer by analyzing what conducts the architect to make use of different techniques to express his own 'idea'.

The occasion on which her hypothesis were tested was offered by an architectural competition, the IBA 84 for Berlin, meeting place of three masters as Aldo Rossi, Peter Eisenman and Rem Koolhaas, with their different poetics and design approaches. For exploring their proposals, Bertola has dept studied writings and drawings of the three, constantly accompanying her discoveries with drawings, collages and notes on her cahier and arriving to a synthetic graphic work which interprets the competition proposals for IBA.

#### *Re-draw to learn: the teaching*

In teaching, a version of the re-drawing is proposed, adapted to the students' training in the Laboratory of

Drawing and Survey in the first year of Architecture at Politecnico di Torino.

The work is conducted on realized works of contemporary masters, starting from the published projects and leads to an exploration of the architects' poetics, through the reading of his writings, the consultation of critic texts on their work, the navigation in their website and then deepen the knowledge of an assigned design through analysis of the context in which it is placed, conducted with the traditional cartography and web map services, and the comparison between the iconographic material found to better understand the distributive, the technological and the materials choices.

The analyses lead to the production of two plates containing 2D and 3D drawings which synthesize the knowledge phase and a short animation and flow into the first practice of the Atelier of Composition and Urban planning, with the production of a plastic model of the building.

Afterwards the scientific assumptions and the educational consequences of these activities are documented.

The exercise of re-drawing is offered to students whose previous training in the secondary schools not necessarily involves the learning of architectural drawing and tools of computer graphics representation into their curricula. The teaching of architectural drawing standards, starting from the representation methods, and in particular of the orthographic projections in their technical form applied to architecture, and the specific graphic symbols are therefore preparatory to such activities. The setting of proper and efficient systems of CAD drawing and modelling, including render, animation and post-production procedures, becomes also necessary, through the application of specific software.

Re-drawing a project using as sources the materials published in magazines and books makes to face with representations, mostly redrawn for the editorial homogeneity needs, generally incomplete and responsive to the graphic standards other than those used in professional practice, while images abound. In contemporary publications, the general trend, in fact, is to reduce the number of drawings and their scale, often not indicated, and to apply a graphic minimalism over the use of conventional symbols, which often makes rather laborious the drawings comprehension, the interpretation of the missing parts and the three-dimensional

reconstruction of the building. In return renderings and photographs, sometimes indistinguishable one from each other, increase, while the autograph drawings, illustrative of the concept, are often absent.

Even the contextualization of the object through site plan, that explains the environmental integration and formal choices, only sometimes is published and must be sought through other instruments, such as web map services.

After the assignation of a specific project, the students are invited to construct their own path of discovery of the artefact that involves the reading the architect's writings, literary criticism and journalism, his personal website. They are also encouraged to conduct virtual explorations through visualizations in aerial and street view mode and collect photographs and videos available on the web.

The buildings chosen by the teacher have in common to be single-family houses built in the Western world from the modern movement to date, and they are published as objects worthy of note, with the recognition of contemporary criticism.

During setting of work the teachers of Architectural Design, that follow the same students in the next Design Studio, are invited to offer their personal analyses about some of the relevant projects, according to their specific disciplinary perspective.

The proposed work is conducted in small groups of two or three persons with the purpose of teaching students a conscious division of work and sharing responsibility: each student must be able to respond to the teacher's observations about the group work.

The drawings are composed in two plates of A1 format with a layout provided by the teacher.

The re-drawing consists of a real transcription, with a high content of abstraction: the process starts from the recognition of each sign, as part of the built that has a three-dimensional and material consistency, and arrives to another type of sign, which responds to the codified language of the architectural drawing. Each line in the iconographic sources must therefore be read, recognized, interpreted and then traced.

The representation of the materials in the two-dimensional drawing of elevations involves the individual

research of those iconic graphics that evoke particular textures realized, making unusable the hatches offered by the software.

The integration between the different sources –drawings of plants, elevations, sections, axonometry and perspectives, with photographs, renderings, videos– facilitates the understanding not only the shapes and materials, but also the paths and ways of use of the spaces. It is a time of great educational value, generally for the first time; the student has to recompose and synthesize information of different nature, facing to the representation of his cognitive path regarding architecture and its environment.

Interesting considerations may arise from the comparison between the original context, documented by vintage photographs, and the current one, that students are asked to represent. The older architectures, in fact, seem sometimes to have drawn some of the reasons for their conformation to environmental conditions no longer present as a result of the urban and infrastructural development. Even the projects themselves may have been subject to changes, or when running or after. All these variants must be carefully recorded by students, and compared with the present situation.

