

# Engineering Reviews ER-001 to ER-200

## *Corpus scope, evidence architecture and reading guide*

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3Dresyns by Resyner Technologies S.L.

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### Author's Note

The Engineering Reviews corpus is the product not only of the ten years of work developed through 3Dresyns, but of a much longer scientific and professional journey. Its roots reach back to the early 1990s, when, during the final year of my degree, I undertook an Erasmus Honours project at Manchester Metropolitan University and began synthesising photoinitiators under the supervision of Professor Norman S. Allen. That first sustained encounter with photochemistry, experimental evidence and the discipline of technical interpretation established questions that have accompanied my work to the present day.

The path since then has extended from chemical synthesis to the formulation of inks and coatings, applications development, technical service, technical sales, consulting and entrepreneurship. It has moved through 2D and 2.5D processes into 3D manufacturing and emerging 4D material systems, with 3Dresyns becoming a deeply personal project in which those experiences converge. My present commitment to high-level science and technology communication grows from the same path. Alongside the Engineering Reviews, broader initiatives such as The Universe and Its Observers express that commitment in a different register; they are distinct projects, but share the aim of making difficult ideas intelligible without diminishing their complexity.

I began this corpus because a large part of useful engineering knowledge remains dispersed across papers, standards, patents, technical notes and accumulated industrial experience. Even when that knowledge is public, it is not always easy to locate, compare or translate into responsible technical decisions. My purpose is to create a coherent route through that complexity: a collection that helps readers understand not only what has been reported, but also how strong the evidence is, where its limits lie and what still requires verification.

For me, democratising technology does not mean simplifying it until its conditions and uncertainties disappear. It means making rigorous technical reasoning more accessible without weakening it. Students, researchers, engineers, manufacturers and curious readers should be able to approach demanding subjects with a clear map of the terminology, mechanisms, evidence and qualification questions involved. Openness has value only when it is accompanied by traceability, proportionate claims and respect for the distinction between established knowledge, engineering interpretation and proposals that remain to be tested.

This is also an ethical and professional commitment. Engineering writing can influence experiments, investments, manufacturing choices and, ultimately, the reliability and safety of products. A review should therefore state honestly what is known, what is inferred, what is uncertain and what evidence would be needed to advance. It should not hide limitations, manufacture certainty or replace validation with persuasive language. The deontological principle running through this corpus is simple: clarity about evidence is part of technical responsibility.

There is a personal motive as well. I have always valued scientific and technical communication as a bridge: between disciplines, between research and industrial practice, and between specialists and people entering a field for the first time. Explaining a difficult subject well is not secondary to doing technical work; it is one way of making that work reusable. The passion behind these reviews comes from connecting ideas, identifying practical consequences and helping others formulate better questions of their own.

ER-001 to ER-200 constitutes the first completed stage of this project. It is not intended to be the final boundary. The corpus may grow to ER-500 and beyond as new areas, evidence and industrial needs justify further reviews. Any such expansion should preserve the same commitments to versioning, traceability, explicit scope and correction when better evidence becomes available. Growth should add structure and understanding, not merely volume.

This corpus is offered as a guide to the literature and to engineering reasoning. It does not replace primary sources, experimental qualification, applicable standards or the judgement of responsible professionals. My hope is that it makes each of those activities more informed, more transparent and more widely approachable. That is the reason for building it, and the standard by which I intend it to continue.

*Juan Segurola*

### Abstract

The Engineering Reviews corpus contains 200 substantive reviews numbered ER-001 to ER-200. This guide defines the identity, scope and reading architecture of that corpus. It is assigned ER-000 so that readers have a stable entry point without changing the numbering or count of the scientific and engineering reviews. ER-000 is therefore a corpus guide rather than a two-hundred-and-first substantive review. It explains how the reviews are grouped, how focused papers relate to the two synthesis reviews, how evidence boundaries should be read, and how the collection differs from the 3Dresyns Technical White Paper Series.

The sequence develops from foundational photopolymerisation and process-qualification topics through polymer families, biopolymer systems, industrial additive-manufacturing routes, factory and part controls, radiation-curing applications, multimaterial addressing, circularity and programmed anisotropy. ER-100 synthesises ER-001 to ER-099, while ER-200 synthesises ER-101 to ER-199. Neither synthesis replaces the individual reviews because the detailed assumptions, mechanisms, limitations and verification requirements remain in their owning papers. This guide provides routes through the corpus based on a reader's problem, material family, process stage or qualification need.

ER-000 is designed as a versioned document. Version 1.0 describes the completed ER-001 to ER-200 corpus. Later versions can extend the same guide to ER-300, ER-400 and ER-500 while preserving the identity of the first 200 reviews and the role of the synthesis papers.

