

SYNERGY DESIGNSM +

AutoCeilTM

AUTOMATED INSULATION SYSTEM

Why AutoCeilTM is Cost Effective

AutoCeil is an automated ceiling and wall insulation support system designed for metal buildings. Developed by a 40 year experienced contractor-erector to make metal buildings safer, faster and easier to erect and insulate. We have eliminated all strapping and bottom side ceiling fastening. Thermal Design has added ceiling support struts between the rafters and moved all rafter brace loads from the purlins to the struts. What results is an unobstructed pathway across every building bay from one sidewall base, up and across all ceiling support struts to the opposite sidewall and then down that wall to the base. Our patented methods include a strong ceiling sheet that is one continuous piece and uses winches to pull the ceiling sheet across the entire building bay, including sidewalls, in just minutes. The ceiling sheet is fastened at one top sidewall strut, tensioned across the entire bay and fastened at the opposite top sidewall strut with a total of just 38 self-drilling fasteners in a 25 foot long bay. **Watch it work at: www.autoceil.com**

AutoCeil Topside EditionTM is documented at over **1000 sf/man-hr** (\$0.06/sf at \$55 per hour pay rate) for the ceiling sheet installation and sealing, and 500 sf/man-hr (\$0.11/sf at \$55 per man hour rate) to install an R-30 insulation on topside of roof. **That is just \$0.17 cents/sf** of installation labor cost at a \$55 labor rate with insulation installed from the topside. **Many erectors charge over \$1.00/sf** to install thick insulation systems with bottom side fasteners and strapping. AutoCeil offsets the cost of the struts with savings of erection and installation costs. There are many additional savings and benefits as well! AutoCeil provides OSHA Compliant Through Fall Protection anywhere on the installed ceiling sheet, not just the very limited claims of leading edge fall prevention.

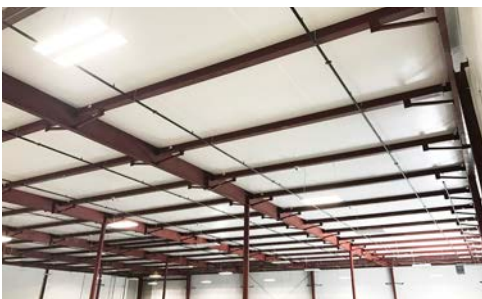
Also available is the even faster **AutoCeil - Inside EditionTM** which provides many additional benefits and savings. The AutoCeil - Inside Edition is **completely installed from the inside**, under the roof and out of the weather, one bay at a time, and uses blow-in insulation to fill the purlin spaces. Thermal Design has created a clear telescoping tube that extends out between the purlins to quickly and reliably blow insulation over the rafters to fill each purlin space or joist cavity with blow-in insulation. The greatest benefit about the AutoCeil-Inside Edition is that the erector can **complete the erection up to 30% faster** and close the building in quickly. No more need for long roof exposures as erectors strive to install and cover roof insulation with full exposure to weather conditions. Erectors need only sheet the building with appropriate thermal breaks. Erectors can install the Inside Edition, but it can be subbed out to an insulation contractor to become more cost efficient.

Contact Thermal Design or one of our licensed distributors for AutoCeil quotes and Synergy Design services.



Thermal Design
INNOVATIVE ENERGY SAVING PRODUCTS

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US Patents 8844230, 8991110, 9133623, other patents pending

The Charts below indicate the potential savings of the **AutoCeil -Topside Edition™** and the additional savings potential of using the **AutoCeil - Inside Edition™**. Thermal Design uses our **Synergy Design™** strategies to identify collateral savings which result from the many AutoCeil features.