Once made the two-dimensional representation, through a site plan in scale 1:500, plans, elevations and sections, in scale 1: 100, i.e. the scale of the final project drawing, the three-dimensional geometric modelling, including interiors, always using CAD tools, is proposed. As known, there are no coded standards about the relationship between scale and content of the 3D model that tends to simplify the object using geometric primitives, because the complexity of the work. Furthermore, the possibility of generating animations, with move to and away from the object, makes the choice particularly delicate. In the actual practice, modelling the building including openings, balconies, roofs, interior walls, stairs and any other distinguishing features, is required. The terrain is created by solid modelling starting from the contour lines; the surrounding buildings are reduced to geometric primitives while the trees require special attention. In order to make lighter the files, the real trees are contoured and slightly extruded and then copied and rotated 90° so as to allow a three-dimensional display. Isometric views, bird and human's eye perspective of this model, displayed in hidden line as the traditional technical drawings, are set. Generic materials are then

applied: clay for all the opaque surfaces and glass for the transparent ones, setting the different lighting conditions, from solar light through which solar studies on the site plan during the solstices, to the artificial ones generating night views.

The choice to represent only the opacity and transparency, avoiding the application of materials and patterns offered by the software, responds to the teacher's will to make appreciating the geometric and spatial qualities, and lighting effects of the modelled buildings, keeping them deliberately in a conceptual sphere flatly distinguishable from real buildings.

The model is also presented in exploded and cutaways views that accentuate the conceptual meaning. Particular attention is paid to the comparison between the photographs of the building and rendering made through research of the same shots.

A short animation, constituted by a path around and inside the building, finally allows simulating a virtual tour of the building, verifying the perceptive effects.

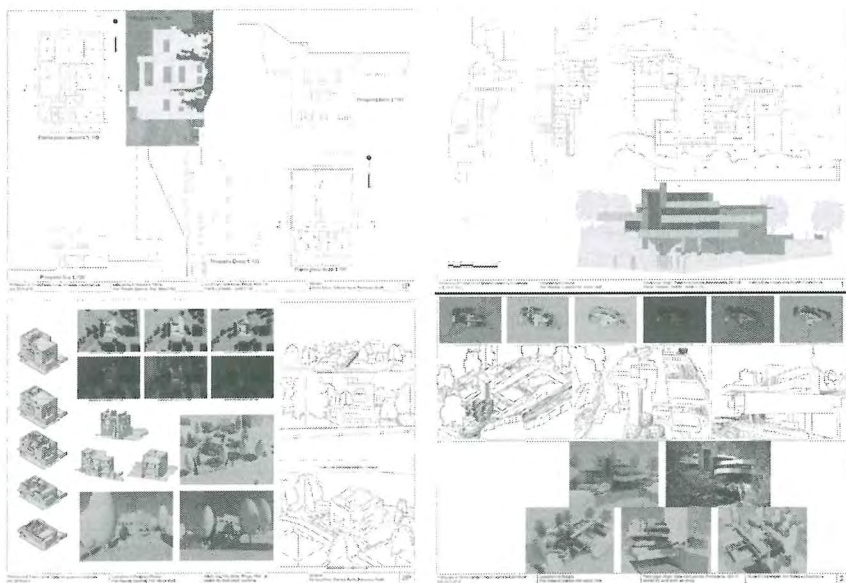
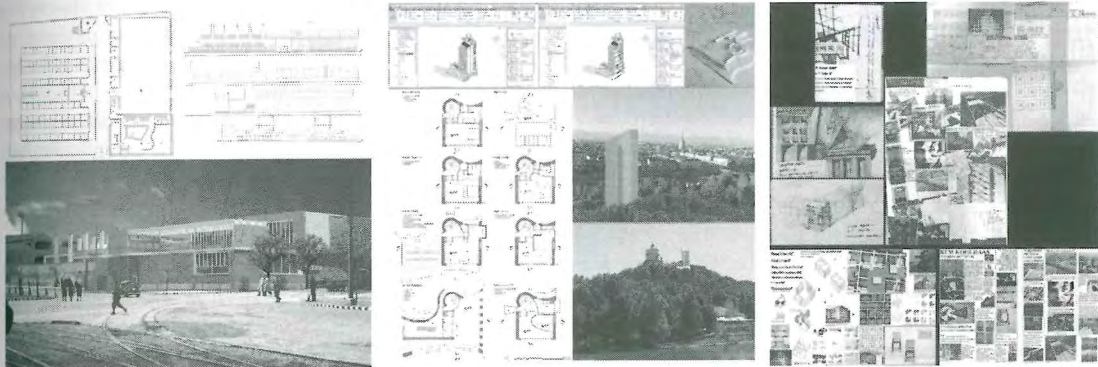
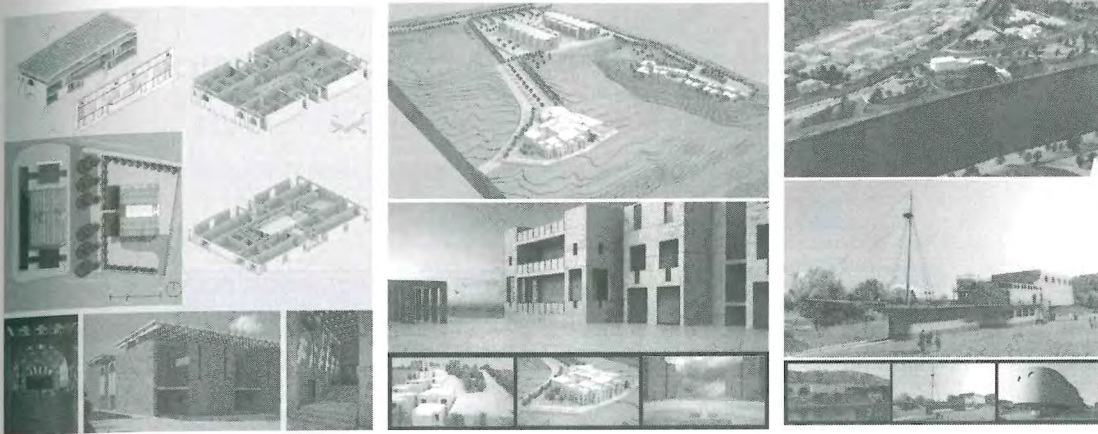
The plastic model, which constitutes the first practice of the Design Studio, ideally ends the cognitive experience with a material object, generally realized in sheets of poly-plat, an easily workable material that allows the construction of a non-mimetic, openable and decomposable plastic.

