

11-26-2004

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U.S. PATENT & TRADEMARK OFFICE

Form PTO-1594
(Rev. 03/01)
OMB No. 0651-0027



T U.S. DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
Docket No. 51270-30

102889863

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To the Honorable Commissioner of Patents and Trademarks: Please record the attached original documents or copy thereof.

1. Name of conveying party(ies): 11-22-04
 Haestad Methods, Inc.
 Bentley Systems, Incorporated

Individual(s) Association
 General Partnership Limited Partnership
 Corporation-State of
 Connecticut and Delaware
 Other _____

Additional names(s) of conveying party(ies) attached? Yes No

2. Name and address of receiving party(ies)
 Name: Wells Fargo Foothill, Inc.
 Internal Address: _____
 Street Address: One Boston Place, 18th Floor
 City: Boston State: MA Zip: 02108

Individual(s) citizenship _____
 Association _____
 General Partnership _____
 Limited Partnership _____
 Corporation-State of California
 Other _____

If assignee is not domiciled in the United States, a domestic representative designation is attached: Yes No
 (Designations must be a separate document from assignment)
 Additional name(s) & address(es) attached? Yes No

3. Nature of conveyance:

Assignment Merger
 Security Agreement Change of Name
 Other: Joinder and Amendment Agreement

Execution Date: October 29, 2004

4. Application number(s) or registration number(s):
 A. Trademark Application No.(s)
See Attached Annex H.

B. Trademark Registration No.(s)
See Attached Annex H.

Additional number(s) attached Yes No

5. Name and address of party to whom correspondence concerning document should be mailed:

A.F. David Steiner
Morrison & Foerster LLP
1290 Avenue of the Americas
New York, New York 10104

6. Total number of applications and registrations involved:..... 113

7. Total fee (37 CR 3.41).....\$ 2,840.00

Enclosed
 Authorized to be charged to deposit account

8. Deposit account number:
03-1952 (Referencing 51270-30)
 (Attach duplicate copy of this page if paying by deposit account)

DO NOT USE THIS SPACE

9. Statement and signature.
To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.

Andrew N. Spivak Andrew N. Spivak 11-22-04
 Name of Person Signing Signature Date

Total number of pages including cover sheet, attachments, and document: 25

Mail documents to be recorded with required cover sheet information to:
Commissioner of Patent & Trademarks, Box Assignments
Washington, D.C. 20231

11/24/2004 DBYRNE 00000167 031952 1067275
 01 FC:8521 40.00 DA
 02 FC:8522 2800.00 DA

va-85376

TRADEMARK
REEL: 003085 FRAME: 0714

ANNEX H

H-1

ny-598608

TRADEMARK
REEL: 003085 FRAME: 0715

TRADEMARK REGISTRATION

| Serial Number | Registration Number | Mark Name | Live/Dead | Status | Registration Date | Estimated Expiration | Renewed Date | Owned By | Jurisdiction |
|---------------|---------------------|---|-----------|------------|-------------------|----------------------|--------------|----------|--------------|
| 76374641 | 2726681 | APEX | LIVE | registered | 6/17/2003 | 6/17/2013 | | HMI | US Federal |
| 74185999 | 1702968 | CADMAGIC | LIVE | registered | 7/28/1992 | 7/28/2002 | 7/1/2002 | HMI | US Federal |
| 76047061 | | CIVILGEMS | DEAD | abandoned | | | | HMI | US Federal |
| 76372535 | | CIVILNEXUS | DEAD | abandoned | | | | HMI | US Federal |
| 76136104 | 2530792 | CIVILQUIZ | LIVE | registered | 1/15/2002 | 1/16/2012 | | HMI | US Federal |
| 78341257 | | CIVILSTORM | LIVE | pending | | | | HMI | US Federal |
| 76264206 | 2607275 | CLIENTCARE | LIVE | registered | 8/13/2002 | 8/13/2012 | | HMI | US Federal |
| 76047064 | | COGOGEMS | DEAD | abandoned | | | | HMI | US Federal |
| 78082429 | 2748745 | CORPORATECARE | LIVE | registered | 8/5/2003 | 8/5/2013 | | HMI | US Federal |
| 74639186 | 1944336 | CULVERTMASTER | LIVE | registered | 12/26/1995 | 12/26/2005 | | HMI | US Federal |
| 76088451 | 2568318 | CURRENT METHODS | LIVE | registered | 5/7/2002 | 5/7/2012 | | HMI | US Federal |
| 74174999 | 1719945 | CYBERNET | LIVE | registered | 9/29/1992 | 9/29/2002 | 7/1/2002 | HMI | US Federal |
| 78081644 | 2733403 | DARWIN | LIVE | registered | 7/1/2003 | 7/1/2013 | | HMI | US Federal |
| 76481630 | | DRAINAGEMASTER | LIVE | abandoned | | | | HMI | US Federal |
| 76416427 | | ENGINEERING WITHOUT BOUNDARIES | LIVE | abandoned | | | | HMI | US Federal |
| 78376092 | | FIRECAD | LIVE | pending | | | | HMI | US Federal |
| 78071313 | 2655082 | FLEXTABLES | LIVE | registered | 11/26/2002 | 11/26/2012 | | HMI | US Federal |
| 76514313 | | FLEXUNIT PRO | LIVE | pending | | | | HMI | US Federal |
| 78071308 | 2675694 | FLEXUNITS | LIVE | registered | 1/14/2003 | 1/14/2013 | | HMI | US Federal |
| 74163485 | 1698860 | FLOWMASTER | LIVE | registered | 7/7/1992 | 7/7/2002 | 7/1/2002 | HMI | US Federal |
| 76432431 | | GASGEMS | DEAD | abandoned | | | | HMI | US Federal |
| 76027961 | | GEM | LIVE | abandoned | | | | HMI | US Federal |
| 76046157 | | GEMS | LIVE | abandoned | | | | HMI | US Federal |
| 76027962 | | GES | LIVE | abandoned | | | | HMI | US Federal |
| 78277961 | | GISCONNECT | LIVE | pending | | | | HMI | US Federal |
| 76484180 | | GISTALK | LIVE | pending | | | | HMI | US Federal |
| 76087420 | 2467907 | GRAPHICAL HEC-1 | LIVE | registered | 7/10/2001 | 7/11/2011 | | HMI | US Federal |
| 76279548 | 2612383 | HAESTAD METHODS | LIVE | registered | 9/27/2002 | 9/27/2012 | | HMI | US Federal |
| 76046010 | 2628943 | HAESTAD METHODS | LIVE | registered | 10/1/2002 | 10/1/2012 | | HMI | US Federal |
| 76294961 | 2776360 | HAESTAD METHODS A+ MODELER AUTHORIZED WATER PROVIDER AND DESIGN | LIVE | registered | 10/21/2003 | | | HMI | US Federal |