The guide does not add experimental results, disclose proprietary formulations or convert literature-supported interpretations into validated universal rules.

**Keywords:** engineering reviews; corpus architecture; photopolymerization; additive manufacturing; qualification; evidence boundaries; technical literature; versioning; reading guide

## 1. Purpose and scope

ER-000 provides the front door to the Engineering Reviews series. A reader should be able to use it to identify the relevant part of the corpus, understand the relationship between a focused review and a synthesis review, and choose the level of evidence needed for a technical decision. It does not summarise every conclusion or substitute for reading the paper that owns a specific mechanism, application or qualification boundary.

The guide covers the public sequence ER-001 to ER-200. The range contains 200 substantive Engineering Reviews. ER-000 is outside that count and remains a navigational and editorial record. Its existence does not renumber the corpus, alter any existing DOI or create a gap in the ER-001 to ER-200 sequence.

### 1.1 Corpus boundary

The Engineering Reviews address the interpretation and qualification of materials, chemistry, printing processes, post-processing, part performance and evidence. They include literature-based technical analysis, engineering frameworks and explicitly bounded research priorities. A review may integrate several stages of a manufacturing chain, but it should not be read as a material specification, a formulation disclosure, a certification, a regulatory approval or a claim that every discussed mechanism has been experimentally demonstrated by 3Dresyns.

## 2. Identity and numbering

The corpus uses fixed identifiers. ER-001 to ER-200 identify the first 200 substantive reviews. ER-100 closes and synthesises the first ninety-nine reviews. ER-200 closes and synthesises the second qualification corpus formed by ER-101 to ER-199. The synthesis papers are members of the numbered series and are included in the total of 200.

$$C200 = \{ER-n \mid 001 \leq n \leq 200\} \quad \text{and} \quad ER-000 \text{ is not a member of } C200$$

The expression states the counting rule rather than a scientific model. ER-000 remains associated with the collection but is not an additional technical review. Public descriptions should therefore distinguish between 200 Engineering Reviews and one corpus guide. If all associated records are counted, the ER collection contains 201 records; if substantive reviews are counted, the result is 200.

## 3. Evidence architecture

The corpus is organised around ownership of scope. A focused review owns the detailed treatment of its subject. A synthesis review connects multiple subjects and records relationships across papers. ER-000 owns neither mechanism nor application evidence. Its function is to direct readers to the appropriate owner and to state how the collection is structured.

The reviews distinguish reported evidence from engineering interpretation and from proposed verification. This distinction matters because a plausible mechanism may explain an observation without proving that it caused a particular failure. Likewise, a material property reported under one formulation, wavelength, printer, specimen geometry or test protocol cannot automatically be transferred to another system. Readers should retain the conditions attached to each claim and consult the cited primary literature when a decision depends on the original experiment.

### 3.1 Types of use

1. Orientation. Use ER-000 and the website index to identify the relevant review or cluster.
2. Mechanistic interpretation. Read the focused review that owns the chemistry, transport process, interface or failure mechanism.
3. Qualification planning. Use the applicable reviews to define variables, controls, acceptance criteria and reporting requirements.
4. Cross-stage analysis. Use ER-100 or ER-200 to examine dependencies that extend across several focused reviews.
5. Citation. Cite the review that contains the claim or method being used rather than citing ER-000 as a substitute.

## 4. Thematic architecture

Table 1 gives the primary route through the first 200 reviews. The boundaries support navigation; they do not imply that a paper belongs to only one scientific field. Many reviews connect photochemistry, transport, rheology, mechanics, dimensional metrology, biological state, processing history and application-specific qualification.

| Range            | Primary scope                                                   | Reading role                                                       |
|------------------|-----------------------------------------------------------------|--------------------------------------------------------------------|
| ER-001 to ER-049 | Foundational sequence and Route A qualification notes           | Core concepts, measurement limits and early qualification controls |
| ER-050 to ER-099 | Expanded technical corpus and closing sequence                  | Broader materials, processes, applications and evidence gaps       |
| ER-100           | Synthesis of ER-001 to ER-099                                   | First corpus-level evidence architecture                           |
| ER-101 to ER-120 | Polymer families and degradable or reprocessable networks       | Material-family selection and qualification variables              |
| ER-121 to ER-138 | Photocurable biopolymer and biologically derived systems        | Identity, modification, processing and biological-state boundaries |
| ER-139 to ER-162 | Industrial additive-manufacturing routes and material selection | Process-route and feedstock-state architecture                     |
| ER-163 to ER-184 | Part, factory and qualification controls                        | Manufacturing controls, diagnostics and evidence under uncertainty |
| ER-185 to ER-196 | Radiation curing and application-specific qualification         | Thick sections, films, coatings, inks and specialised uses         |
| ER-197 to ER-199 | Photochemical addressing, circularity and programmed anisotropy | Terminal focused reviews and research priorities                   |
| ER-200           | Synthesis of ER-101 to ER-199                                   | Second corpus-level evidence architecture                          |

Table 1. Primary architecture of Engineering Reviews ER-001 to ER-200.