Watch it Work: autoceil.com

AutoCeil™ Synergy Item	Cost or Savings With Topside Edition Using AutoCeil™	Material Value Range \$/SF ¹	Labor Value Range \$/SF	Total Avg/SF	
Add ceiling support struts to rafter web stiffeners, move flange braces.	Add struts 10' on-center between rafters from ridge to eaves to support ceiling collateral loads and to brace rafters using two bolt connections. ²	+\$0.50 to +1.20 depends on offsets used (Avg:+\$0.85)	+\$0.10 to +0.15 (Avg:+\$0.13)	\$0.98	
AutoCeil Ceiling & Sidewall sheet installation.	Installing the AutoCeil ceiling & wall sheet is automated with manual sealing (video and timed as proof of installation speed).		+\$0.06 to +0.12 (Avg:+\$0.09)	\$0.09	
AutoCeil Roof Insulation Labor.	Install two layers, R-25 between and R-11 over the purlins in roof (10,000 sf).		+\$0.10 to +0.20 (Avg:+\$0.15)	\$0.15	
AutoCeil Sidewall Insulation and sealing Labor	Install one layer R-25 side wall insulation with Fast-R hangers as needed in side walls and seal already hanging sidewall sheet.		+\$.15 to +.30/sf (Ave +\$.23/sf)	\$0.23	
AutoCeil Wall Insulation Labor with endwall sheet.	Install one layer R-25 end wall insulation with Fast-R hangers as needed in end walls and hang and seal end wall sheet.		+\$0.15 to + 0.35 (Avg:+\$0.25)	\$0.25	
Add AutoCeil Ceiling and Wall Sheet.	Added Cost of AutoCeil materials over Liner System materials of same R Values of Insulation.	+\$0.20 to +0.25 (Avg:-\$0.23)		\$0.23	
SAVINGS	Eliminate handling and installation of rafter flange braces.	Design strut ends with two bolt connections to rafter web stiffeners as moment connections to brace the rafters without requiring flange braces if possible, otherwise attach flange braces to struts, not purlins. ³	-\$0.05 to -0.10 (Avg:- \$.08)	-\$0.05 to -0.15 (Avg:- \$.10)	-\$0.18
	Purlin size & spacing weight reductions.	Removing steel weight by moving hanging loads to the ceiling brace struts from the purlins. ⁴	-\$0.10 to 0.30 (Avg:-\$0.20)		-\$0.20
	Rafter web thickness weight reduction.	Rafter webs with full height stiffeners spaced uniformly 10' on-center on each side of rafter webs results in web thickness reductions and savings.	-\$0.10 to -0.25 (Avg:-\$0.18)		-\$0.18
	Crane rental savings.	Rafters install safely and quickly using simple span brace struts between the rafters that immediately bolt tight and fully X-braced from within the bay; as opposed to lap purlins above rafters with only temporary bolts and bracing.	-\$0.25 to -0.50 (Avg:-\$0.38)		-\$0.38
	Lift rental savings.	AutoCeil is automatically winched from the floor inside one sidewall, up and across the entire ceiling width and down to the floor on the opposite side of the building. There are NO strapping (banding) and NO bottom side ceiling fasteners. ⁵	-\$0.05 to -0.15 (Avg:-\$0.10)		-\$0.10
	Credit for banded roof liner installation labor.	Installation Credit of R-25+R-11 Liner System in roof and R-25 liner system walls with Quik-Stop™ Trash-Free foam thermal break tape on girts (price from an erector).		-\$1.00 -1.50 (Avg:-\$1.25)	-\$1.25
	HVAC Reductions.	Roof and wall heating and cooling load reductions based on thermal calculations with nominal 65% savings over typical laminated insulation in roof and walls.	-\$0.50 to -1.50 (Avg:-\$1.00)		-\$1.00
	Power Service Reductions.	Reduce service entrance capacity by 100 AMP to 200 AMP.	-\$0.10 to -0.20 (Avg:-\$0.15)		-\$0.15
	Gas Service Reductions.	Reduce gas service or go all electric eliminate gas service.	-\$0.00-0.40 (Avg:-\$0.20)		-\$0.20
	Lighting Reductions.	Bright white reflective interior covering purlins and girts increases light levels by 20 - 30% and a reduction in fixtures required.	-\$0.05-0.15 (Avg:-\$0.10)		-\$0.10
Potential Synergy Savings using AutoCeil in the Roof and Walls		Total Estimated Savings/SF		-\$1.41	

AutoCeil™ Synergy Item	Additional Potential Savings using AutoCeil - Inside Edition installation	Material Value Range \$/SF⁶	Labor Value Range \$/SF	Total Avg/SF	
SAVINGS	Minimizes weather delays, closes in building faster and saves time and expenses.	Forecasted, actual and aftermaths of bad weather cause major delays. Erectors can erect and sheet buildings up to 30% faster without installing bulky insulation systems during the sheeting process.		-\$0.00 to -1.00 (Avg: -\$0.50)	-\$0.50
	Contractors save estimating, ordering, storage and coordination time.	Insulation contractors price the AutoCeil by the R-value per square foot, bring the blow insulation with them, take the trash away daily, and with negligible waste.		-\$0.02 to -0.04 (Avg: -\$0.03)	-\$0.03
	Man hour costs of insulation workers much lower than steel erectors.	Skilled erectors are in short supply and using insulation contractors frees them to erect steel. Wage rates of insulation workmen are about half that of erectors and blowing insulation goes in just as fast.		-\$0.06 to -0.12 (Avg: -\$0.09)	-\$0.09
	Freight savings.	Blow wool has about twice the R-value-SF on a 53' trailer than blanket insulation due to compression and recovery limitations of the blanket.	-\$0.05 to -0.10 (Avg -\$0.08)		-\$0.08
	Minimum 8% less waste than using laminated products.	Certified R Laminated insulation product requires 8% more R-value to purchase due to processing losses of the product.	-\$0.05 to -0.07 (Avg -\$0.06)		-\$0.06
	Reduction of roof pieces and labor.	Eliminate stand-off clips & thermal blocks, not required with AutoCeil.	-\$0.06 to -0.10 (Avg: -\$0.08)	-\$0.05	-\$0.13
Potential Additional Synergy Savings using AutoCeil - Inside Edition		Total Estimated Savings/SF		-\$0.89	

Thermal Design has estimated the above costs and the savings offsets and can not guarantee all of them on any one project, however most can be realized by seeking them in your designs sub-contracts and scheduling. There are many other features, benefits and advantages not mentioned above which also yield savings. Call Thermal Design, Inc. at 800-255-0776 and let us help you identify the offsetting project savings using our Synergy Design program.