| Serial Number | Registration Number | Mark Name | Live/Dead | Status | Registration Date | Estimated Expiration | Renewed Date | Owned By | Jurisdiction |
|---------------|---------------------|---|-----------|------------|-------------------|----------------------|--------------|----------|--------------|
| 76294962 | 2776361 | HAESTAD METHODS CERTIFIED AUTHORIZED WATER PROVIDER AND DESIGN | LIVE | registered | 10/21/2003 | | | HMI | US Federal |
| 78098000 | | HAESTAD METHODS CLIENTCARE | DEAD | dead | | | | HMI | US Federal |
| 76295126 | 2776363 | HAESTAD METHODS EXPERT MODELER AUTHORIZED WATER PROVIDER AND DESIGN | LIVE | registered | 10/21/2003 | | | HMI | US Federal |
| 76529443 | | HAESTAD METHODS EZPAY | LIVE | pending | | | | HMI | US Federal |
| 76295127 | 2776364 | HAESTAD METHODS MASTER MODELER AUTHORIZED WATER PROVIDER AND DESIGN | LIVE | registered | 10/21/2003 | | | HMI | US Federal |
| 75599137 | 2306147 | HAESTAD PRESS and Design | LIVE | registered | 1/4/2000 | 1/4/2010 | | HMI | US Federal |
| 76348996 | 2674556 | HAESTAD PRESS | LIVE | registered | 1/14/2003 | 1/14/2013 | | HMI | US Federal |
| 75595144 | | HAESTAD PRESS and Design | DEAD | dead | | | | HMI | US Federal |
| 76373816 | 2677450 | HAESTAD SEVERITY INDEX | LIVE | registered | 1/21/2003 | 1/21/2013 | | HMI | US Federal |
| 78272883 | | HAMMER | LIVE | pending | | | | HMI | US Federal |
| 76219738 | 2847967 | HECGEMS | LIVE | registered | 6/1/2004 | 6/1/2014 | | HMI | US Federal |
| 76046009 | 2650131 | HMI | LIVE | registered | 11/12/2002 | 11/12/2012 | | HMI | US Federal |
| 78097993 | | HMI CLIENTCARE | DEAD | abandoned | | | | HMI | US Federal |
| 76056337 | 2484874 | JUMPSTART | LIVE | registered | 9/4/2001 | 9/5/2011 | | HMI | US Federal |
| 75632497 | 2832210 | MERGEFAX | LIVE | registered | 4/13/2004 | 4/13/2014 | | HMI | US Federal |
| 76046155 | | MUNICIPALGEMS | LIVE | abandoned | | | | HMI | US Federal |
| 76432430 | | PETROGEMS | LIVE | registered | 4/6/2004 | 4/6/2014 | | HMI | US Federal |
| 76432429 | | PETROLGEMS | LIVE | abandoned | | | | HMI | US Federal |
| 76326409 | | PONDCAD | LIVE | abandoned | | | | HMI | US Federal |
| 76046160 | 2817748 | PONDGEMS | LIVE | registered | 2/24/2004 | 2/24/2014 | | HMI | US Federal |
| 76326405 | | PONDGIS | LIVE | abandoned | | | | HMI | US Federal |
| 76046158 | 2568260 | PONDMAKER | LIVE | registered | 5/7/2002 | 5/7/2012 | | HMI | US Federal |
| 75243956 | 2240149 | PONDPACK | LIVE | registered | 4/20/1999 | 4/20/2009 | | HMI | US Federal |
| 76326726 | | PONDSAFE | LIVE | abandoned | | | | HMI | US Federal |
| 76326729 | | PONDSAGE | LIVE | abandoned | | | | HMI | US Federal |
| 76047066 | | PUMPGEMS | LIVE | pending | | | | HMI | US Federal |
| 76056338 | 2772042 | PUMPMASTER | LIVE | registered | 10/7/2003 | 10/7/2013 | | HMI | US Federal |
| 78263577 | 2856034 | PUMPMASTER and Design | LIVE | registered | 6/22/2004 | 6/22/2014 | | HMI | US Federal |
| 76372533 | | PUMPNEXUS | LIVE | abandoned | | | | HMI | US Federal |
| 78258979 | | PUMPTALK | LIVE | pending | | | | HMI | US Federal |
| 73810872 | | REAL LIFE | DEAD | dead | | | | HMI | US Federal |

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| Serial Number | Registration Number | Mark Name | Live/Dead | Status | Registration Date | Estimated Expiration | Renewed Date | Owned By | Jurisdiction |
|---------------|---------------------|------------------|-----------|------------|-------------------|----------------------|--------------|----------|--------------|
| 76270741 | | RIVERCAD | DEAD | dead | | | | HMI | US Federal |
| 76047062 | | ROADGEMS | DEAD | abandoned | | | | HMI | US Federal |
| 78415847 | | SCADACONNECT | LIVE | pending | | | | HMI | US Federal |
| 76412816 | | SEWERATLAS | LIVE | abandoned | | | | HMI | US Federal |
| 75059977 | 2306664 | SEWERCAD | LIVE | registered | 1/4/2000 | 1/4/2010 | | HMI | US Federal |
| 74579929 | | SEWERCAD | DEAD | dead | | | | HMI | US Federal |
| 76492796 | | SEWERCAD | LIVE | pending | | | | HMI | US Federal |
| 76046159 | 2817747 | SEWERGEMS | LIVE | registered | | | | HMI | US Federal |
| 76326406 | | SEWERGIS | LIVE | abandoned | 2/24/2004 | 2/24/2014 | | HMI | US Federal |
| 76163414 | | SEWERNET | LIVE | suspended | | | | HMI | US Federal |
| 76290056 | | SEWEROBJECTS | LIVE | abandoned | | | | HMI | US Federal |
| 76326403 | | SEWERSAFE | LIVE | abandoned | | | | HMI | US Federal |
| 76326728 | | SEWERSAGE | LIVE | abandoned | | | | HMI | US Federal |
| 78069315 | 2696713 | SEWERTALK | LIVE | registered | 3/11/2003 | 3/11/2013 | | HMI | US Federal |
| 76224512 | | SITEGEMS | DEAD | abandoned | | | | HMI | US Federal |
| 78412343 | | SKELEBRATION | LIVE | abandoned | | | | HMI | US Federal |
| 78411274 | 2787373 | SKELEBRATOR | LIVE | registered | 11/25/2003 | | | HMI | US Federal |
| 74260391 | | SPELL and Design | DEAD | dead | | | | HMI | US Federal |
| 78376101 | | SPRINKLERCAD | LIVE | pending | | | | HMI | US Federal |
| 76412814 | | STORMATLAS | LIVE | abandoned | | | | HMI | US Federal |
| 74579928 | 1925227 | STORMCAD | LIVE | registered | 10/10/1995 | 10/10/2005 | | HMI | US Federal |
| 76046156 | | STORMGEMS | LIVE | registered | 2/24/2004 | 2/24/2014 | | HMI | US Federal |
| 76326402 | | STORMGIS | LIVE | pending | | | | HMI | US Federal |
| 76163100 | | STORMNET | LIVE | abandoned | | | | HMI | US Federal |
| 76290057 | | STORMOBJECTS | LIVE | abandoned | | | | HMI | US Federal |
| 76326725 | | STORMSAFE | LIVE | abandoned | | | | HMI | US Federal |
| 76326408 | | STORMSAGE | LIVE | abandoned | | | | HMI | US Federal |
| 78069319 | 2744955 | STORMTALK | LIVE | registered | 7/29/2003 | 7/29/2013 | | HMI | US Federal |
| 76072804 | | STREAMCAD | LIVE | abandoned | | | | HMI | US Federal |
| 76047067 | | STREAMGEMS | DEAD | abandoned | | | | HMI | US Federal |
| 76047063 | | SURVEYGEMS | DEAD | abandoned | | | | HMI | US Federal |
| 76290054 | | TRANSCAD | DEAD | dead | | | | HMI | US Federal |
| 76047065 | | TRANSGEMS | DEAD | abandoned | | | | HMI | US Federal |
| 78215289 | 2856958 | UTALK | LIVE | registered | 6/22/2004 | 6/22/2014 | | HMI | US Federal |
| 76047573 | | UTILITYGEMS | DEAD | abandoned | | | | HMI | US Federal |
| 76224511 | | VIEWGEMS | LIVE | abandoned | | | | HMI | US Federal |
| 75243957 | | VISUAL HEC-1 | DEAD | dead | | | | HMI | US Federal |