## 5. Reading routes

A linear reading from ER-001 to ER-200 is possible but rarely necessary. The most efficient route starts from the technical decision and then follows the variables that can change that decision. A reader investigating dimensional error, for example, may need optical, kinetic, mechanical, cleaning and measurement papers rather than a single article carrying the application name.

### 5.1 Problem-led route

Start with the observed failure or uncertainty. Identify the stage at which it first becomes measurable, then read the review that owns that stage and the adjacent reviews governing upstream causes and downstream consequences. Competing explanations should remain separate until a controlled test discriminates between them. This route is appropriate for troubleshooting and root-cause analysis.

### 5.2 Material-led route

Start with the material class and identify its reactive groups, network-forming route, physical state, optical state, rheology and intended service environment. Continue to the process and post-processing reviews that can alter those properties. This route is appropriate for selecting a resin family, comparing feedstock states or defining a qualification programme.

### 5.3 Process-led route

Start with the manufacturing route and divide it into material preparation, energy delivery, shape formation, separation or recoating, cleaning, secondary treatment and final verification. Use the corresponding reviews to define state variables and acceptance criteria at each transition. This route is appropriate when transferring a material between machines or moving from laboratory printing to controlled production.

### 5.4 Corpus-led route

Use ER-100 for the relationships across ER-001 to ER-099 and ER-200 for ER-101 to ER-199. Return to the focused reviews for the detailed evidence, references and limitations. The synthesis papers help locate couplings, but their broader architecture does not supersede the narrower evidence boundary of each source review.

## 6. Relationship to the Technical White Paper Series

The Technical White Paper Series and the Engineering Reviews serve different purposes. A white paper supports product-family orientation, material selection and practical use. An Engineering Review examines why a system behaves as it does, what evidence supports that interpretation and where transfer between formulations, machines or applications can fail. Readers can use the two series together, but a product-facing white paper should not be treated as the evidence source for a scientific mechanism when a focused review and its cited literature are available.

## 7. Citation and versioning

Each published review is a separate Zenodo record with its own persistent identifier and version history. The citation should identify the specific paper that supports the statement being used. A version-specific DOI is appropriate when the exact archived file matters. A concept DOI is appropriate when the citation should resolve to the record and its current version. Zenodo preserves earlier versions as separate records linked within the version chain [4,5].

ER-000 should follow the same model once published. Its first public version will describe ER-001 to ER-200. Later expansions should create new versions of the same ER-000 record rather than new introductory identifiers. Existing versions must remain citable so that a reader can recover the guide that corresponded to a particular corpus boundary.

## 8. Extension pathway to ER-500

The planned expansion should preserve the fixed identifiers and the role of the synthesis reviews. ER-300, ER-400 and ER-500 can close later hundred-review blocks or larger architectural stages according to the approved roadmap. ER-000 can then be revised at each boundary to update the thematic map, reading routes and corpus-level relationships. It should not predict the conclusions of unwritten papers or describe reserved identifiers as published records.

The expansion rule is simple: a new ER-000 version may describe only records that have reached their public state. Reserved titles, architectural placeholders and future synthesis roles can be identified as roadmap elements, but they must remain distinct from the published corpus. This prevents the guide from overstating completion and keeps historical versions auditable.

## 9. Public record controls

A public Engineering Review should present a stable identifier, exact title, author, version, publication date, public file, rights statement and persistent DOI. The PDF and repository metadata should agree. Public-facing filenames and document surfaces should contain only the publication identity and version needed by readers. The review should not claim peer review, certification or validation unless the record supports that claim.

All Rights Reserved governs the corpus. Public access permits reading and citation but does not replace the rights statement. Technical content should distinguish public methods and evidence from proprietary formulations, raw-material grades, supplier identities and process settings that remain confidential.

## 10. Conclusions

ER-000 provides a stable introduction to the 200-review corpus without changing its numbering. ER-001 to ER-200 remain the substantive Engineering Reviews, ER-100 and ER-200 retain their synthesis roles, and ER-000 directs readers to the appropriate owner of evidence. The guide can grow by version as the corpus expands to ER-500 while preserving earlier states, identifiers and citations.

The central reading rule is to cite and evaluate the paper that owns the claim. ER-000 supplies orientation and architecture. It does not replace the detailed review, its primary sources or the verification required for a particular material, printer, process or application.

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