AutoCeil is safer, faster and easier to install. Contact Thermal Design today and we can help you achieve the desired offsets so that your buildings cost less.



1 Based upon a 10,000 SF building; 100 x 100 x 16; Values will vary by geographic area climate variations; excludes product loads and user infiltration loads which are independent of the basic building interior climate conditioning loads.

2 Beginning erection at a brace bay allows immediate and permanent squaring of the first bay of the building as the brace struts provide for permanent attachment and the bay can be cross braced and squared immediately upon installation of the struts and X-bracing in the brace bay. The entire building goes up square from the start and saves time later. There is no temporary bolting and unbolting of lap purlins required, nor coming back later to install rafter flange braces or to cut braces through a liner system sheet and need to seal them up. Flange braces, if needed, attach to the bottom of the brace struts. Nothing penetrates the plane of the ceiling sheet except the purlin clips.

3. Using struts with two bolt moment connections with two opposing vertical rafter web stiffeners should eliminate need for rafter flange braces and welded hole tabs at rafters bottom flanges except on very deep rafters. A brace support strut adds 9 pieces (1 strut, 4 bolts, 4 nuts) per strut location (full height web stiffeners already exist on rafters and typically average about 10 feet on-center). Eliminating two flange braces removes 22 pieces (2 braces, 2 shop-welded hole tabs, 4 bolts, 4 nuts, 2 purlin clips, 8 fasteners) at each rafter brace location which occur about 10 feet on-center. Struts permanently square the rafters as they are rigidly installed between the rafter webs. X-bracing should be designed spanning and crossing midway below a strut and connected to alternating strut ends which eliminates shop fabricating rod or cable brace holes through rafter webs.

4 Moving rafter braces from purlins to the struts simplifies erection by allowing complete permanent attachment of the rafter bracing immediately upon rafter placement. Most importantly, this provides a clear path to winch the AutoCeil sheet across the full building width in minutes. Purlin bundles are simply distributed on rafters for convenience and walked out on the rafters or installed from a lift by workmen. Flange braces no longer attach to the purlins, brace hole alignment problems don't exist and results in zero penetrations through the entire AutoCeil vapor/air barrier. No temporary bolting and removal of bolts at purlin laps is required. Simply lap each purlin end over the previous purlin and permanently bolt them in position with all bolts tightened to spec in a single operation to save time!

5 AutoCeil is a tensioned ceiling sheet from sidewall to the other sidewall. It is fastened to the top side of one ceiling interior corner strut with only slight tension, then high tensioned across the building width and fastened to the top side of the opposing wall, inside corner strut. There are no bottom-side ceiling fasteners at all, ZERO! Very wide buildings may require a splice on the top side of an intermediate strut. Interior installs, under an installed roof, require very limited bottom-side fasteners into the wall inside corner struts or an intermediate splice strut from the interior.

6. Based upon a 10,000 SF building; 100 x 100 x 16; Values will vary by geographic area climate variations; excludes product loads and user infiltration loads which are independent of the basic building interior climate conditioning loads.

AutoCeil™

AUTOMATED INSULATION SYSTEM

› Safer › Faster › Easier

AutoCeil™ features an automated ceiling installation process which provides a tensioned support system for uncompressed insulation, allowing designers and installers to safely, quickly and economically achieve any desired thermal performance.



No Bottom Side Banding

No Bottom Side Ceiling Fasteners

No Bottom Side Technology eliminates the tasks involved with other types of methods for metal building insulation. NoBS Technology will save time, money, equipment costs and labor for the installer while maintaining zero ceiling penetrations through the continuous vapor retarder.

›› **Watch It Work**
autoceil.com

Synergy Design includes:

- Design Build Energy Analysis – Insulation, HVAC and Lighting
- Quotes for Insulation System, HVAC Appliances and Light Fixtures
- Builder Comparison Sheet
- Owner Comparison Sheet
- Technical Documentation
- Sales Materials and Brochures
- Technical and Sales Support

About Thermal Design:

Thermal Design manufactures roof and wall insulation systems such as the Simple Saver System® and the new automated insulation system, AutoCeil™. These patented insulation systems are used for new and existing commercial, industrial and institutional buildings. The systems are revolutionary products that meet the energy codes for “in-place” R-values and retain these values beyond installation.

Thermal Design’s goal is to educate and inform builders, contractors and metal building manufacturers of obsolete installation methods and point the way to a more efficient, more beneficial means of conserving energy in metal buildings.

1,000 sqft/man-hr Achieved



Automated Installation



OSHA Compliant Fall Protection



Reduce Weather Delays



Thermal Design

INNOVATIVE ENERGY SAVING PRODUCTS

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