| Serial Number | Registration Number | Mark Name | Live/Dead | Status | Registration Date | Estimated Expiration | Renewed Date | Owned By | Jurisdiction |
|---------------|---------------------|-------------------------|-----------|------------|-------------------|----------------------|--------------|----------|--------------|
| 75267276 | | VISUAL HEC-PACK | DEAD | dead | | | | HMI | US Federal |
| 76412815 | | WATERATLAS | LIVE | abandoned | | | | HMI | US Federal |
| 74639187 | 1944337 | WATERCAD | LIVE | registered | 12/26/1995 | 12/26/2005 | | HMI | US Federal |
| 76046154 | 2713988 | WATERGEMS | LIVE | registered | 5/6/2003 | 5/6/2013 | | HMI | US Federal |
| 76326407 | | WATERGIS | LIVE | abandoned | | | | HMI | US Federal |
| 76179132 | | WATERNET (stylized) | DEAD | dead | | | | HMI | US Federal |
| 76290055 | 2753907 | WATEROBJECTS | LIVE | registered | 8/19/2003 | 8/19/2013 | | HMI | US Federal |
| 76529187 | 2855760 | WATEROBJECTS | LIVE | registered | 6/22/2004 | 6/22/2014 | | HMI | US Federal |
| 76484595 | | WATERPROFTALK | LIVE | abandoned | | | | HMI | US Federal |
| 76326404 | 2807111 | WATERSAFE | LIVE | registered | 1/20/2004 | | | HMI | US Federal |
| 76326727 | | WATERSAGE | LIVE | abandoned | | | | HMI | US Federal |
| 78069317 | 2748701 | WATERTALK | LIVE | registered | 8/5/2003 | 8/5/2013 | | HMI | US Federal |
| 76332831 | 2762513 | WSS (stylized) | LIVE | registered | 9/9/2003 | 9/9/2013 | | HMI | US Federal |
| 76348875 | | WSSI | LIVE | abandoned | | | | HMI | US Federal |
| 76046008 | 2512030 | WWW.HAESTAD.COM METHODS | LIVE | registered | 11/27/2001 | 11/28/2011 | | HMI | US Federal |

Rev. 7/14/04

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JOINDER AND AMENDMENT AGREEMENT

JOINDER AND AMENDMENT AGREEMENT, dated as of October 29, 2004 (this "Joinder Agreement"), among HAESTAD METHODS, INC., a Connecticut corporation ("Haestad"), BENTLEY SYSTEMS, INCORPORATED, a Delaware corporation, as Borrower (the "Borrower"), the lenders listed on the signatory pages hereof (the "Lenders"), and WELLS FARGO FOOTHILL, INC., a California corporation, in its capacity as administrative agent (the "Agent").

WITNESSETH

WHEREAS, Borrower, the Lenders and Agent are parties to that certain Loan and Security Agreement, dated as of December 23, 2003 (as amended on October 29, 2004, and as it may be further amended, modified, supplemented or amended and restated from time to time, the "Loan Agreement"); and

WHEREAS, Borrower has purchased the Stock of Haestad pursuant to that certain Stock Purchase Agreement, dated as of July 30, 2004 (the "Purchase Agreement"), among Borrower, Haestad and John Haestad;

WHEREAS, in connection with the Purchase Agreement, Haestad became a wholly-owned subsidiary of Borrower; and

WHEREAS, the parties desire that, subject to the terms and conditions hereof, Haestad become a Guarantor and a party to certain of the Loan Documents;

NOW, THEREFORE, in consideration of the agreements and provisions herein contained, the parties hereto do hereby agree as follows:

Section 1. Definitions. Any capitalized terms used but not otherwise defined herein shall have the meanings ascribed to such terms in the Loan Agreement. To the extent such terms are not defined in the Loan Agreement, they shall have the meanings ascribed to such terms in the other Loan Documents, as applicable.

Section 2. Joinders. Subject to the satisfaction of the conditions set forth in Section 5, the parties agree that Haestad shall become a party to the following documents (the "Joined Loan Documents") as follows:

2.01 Guaranty.

A. By execution of this Joinder Agreement, Haestad will become a party to the Guaranty, and Haestad will be deemed to be a "Guarantor" for all purposes under the Guaranty as of the Effective Date (as defined below).

B. As a Guarantor, Haestad assumes all the rights and obligations of a Guarantor jointly and severally with each other Guarantor as if originally named in the Guaranty.

C. As a Guarantor, Haestad is bound by the provisions of the Guaranty and shall perform in accordance with its terms all the obligations which by the terms of the Guaranty are required to be performed by it as a Borrower to the same extent as if originally a party thereto.

2.02 Guarantor Security Agreement.

A. By execution of this Joinder Agreement, Haestad will become a party to the Guarantor Security Agreement.

B. Haestad assumes all the rights and obligations of a Guarantor jointly and severally with each other Guarantors as if originally named in the Guarantor Security Agreement.

C. As a Guarantor, Haestad is bound by the provisions of the Guarantor Security Agreement and shall perform in accordance with its terms all the obligations which by the terms of the Guarantor Security Agreement are required to be performed by it as a Guarantor to the same extent as if originally a party thereto.

D. Haestad hereby, and by virtue of becoming a Guarantor under the Guarantor Security Agreement, grants to Agent, for the benefit of Agent and the Lenders, a continuing security interest in, lien on, assignment of and right of set-off against, its right, title and interest in all of its "Guarantor Collateral" (as defined in the Guarantor Security Agreement), as set forth in the granting clause of Section 2.1 of the Guarantor Security Agreement, whether now owned or existing or hereafter acquired, regardless of where located.

2.03 Intellectual Property Security Agreements.

A. By execution of this Joinder Agreement, Haestad will become a party to each of (i) the Patent Security Agreement, (ii) the Trademark Security Agreement, and (iii) the Copyright Security Agreement (each of the Patent Security Agreement, Trademark Security Agreement and Copyright Security Agreement is herein referred to as an "IP Security Agreement"), and Haestad will be deemed to be a "Grantor" for all purposes under each IP Security Agreement as of the Effective Date.

B. As a Grantor, Haestad assumes all the respective rights and obligations of a Grantor jointly and severally with each other Grantor in each IP Security Agreement as if originally named in such IP Security Agreement.