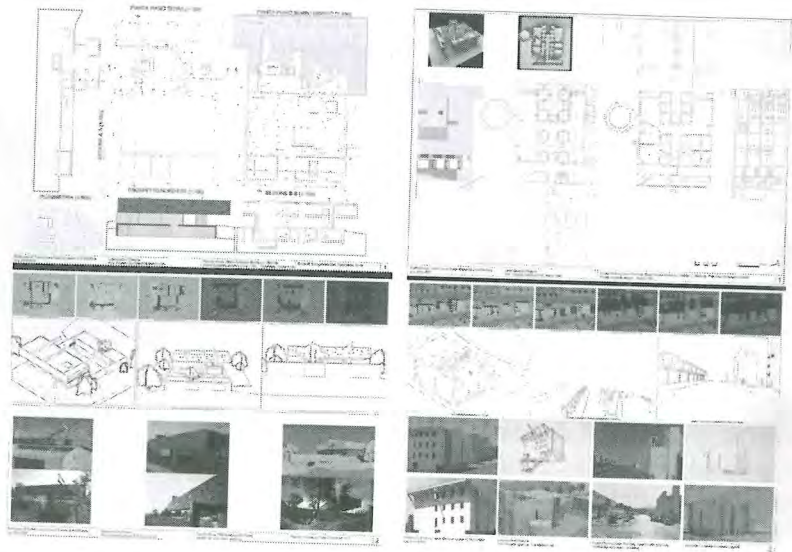
### *Conclusions*

In the considerations and case studies above developed two different approaches emerge about the re-drawing of the design intended as a heuristic practice.

In the teaching, in fact, the knowledge moment is privileged and the use of representation tools, strongly conformed, is aimed to the acquisition of the architectural drawing conventional language and to its use for expressing the cognitive process accomplished, in the research the interpretive moment prevails, in particular based on deep analysis of the masters' poetics taken into account, and on the putting in relation the texts and drawings. The choice of the adapt tools to express these interpretations then becomes part of the interpretation itself; it cannot be unique and draws from the sensibilities of the one who has to re-draw, that performs an operation of real re-design with his work.

El arquitecto, de la tradición al siglo XXI





### References

- PACE, Sergio. 2006. *Carlo Mollino architetto, 1905-1973*. Electa. Milano.
- QUARONI, Ludovico. 1995. *Progettare un edificio. Otto lezioni di architettura*. Gangemi. Roma.
- SPALLONE, Roberta, BRUNO jr., Andrea. 2013. "Heritage and memory. Digital reconstructions of minor architectures of the Thirties in Turin area". *Atti del 35° Convegno Internazionale dei Docenti della Rappresentazione*, 909-916.
- SPALLONE, Roberta. 2015a. "Digital Reconstruction of Demolished Architectural Masterpieces, 3D Modeling, and Animation: The Case Study of Turin Horse Racing by Mollino". In BRUSAPORCI, Stefano (editor). *Handbook of Research on Emerging Digital Tools for Architectural Surveying, Modeling, and Representation*, 476-509. IGI Global, Hershey.
- SPALLONE, Roberta. 2015b. "Reconstruction, modeling, animation and digital fabrication of 'architectures on paper'. Two ideal houses by Carlo Mollino". *Scires-It*, 5 (1): 101-114.
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