C. As a Grantor, Haestad is bound by the respective provisions of each IP Security Agreement and shall perform in accordance with its respective terms all the obligations which by the terms of such IP Security Agreement are required to be performed by it as a Grantor to the same extent as if originally a party thereto.

D. Haestad hereby, and by virtue of becoming a Grantor under the IP Security Agreements, assigns and pledges to Agent, for the benefit of the Lender Group, a security interest in all of Haestad's rights, title and interest in and to its "Copyright Collateral," "Patent Collateral," and "Trademark Collateral" (each as defined in the respective IP Security

Agreements) described in each of the granting clauses set forth in Section 1 of each IP Security Agreement, respectively.

2.04 Pledge Agreement.

A. By execution of this Joinder Agreement, Haestad will become a party to the Pledge Agreement, and Haestad will be deemed to be a "Pledgor" for all purposes under the Pledge Agreement as of the Effective Date.

B. As a Pledgor, Haestad assumes all the rights and obligations of a Pledgor jointly and severally with each other Pledgor as if originally named in the Pledge Agreement.

C. As a Pledgor, Haestad is bound by the provisions of the Pledge Agreement and shall perform in accordance with its terms all the obligations which by the terms of the Pledge Agreement are required to be performed by it as a Pledgor to the same extent as if originally a party thereto.

D. Haestad hereby, and by virtue of becoming a Pledgor under the Pledge Agreement, transfers and grants to Agent, on behalf of the Lender Group, a senior, first priority Lien in all of its rights, title and interest in the "Collateral" (as defined in the Pledge Agreement), as set forth in the granting clause of Section 2 of the Pledge Agreement.

2.05 Intercompany Subordination Agreement.

A. By execution of this Joinder Agreement, Haestad will become a party to the Intercompany Subordination Agreement, and Haestad will be deemed to be a "Subordinating Creditor" for all purposes under the IC Subordination Agreement as of the Effective Date.

B. As a Subordinating Creditor, Haestad assumes all the rights and obligations of a Subordinating Creditor jointly and severally with each other Subordinating Creditor as if originally named in the IC Subordination Agreement.

C. As a Subordinating Creditor, Haestad is bound by the provisions of the IC Subordination Agreement and shall perform in accordance with its terms all the obligations which by the terms of the IC Subordination Agreement are required to be performed by it as a Subordinating Creditor to the same extent as if originally a party thereto.

Section 3. Amendments. Subject to the satisfaction of the conditions precedent set forth in Section 5 hereof, the parties hereby agree to the following amendments to certain Loan Documents.

3.01 Schedule 5.5 to the Loan Agreement. Schedule 5.5 to the Loan Agreement is hereby amended by adding the information set forth on Annex A hereto.

3.02 Schedule 5.7(a) to the Loan Agreement. Schedule 5.7(a) to the Loan Agreement is hereby amended by adding the information set forth on Annex B.

3.03 Schedule 5.7(b) to the Loan Agreement. Schedule 5.7(b) to the Loan Agreement is hereby amended by adding the information set forth on Annex C hereto.

3.04 Schedule 5.7(c) to the Loan Agreement. Schedule 5.7(c) to the Loan Agreement is hereby amended by adding the information set forth on Annex D.

3.05 Schedule 5.10 to the Loan Agreement. Schedule 5.10 to the Loan Agreement is hereby amended by adding the information set forth on Annex E.

3.06 Schedule 1 to the Pledge Agreement. Schedule 2 to the Pledge Agreement is hereby amended by adding the following to the end of the section captioned "Stock Owned and Pledge by Bentley Systems, Incorporated" on such schedule:

"570 shares of the common stock, no par value, of Haestad Methods, Inc. (representing 100% of the total outstanding voting power of all classes of stock of Haestad Methods, Inc. entitled to vote)"

3.07 Schedule I to the Copyright Security Agreement. Schedule I to the Trademark Security Agreement is hereby amended by adding the information set forth on Annex F hereto with respect to Haestad.

3.08 Schedule I to the Patent Security Agreement. Schedule I to the Trademark Security Agreement is hereby amended by adding the information set forth on Annex G hereto with respect to Haestad.

3.09 Schedule I to the Trademark Security Agreement. Schedule I to the Trademark Security Agreement is hereby amended by adding the information set forth on Annex H hereto with respect to Haestad.

Section 4. Representations and Warranties. In order to induce Agent and Lenders to execute this Joinder Agreement, each of Haestad and Borrower hereby represents and warrants to Agent and each Lender that:

4.01 Corporate Power, Etc. Each of Haestad and Borrower (a) has all requisite corporate power and authority to execute and deliver this Joinder Agreement and to consummate the transactions contemplated hereby and (b) has taken all action, corporate or otherwise, necessary to authorize the execution and delivery of this Joinder Agreement and the consummation of the transactions contemplated hereby.

4.02 Binding Effect. This Joinder Agreement has been duly executed and delivered by Haestad and Borrower and this Joinder Agreement constitutes the legal, valid and binding obligations of each of Haestad and Borrower, enforceable against each of them in accordance with its terms, except as such enforceability may be limited by (a) applicable bankruptcy, insolvency, reorganization, moratorium or other similar laws, now or hereafter in effect, relating to or affecting the enforcement of creditors' rights generally, and (b) the application of general principles of equity (regardless of whether such enforceability is considered in a proceeding in equity or at law).

4.03 Noncontravention. The execution, delivery and performance of this Joinder Agreement will not (a) violate any provision of federal, state, or local law or regulation applicable to Borrower or Haestad, the Governing Documents of Borrower or Haestad, or any order, judgment, or decree of any court or other Governmental Authority binding on Borrower or

Haestad, (b) conflict with, result in a breach of, or constitute (with due notice or lapse of time or both) a default under any material contractual obligation of Borrower or Haestad, (c) result in or require the creation or imposition of any Lien of any nature whatsoever upon any properties or assets of Borrower or Haestad, other than Permitted Liens, or (d) require any unobtained approval of Borrower's or Haestad's interestholders or any unobtained approval or consent of any Person under any material contractual obligation of Borrower or Haestad.

Section 5. Conditions. This Joinder Agreement shall be effective as of October 29, 2004 (the "Effective Date"), only upon the fulfillment in a manner satisfactory to Agent, of all of the following conditions in this Section 5:

5.01 Execution of Joinder Agreement. Haestad, Borrower, the Guarantor, Agent, and the Lenders shall have executed an original counterpart of this Joinder Agreement and shall have delivered (including by way of facsimile transmission) the same to Agent.

5.02 Governing Documents. Agent shall have received copies of Haestad's Governing Documents, as amended, modified, or supplemented to the Closing Date, certified by the Secretary of Haestad.

5.03 Certificate of Status. Agent shall have received certificates of status with respect to Haestad, dated within 10 days of the Effective Date, such certificate to be issued by the appropriate officer of the jurisdiction of organization of Haestad, which certificate shall indicate that Haestad is in good standing in such jurisdiction

5.04 Incumbency Certificate. Agent shall have received (a) a certificate of an officer of Haestad as to the incumbency and signatures of the officers of Haestad authorized to execute any document in connection with the transactions contemplated by this Joinder Agreement; and (b) copies of resolutions of the Board of Directors of Haestad, as provided by the organizational documents of Haestad, authorizing the execution, delivery and performance of this Joinder Agreement and the transactions contemplated hereby. Such certificate shall state that the resolutions set forth therein have not been amended, modified, revoked or rescinded as of the date of such certificate.

5.05 Pledged Stock. Borrower shall have delivered to Agent the certificates representing the shares of Haestad owned by Borrower, together with an undated stock power covering each such certificate, duly executed in blank.

Section 6. Covenants.

6.01 Loan Document Obligations. Haestad covenants that it will perform all covenants required to be performed by it as party to each of the Joined Loan Documents.

6.02 Cleanup of Certain Intellectual Property On or prior to the date that is thirty (30) days after the date hereof, Haestad shall have prepared and shall deliver, or cause to be delivered, to the U.S. Patent and Trademark Office and the U.S. Copyright Office, in good faith in accordance with the procedures and regulations of such office all documents, instruments or other information necessary for accurate and proper recordation of [TBD]. Following such delivery, Borrower shall promptly provide to Agent reasonable documentation of such delivery, including verification of receipt by the applicable entity.

6.03 Further Assurances. Haestad and Borrower shall execute and deliver, or cause to be executed and delivered, to Agent such documents and agreements, and shall take or cause to be taken such actions, as Agent may, from time to time, reasonably request to carry out the terms and conditions of this Joinder Agreement and the transactions contemplated hereby. Haestad hereby authorizes Agent to file, as agent for the Lenders, appropriate initial Uniform Commercial Code financing statements naming Haestad as debtor.

Section 7. Miscellaneous.

7.01 Continuing Effect. Except as specifically provided herein, the Loan Agreement and the other Loan Documents shall remain in full force and effect in accordance with their respective terms and are hereby ratified and confirmed in all respects.

7.02 No Waiver. This Joinder Agreement is limited as specified and shall not operate as a modification, acceptance or waiver of any provision of the Loan Agreement or any other Loan Document, except to the extent specifically set forth herein. Agent, on behalf of the Lenders, hereby reserves all of the rights and remedies of the Lenders arising as a result of any Default or Event of Default under the Loan Documents.

7.03 Governing Law. THIS JOINDER AGREEMENT SHALL BE GOVERNED BY, AND CONSTRUED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW YORK.

7.04 Counterparts. This Joinder Agreement may be executed in any number of counterparts, each of which counterparts when executed and delivered shall be an original, but all of which shall together constitute one and the same instrument. A complete set of counterparts shall be lodged with the Administrative Borrower and Agent.

7.05 Headings. Section headings in this Joinder Agreement are included herein for convenience of reference only and shall not constitute a part of this Joinder Agreement for any other purpose.

7.06 Binding Effect; Assignment. This Joinder Agreement shall be binding upon and inure to the benefit of Haestad, Borrower, Agent, and the Lender, and their respective successors and assigns; provided, however, that the rights and obligations of Haestad and Borrower under this Joinder Agreement shall not be assigned or delegated without the prior written consent of Agent.

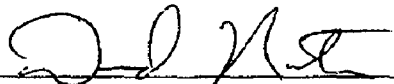
7.07 Expenses. Borrower agrees to pay Agent upon demand for all reasonable expenses, including reasonable fees of attorneys and paralegals for Agent incurred by Agent in connection with the preparation, negotiation and execution of this Joinder Agreement and any document required to be furnished herewith.

[Signature Pages Follow]

IN WITNESS WHEREOF, each of the undersigned has caused this Joinder Agreement to be executed and delivered by a duly authorized officer as of the date first above written.


JOINING GUARANTOR:

HAESTAD METHODS, INC.

By: 
Name:
Title:

BORROWER:

BENTLEY SYSTEMS, INCORPORATED

By: 
Name:
Title:

AGENT AND LENDER:

WELLS FARGO FOOTHILL, INC.

By: _____
Name:
Title:

Signature Page to Joinder Agreement

ny-598608

TRADEMARK
REEL: 003085 FRAME: 0726

IN WITNESS WHEREOF, each of the undersigned has caused this Joinder Agreement to be executed and delivered by a duly authorized officer as of the date first above written.

JOINING GUARANTOR:

HAESTAD METHODS, INC.

By: _____
Name:
Title:

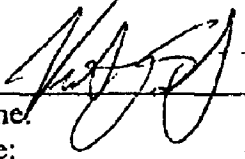
BORROWER:

BENTLEY SYSTEMS, INCORPORATED

By: _____
Name:
Title:

AGENT AND LENDER:

WELLS FARGO FOOTHILL, INC.

By:  _____
Name: Vincent J. Bar, Jr.
Title: Vice President

Signature Page to Joinder Agreement

ny-598608

TRADEMARK
REEL: 003085 FRAME: 0727

ANNEX A

Supplement to Schedule 5.5

14 Corporate Drive, Clifton Park, NY 12065

1129 Hospital Drive, Suite 6F, Stockbridge, GA 30281

1 Focus Plaza, Suite 200, 3360 Martin Farm Rd., Suwanee, GA 30024

9418 Brookline Avenue, Suite C, Baton Rouge, LA 70809

9668 Madison Blvd., Madison, AL 35758

37 Brookside Road, Waterbury CT 06708

ANNEX B

Supplement to Schedule 5.7(a)

Haestad Methods, Inc., a Connecticut corporation and wholly-owned subsidiary of Borrower

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TRADEMARK
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ANNEX C

Supplement to Schedule 5.7(b)

The chief executive office of Haestad Methods, Inc. is 685 Stockton Drive, Exton, Pennsylvania, 19341.

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ny-598608

TRADEMARK
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ANNEX D

Supplement to Schedule 5.7(c)

Haestad Methods, Inc.

06-1214452

CT 207185

ny-598608

D-1

TRADEMARK
REEL: 003085 FRAME: 0731

ANNEX E

Supplement to Schedule 5.10

1. On December 12, 2002, Intergraph Corporation ("Intergraph") commenced a legal action in Alabama against Borrower seeking declaratory relief and an accounting of certain maintenance contract revenue in connection with the adjustment of the amount of the note issued pursuant to the asset purchase agreement dated December 26, 2000. After Intergraph filed its action, Borrower filed a counterclaim to recover damages resulting from Intergraph's breaches of its obligations under the asset purchase agreement. On May 11, 2004, the judge (i) denied Intergraph's claimed note adjustment and found the current outstanding balance of the note to be \$6.7 million plus accrued interest, (ii) denied Borrower's counterclaims, and (iii) ordered each party to indemnify the other for its claimed costs. Borrower and Intergraph have filed appeals with the Alabama Supreme Court. Borrower is vigorously pursuing its appeal and the defense of Intergraph's appeal.

2. On September 9, 2002, Advantage Systems, Inc., a former authorized reseller of Borrower products and services, commenced an action against Borrower with the American Arbitration Association in Philadelphia, Pennsylvania. The action seeks monetary damages for breach of reseller contract, postal fraud, failure to negotiate in good faith, and wrongful termination. The arbitration hearing has been scheduled for March of 2005. Borrower is vigorously defending itself against this action.

3. On May 1, 2003, Third Millennium Technologies ("3MT") commenced an action against Borrower in the US District Court for the District of Kansas. This action sought to recover unspecified amount of monetary damages for breach of fiduciary duty, tortious interference, and fraudulent or negligent misrepresentation arising out of 3MT's relationship with Borrower under the Bentley Integrator documents. On June 24, 2003, Bentley filed a motion to compel arbitration. The US District Court for the District of Kansas granted Borrower's motion to compel arbitration on November 3, 2003. On January 14, 2004, 3MT filed a demand for arbitration with the American Arbitration Association in Philadelphia, Pennsylvania. The arbitration hearing has been scheduled for February of 2005. Borrower is vigorously defending itself against 3MT's demands.

ANNEX F

ny-598608

F-1

TRADEMARK
REEL: 003085 FRAME: 0733

COPYRIGHT REGISTRATION

| NAME | Material | TYPE | REGISTRATION # | YEAR WORK COMPLETED | DATE OF 1ST PUBLICATION | DATE OF REGISTRATION | DATE FILED | NAME OF FILER |
|---|-----------------|------|----------------|---------------------|-------------------------|----------------------|------------|------------------|
| Advanced Water Distribution Modeling and Management | Book | TX | TX 5-690-710 | 2003 | 1/18/2003 | 2/13/2003 | 2/8/2003 | Chiriana Ewing |
| AMWA Web Site | Web Site | TX | TXU 1-097-275 | 2001 | | 1/3/2003 | 3/1/2002 | Jeff Cohen, Esq. |
| Christmas Greeting Card (1996) | Card | VA | VA 945-915 | 1996 | 12/1/1996 | 10/7/1998 | 10/1/1998 | Jeff Cohen, Esq. |
| Christmas Greeting Card (1997) | Card | VA | VA 945-914 | 1997 | 12/1/1997 | 10/7/1998 | 10/1/1998 | Jeff Cohen, Esq. |
| Civil Projects Web Site | Web Site | TX | TXU 1-098-878 | 2001 | | 3/13/2002 | 2/28/2002 | Jeff Cohen, Esq. |
| Civil Quiz Web Site | Web Site | TX | TXU 1-098-880 | 2001 | | 3/13/2002 | 2/28/2002 | Jeff Cohen, Esq. |
| CIVISform 2005 | Software/Manual | TX | | 2004 | 7/2/2004 | | 9/23/2004 | Steve Porzio |
| Computer Applications in Hydraulic Engineering, Third Edition | Book | TX | TX 5-162-472 | 1999 | 10/5/1999 | 7/5/2000 | 6/30/2000 | Chiriana Ewing |
| ConverMaster for Windows 3.0 | Software/Manual | TX | TXU 1 154 657 | 2003 | 8/2/2003 | 7/10/2003 | | Chiriana Ewing |
| ConverMaster Project | Software | TX | TX 5 036 484 | 1995 | 11/1/1995 | 11/23/1998 | | |
| Current Methods | Magazine | TX | TX 5-423-169 | 2001 | 9/17/2001 | 10/4/2001 | 10/2/2001 | Chiriana Ewing |
| Cybernet for Windows 3.1 | Software | TX | TX 4 895 017 | 1998 | 3/25/1998 | 11/23/1998 | | Chiriana Ewing |
| Essential Hydraulics and Hydrology | Book | TX | TX 5-143-405 | 1998 | 11/23/1998 | 7/5/2000 | 6/30/2000 | Chiriana Ewing |
| FlexWorks Version 2.0 | Software/Manual | TX | TX 5-895-892 | 2003 | 9/14/2003 | 11/26/2003 | 11/17/2003 | Steve Porzio |
| Floodplain Modeling Using HEC-RAS | Book | TX | | 2003 | 10/14/2003 | | 11/17/2003 | Steve Porzio |
| FlowMaster 2005 | Software/Manual | TX | | 2004 | 2/28/2004 | | 9/23/2004 | Steve Porzio |
| FlowMaster For Windows Version 7 | Software/Manual | TX | TXU 1-113-555 | 2003 | | 7/10/2003 | 6/30/2003 | Steve Porzio |
| FlowMaster PE for Windows 6.0 | Software | TX | TX 4 896 015 | 1998 | 6/27/1998 | 11/23/1998 | | Chiriana Ewing |
| GISConnect for AutoCAD Version 1.0 | Software/Manual | TX | TX 5-839-234 | 2003 | 9/18/2003 | 11/21/2003 | 11/17/2003 | Steve Porzio |
| GISConnect for AutoCAD Version 2.0 | Software/Manual | TX | | 2004 | 9/1/2004 | | 9/23/2004 | Steve Porzio |
| Graphical HEC-1 Version 1.0 | Software | TX | TX 4 895 019 | 1998 | 2/9/1998 | 11/23/1998 | | Chiriana Ewing |
| Haestad Methods AMWA Website | Web Site | TX | | 1998 | | | | not yet filed |
| Haestad Methods Civil Campus Website | Web Site | TX | | 2002 | | | | not yet filed |
| Haestad Methods Civil Projects Website | Web Site | TX | TXU 1-093-835 | 1997 | | 1/23/2003 | 1/15/2003 | Chiriana Ewing |
| Haestad Methods Civil Quiz Website | Web Site | TX | TXU 1-093-836 | 2003 | | 1/23/2003 | 1/15/2003 | Chiriana Ewing |
| Haestad Methods Severity Index Website | Web Site | TX | TXU 1-093-834 | 1999 | 10/1/1999 | 1/23/2003 | 1/15/2003 | Chiriana Ewing |
| Haestad Methods Virtual Tour | Software | PA | | 2003 | 5/20/2003 | | 3/30/2004 | Steve Porzio |
| Haestad Methods Water Security Website | Web Site | TX | TXU 1-093-837 | 2003 | | 1/23/2003 | 1/15/2003 | Chiriana Ewing |
| Haestad Methods WaterObjects Website | Web Site | TX | | 2002 | | | | not yet filed |
| Haestad Methods Website | Web Site | TX | TXU 1-015-640 | 2001 | | 6/18/2001 | 9/13/2001 | Jeff Cohen, Esq. |
| HAMMER for Windows Version 1.0 | Software/Manual | TX | TX 5 897 734 | 2003 | 9/10/2003 | 11/21/2003 | 11/17/2003 | Steve Porzio |

| NAME | Material | TYPE | REGISTRATION # | YEAR WORK COMPLETED | DATE OF 1ST PUBLICATION | DATE OF REGISTRATION | DATE FILED | NAME OF FILER |
|--|-------------------|------|----------------|---------------------|-------------------------|----------------------|------------|------------------|
| Hydraulics and Hydrology: Practical Guide | Software | TX | TX 4 506 288 | 1997 | 5/8/1997 | 7/10/1997 | | Chintana Ewing |
| PondPack for Windows Version 7.0 | Software/Manual | TX | TX 5-245-157 | 1999 | 5/10/1999 | 8/9/2000 | 8/3/2000 | Chintana Ewing |
| PondPack for Windows Version 8.0 | Software/Manual | TX | TX 5-820-813 | 2002 | 10/2/2002 | 11/25/2002 | 11/18/2002 | Chintana Ewing |
| PondPack for Windows Version 9 | Software/Manual | TX | TXU 1-141-754 | 2003 | | 8/15/2003 | 8/11/2003 | Chintana Ewing |
| PondPack Version 6.1 | Software/Manual | TX | TX 4-895-020 | 1998 | 8/1/1998 | 11/23/1998 | 11/19/1998 | Jeff Smith, Esq. |
| PumpMaster for Windows Version 1.0 | Software/Manual | TX | TX 5-784-197 | 2003 | 7/17/2003 | 7/30/2003 | 7/25/2003 | Steve Porzio |
| PumpMaster.com Website | Web Site | TX | TX 5-809-099 | 2003 | 7/7/2003 | 7/30/2003 | 7/25/2003 | Chintana Ewing |
| SCADAConnect for Windows 1.0 | Software/Manual | TX | TX 5-928-771 | 2003 | 11/6/2003 | 4/22/2004 | 3/30/2004 | Steve Porzio |
| Saverly Index Web Site | Web Site | TX | TXU 1-098-881 | 2001 | | 3/13/2002 | 2/28/2002 | Jeff Cohen, Esq. |
| SewerCAD Version 4.1 | Software/Manual | TX | TX 5-245-158 | 2000 | 5/23/2000 | 8/10/2000 | 8/8/2000 | Chintana Ewing |
| SewerCAD Version 5.5 | Software/Manual | TX | TXU 1 154 856 | 2003 | 6/2/2003 | 7/10/2003 | | Chintana Ewing |
| StormCAD for Windows Version 5.5 | Software/Manual | TX | TXU 1-113-842 | 2003 | | 7/10/2003 | 6/30/2003 | Steve Porzio |
| StormCAD Version 4.1 | Software/Manual | TX | TX 5-245-155 | 2000 | 5/23/2000 | 8/10/2000 | 8/8/2000 | Chintana Ewing |
| Stormwater Conveyance Modeling and Design | Book | TX | | 2003 | 8/28/2003 | | 9/18/2003 | Steve Porzio |
| Water Distribution Modeling, First Edition | Book | TX | TX 5-340-954 | 2001 | 4/3/2001 | 4/27/2001 | 4/23/2001 | Chintana Ewing |
| Water Security Summit Proceedings | Audio Visual Work | PA | PA 1-105-860 | 2002 | 3/15/2002 | 7/12/2002 | 7/12/2002 | Chintana Ewing |

ANNEX G

ny-598608

G-1

TRADEMARK
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PATENT STATUS

| Client Matter # | Filing Date | Examination Expected | Inventors | Title | Application Number | Description |
|-----------------|--|------------------------------|---|---|--------------------------|---|
| 107051-0001C1 | November 14, 2001 Provisional January 17, 2002 Utility Patent | November 1, 2004 | Zheng Y. Wu, Thomas M. Waliski, Robert A. Gurnett, Gregg A. Harro, & Robert F. Mankowski | Method and System for Automatic Water Distribution Model Calibration | 10/051,820 | The disadvantages of prior techniques have been overcome by the present invention, which provides an automatic water distribution model calibration process that has improved accuracy and efficiency. Multiple parameters and corresponding boundary conditions are taken into account to provide an accurate representation of the network at an instant in time. The inventive system includes a software program that contains three integral parts: a hydraulic simulation module and a calibration module. These modules interact to provide an optimized calibration solution. More specifically, the invention includes a method of automatically calibrating a water distribution model that involves a user selecting multiple calibration parameters. |
| 107051-0002U | March 7, 2002 Provisional March 4, 2003 Utility Patent | September 2005 to March 2006 | Zheng Y. Wu, Thomas M. Waliski, Gregg A. Harro, Robert F. Mankowski, Wayne R. Hartell, Jonathan DeCaro & Benjamin D. Wilson | Method for Optimal Design and Rehabilitation of Water Distribution Systems | 10/379,353 80/363,121 | Darwin Designer provides an integrated decision-making support tool. It offers modelers the best than ever optimization software of rich functionality and great flexibility. Using Darwin Designer, a water engineer is able to design a water distribution system for practical conditions to achieve the goal of the maximum cost efficiency and benefit. It handles single and/or multiple objectives for the design and rehabilitation. The optimization model can be established to include the combination and aggregation of sizing new pipes and rehabilitating old pipes, multiple demand loading conditions and various boundary system conditions. This will enable a modeler to optimize either an entire water system or a portion of the system with the minimum cost and maximum benefit. The cost effective design and/or rehabilitation solution is determined by the least cost, the maximum benefit or the trade-off between the cost and benefit. Darwin Designer provides an engineer with three different optimization levels. A user is able to select any one of three optimization models to best suit his project needs. |
| 107051-0003 | March 22, 2002 | September 2004 to March 2005 | Ezo Todini, Michael E. Trypp, Jack S. Cook, Thomas M. Waliski, & Robert F. Mankowski | Automatic Parameter Estimation Extension for Variable Speed Pumps | 10/04,714 | The invention extends the capabilities of a public domain hydraulic network solver in 3 important ways: 1) Estimates the relative speed factor for a variable speed pump drive sufficient to maintain a fixed pressure at a control node (junction, reservoir, or tank) in the network; 2) Estimates the relative speed factor for a variable speed pump drive sufficient to maintain a fixed flow through the pump subject to varying suction side and discharge side pressures; and 3) Fully integrates variable speed pump operation with the status and control capabilities of the hydraulic network solver. |
| 107051-0004 | June 12, 2002 | December 2004 to July 2005 | Gregg A. Harro & Benjamin D. Wilson | Method and System for Providing an Energy Cost Estimation for a Water Distribution Network | 10/170,253 | The invention provides a way for engineers to estimate the energy costs associated with storage that occurs within a water distribution network. Pumps push water from areas of low hydraulic grade to areas of higher hydraulic grade, and use energy in the process. This energy has an associated cost. Traditional methods of estimating energy costs are based strictly on pump usage, which does not account for changes in system storage, which do have a significant impact on the overall energy usage and cost of maintaining the system. The invention estimates the financial impact (additive or subtractive) that results from tanks filling or draining during the period of hydraulic analysis, thus arriving at a more accurate long-term estimate of energy cost. |
| 107051-0006 | January 3, 2003 | July 2005 to January 2006 | Ming Jin, Jack S. Cook, Jr., Sammy R. Coran, & Darryl L. Fread | Method and System for Developing a Numerical Dynamic Sanitary Sewer and Storm Water Drainage Simulation Model | 10/338,473 | It is a highly efficient, very robust, widely applicable computer numerical model, which is based on an implicit finite difference scheme to get simultaneously numerical solutions of one-dimensional hydrodynamic equations (Saint-Venant equations). The model is applicable to simulate steady and unsteady flows in sanitary sewer system, storm water drainage system, detention pond system, and open channel system. These simulations can be used in the engineering design, water management, water resources research, etc. The model contains algorithms/codes to greatly increase the computational efficiency and robustness to simulate complicated network of pipe/channel system with any combinations of complicated flows, such as subcritical/supercritical mixed flows, gravity, pressure and street flooded flows. These new algorithms include relaxation technique and LPI technique. |
| 107051-0007 | January 8, 2003 | July 2005 to January 2006 | Ming Jin, Jack S. Cook, Jr., Sammy R. Coran, John A. Router, & Mike K. Glazner | Universal Hydraulics Solver (Part 1) | 10/338,230 | The disadvantages of prior techniques are overcome by the present invention which is a software program embodying a method and system for providing hydraulic response curves for a complex hydraulic network system that includes transitional flows and structures that are not otherwise readily described by convention modeling techniques, but which can be readily and accurately described using the techniques of the present invention. More specifically, in accordance with the method of the present invention, first a set of hydraulic delivery curves is developed using typical numerical techniques. A hydraulic structure whose operation can be represented by a single-valued rating curve around a fixed, downstream boundary is described using a conventional technique. Then any curve overlap, or curve crossover is detected. Once detected, the next step of the method of the present invention performs a removal of curve overlap occurring at the ends of the curves, and then provides a technique for removal of curve overlap along the interior sections of the curve |
| 107051-0008 | January 10, 2003 Provisional May 19, 2003 Utility Patent | October 2005 to May 2006 | Robert A. Gurnett & Robert F. Mankowski | Method of Detecting Potential Topology Problems in a Network | 10/336,473 60/439,285 | This invention is used to locate two types of potential topology problems within a network. Vertices in close proximity - Vertices in close proximity to any other vertex are flagged as potential problems, because in some cases all incoming edges should be connected to a single vertex. Pipe spool candidates - Vertices in close proximity to an edge (pipe) are flagged, because in some cases they visually appear that an edge is connected to a vertex, when in fact it is not. We construct a Quadtree representation of the network to optimally perform these "nearest neighbor" searches. |

| Client Matter # | Filing Date | Examination Expected | Inventors | Title | Application Number | Description |
|-----------------|---|----------------------------|---|--|--------------------------|--|
| 107051-0009 | May 14, 2002 | October 2004 to May 2005 | Jack S. Cook, Jr., Scott P. Devos, Sasa Tomik, and Benjamin D. Wilson | Method and System for the Storage and Use of Engineering Modeling Alternatives With Unitized Data | 10/145,841 | The invention provides the way for a modeling application to manage unitized data in a database without assumption about the units the data is stored in. The invention provides the mapping between working units, display units, storage units. Working units represent the units an application needs to use the data in. Display units are the units a client desires to see the data in. Storage units are the units used to store the data in the database. For example the application might think of pipe lengths in miles, the user might desire to see them in kilometers, while the database might store it in meters. The invention allows the users to define each set of units for different attributes. An attribute is user defined dimension. An example of an attribute would be pipe length. The user can define multiple attributes for the same physical dimension. Pipe length and pipe diameter can be separate attributes even though they belong to the same dimension of length. This allows the client to see pipe lengths in different units than diameters, e.g. lengths in miles and diameters in inches. The invention also the user to create new dimensions, attributes, and units. It provides the |
| 107051-0011 | July 8, 2002 | January 2005 to July 2005 | Wayne R. Henzell, Jack S. Cook, Jr., Robert F. Mankowski, Gregg A. Herin, Zheng Y. Wu | Method and System for Reduction of a Network Topology-Based System Having Automated Calibration Features | 10/190,651 | The disadvantages of prior techniques have been overcome by the present invention, which provides an automatic model reduction and skeletonization process that maintains system integrity through consistent network topology and equivalent pipe techniques and includes user-specified criteria and tolerances to allow customization of the skeletonization process by the user. The reduction in the number of elements utilized by the model is performed using multiple skeletonization techniques and particularly, data scrubbing which is enhanced by a network integrity preservation algorithm that includes a loop sensitivity heuristic that can be user-defined. The data scrubbing process also includes a genetic algorithm-based calibration program that is run to re-instate the network behavior and to optimize that behavior, such as the hydraulics, to the reduced model. The user has the capability of setting criteria and tolerances for the skeletonization techniques, and for identifying certain elements as "non-removable." The calibration includes multiple parameters and corresponding boundary conditions that are taken into account to provide an accurate representation of the |
| 107051-0012 | June 13, 2002 Provisional June 8, 2003 Utility Patent | November 2005 to June 2006 | Zheng Y. Wu, Jack S. Cook, Jr., Robert F. Mankowski, and Gregg A. Herin | Technique for Optimization of a Simplified Network Model | 10/457,120 60/388,391 | The disadvantages of prior techniques have been overcome by the solutions of the present invention in which a method and system for optimization of a simplified engineering model is provided. The invention provides a software tool for efficiently simplifying an engineering model such as a water distribution system and for preserving the hydraulic accuracy of the simplified model. More specifically, in the water distribution network environment, the hydraulic network simplification includes a method and system for optimization of a simplified engineering model. The invention provides a software tool for efficiently simplifying an engineering model such as a water distribution system and for preserving the hydraulic accuracy of the simplified model. The system includes a software program that employs a genetic algorithm to evolve solutions for reinstating the behavior of the original network into a simplified network. The genetic algorithm can be used for identifying the less sensitive hydraulic elements (links and nodes), and removing them or replacing them with the best-fit element parameters produced by the genetic algorithm module of the present invention |
| 107051-0014 | January 8, 2003 | July 2005 to January 2006 | Ming Jin, Jack S. Cook, Jr., Samuel R. Coran, John A. Roulier, and Michael K. Glazner | Universal Hydraulics Solver (Part 2) | 10/338,216 | The disadvantages of prior techniques are overcome by the present invention which is a software program embodying a method and system for providing hydraulic surface representations of flow data for complex hydraulic network systems that include transitional flows and structures that are not otherwise readily described by conventional modeling techniques, but which can be readily and accurately described using the techniques of the present invention. More specifically, in accordance with one aspect of the invention, a triangulated surface interpolation of the data, which maintains the monotonicity of the surface and allows a quick evaluation of flow value at any point in the system is provided. In addition, a mathematical response patch surface using special smoothing and regression techniques is provided that enforces monotonic characteristics. As used herein, "monotonic" shall mean that the first derivatives are either increasing or decreasing over the full solution domain. |
| 107051-0015 | June 10 to review draft. Other inventors made edits to the draft | TBD after filing | Jack S. Cook, Diego Alexander Diaz Pabon, Annaleis Hogan, Benjamin J. Ewing | PumpMaster | TBD | The disadvantages of prior techniques are overcome by the present invention, which provides a method and system for an integrated internet-based solution that is industry specific and provides a unified collection of searchable information and a collaborative communications environment for members within the industry, with the invention being embodied in a software program and associated internet tool comprising a web portal. The software program and web portal which is a robust web site that provides a variety of services, access an associated database that contains information about products, including manufacturers catalogs, and other information for the relevant industry involved in the specific application of the invention. Using the software program and the web portal of the present invention, a user can construct a query to search the database for products that meet that user's unique design criteria. The query can be submitted under a unique key or user name, that maintains the user's identity as confidential. Query results are returned that provide the best-fit solutions for the user's proposed design. These query results are also made available on a web page targeted for manufacturers and suppliers in the industry whose products are featured on the web |

Rev 7/14/04

HMI Confidential

10/29/2004

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